School of Science

Welcome to the School of Science at IUPUI!

The School of Science at IUPUI provides an environment where students are both challenged and nurtured by each other, faculty and staff on a campus with a multitude of resources to help students succeed.

The School of Science offers over 25 undergraduate, ten masters, and nine Ph.D. degree programs across seven departments. In addition to preparing students for science or technology-related careers and for advanced study in graduate school, an undergraduate program in one of the sciences is an excellent background for professional study in medicine (including veterinary medicine), dentistry, business administration, law, and areas of the social sciences where quantitative methods are important.

Students here reap the benefits of small classes, an interactive learning environment, and challenging material and lab work. As early as their freshman year, our undergraduates are able to participate in real research with renowned faculty. Our undergraduate students have co-authored research papers and presented at national conferences.

We're a community of learners and students thrive here. Students support each other through peer-led mentoring, providing a unique environment where students become leaders by teaching others. Student organizations and volunteer programs are just a couple of the ways for students to get involved outside of the classroom.

We're great scientists, but more importantly, we're innovative teachers. As a school and a university, we've developed teaching methods that engage and encourage students—and are used at universities throughout the United States. Simply put, we care about our students.

The School of Science and its seven departments are situated in the heart of Indianapolis, near five hospitals, the Indiana University schools of medicine, dentistry and nursing, and countless science and technology companies. Through internships and undergraduate research, our students have opportunities to collaborate across disciplines, across campus, and across the academic and business communities. Our graduates emerge as well-rounded scientists whose experiences have prepared them to solve the problems of the future.

The School of Science at IUPUI is critical to the success of the life, health and technology industries in central Indiana —our graduates are the life blood of an economy that needs innovative thinkers, contributing team members and eager learners. Committed to having real impact in their work and community, our graduates emerge from the School of Science as well-rounded scientists whose experiences have prepared them to solve the problems of the future.

Overview

The School of Science offers undergraduate and graduate programs that prepare students for a variety of careers. As part of its instructional mission, the school also provides non-science majors with the scientific background to help them become more aware and better-informed consumers and citizens. Scientists advance the boundaries of our knowledge of the natural world through applied and basic research. Science benefits society by providing fundamental knowledge and technical advances in such areas as health, ecology, computer and software design, mathematical modeling, and chemistry. Science informs the social sciences with scientific understanding of psychology, applications of statistics, and an understanding of environmental issues. Science contributes to the arts and humanities by offering knowledge of the physical universe and the symmetry and wonder of nature. In addition to preparing students for science-related careers and for advanced study in graduate school, an undergraduate program in one of the sciences is an excellent background for professional study in medicine (including veterinary medicine), dentistry, business administration, law, and areas of the social sciences where quantitative methods are important. An education in the sciences also opens the door to employment in the high-tech industry in sales and management.

Over 140 faculty members, with ranks ranging from lecturer through full professor, are dedicated to helping students take steps toward reaching their educational, professional, and career goals. Our average student to faculty ratio is 17:1. We pride ourselves on our interdisciplinary approach, extensive undergraduate research opportunities, professional school placements, and service to our students. An education from the School of Science pays off: our students go on to top graduate programs, medical schools, and careers in academia, research, and the private sector.

Last Updated: April 2018

History

Indiana University (IU) established its first extension center at Indianapolis in 1916, although the first IU course was taught in Indianapolis in 1890. The Indianapolis campus of Purdue University (PU) grew out of World War II training programs sponsored by Purdue, and began its major operations in 1946. Indiana University established the Indianapolis regional campus in the mid-1960s. In 1968, the Trustees of Indiana University created Indiana University at Indianapolis, and less than a year later, in 1969, the Trustees of Indiana and Purdue universities merged their Indianapolis operations to form Indiana University–Purdue University at Indianapolis (IUPUI). Indiana University was selected to administer the campus. Purdue brought to the merger a growing complex of degree programs and Purdue's traditional strengths in the physical sciences, engineering, and technology.

A restructuring of undergraduate programs at IUPUI in the Fall of 1972 created three new schools: the School of Liberal Arts (humanities and the social sciences), the School of Engineering and Technology, and the School of Science (physical, behavioral, and life sciences).

After being housed for almost 22 years on the 38th Street campus, the School of Science made a historic move in two phases into two buildings on the main campus during 1991-1993.

The name of the campus was changed to Indiana University–Purdue University Indianapolis in 1992.

In late 2013, The Science and Engineering Laboratory Building (SELB), the first non-medical building to be built on campus in 20 years, was completed along the Science corridor on Blackford Street between New York and Michigan Streets. The $25 million project is the new home for biology, chemistry and psychology research and teaching labs.

Innovation Hall, located on the southeast corner of Michigan and Blackford streets, was completed in early 2021. The building was constructed to meet the evolving teaching and research needs for programs in the School of Science, the School of Engineering and Technology, and the School of Informatics and Computing. Innovation Hall was designed specifically to enhance innovative collaboration across the three schools. In addition, this building is home to the university's first Class 100 Clean Room, a specific type of space that provides high levels of cleanliness. This provides the opportunity for faculty and students to fabricate nanodevices.

As of Fall 2021, IUPUI enrolled more than 26,000 students.

Mission, Core Values, and Vision

The School of Science at IUPUI provides an environment where students are both challenged and nurtured by each other, faculty and staff on a campus with a multitude of resources to help students succeed.

The School of Science offers over 20 undergraduate, 10 masters, and 9 doctoral degree programs across seven departments. In addition to preparing students for science or technology-related careers and for advanced study in graduate school, an undergraduate program in one of the sciences is an excellent background for professional study in medicine (including veterinary medicine), dentistry, business administration, law, and areas of the social sciences where quantitative methods are important.

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Mission

The IUPUI School of Science is dedicated to conducting fundamental and applied scientific research and providing the highest quality undergraduate education and graduate training. In both our research and teaching, we promote an understanding of basic science and interdisciplinary approaches for addressing scientific questions, an appreciation of academic values, and translation of scientific findings to our communities. We foster an environment where students can access faculty for personalized mentoring and instruction, and where they can be meaningfully engaged in research and scholarship. The School is committed to providing the State of Indiana and beyond with graduates who possess deep knowledge of modern science and who are fully equipped to make an impact in science, industry, schools, and communities.

Core Values

The School of Science will achieve its mission through outstanding teaching, innovative research, strong commitment to diversity among faculty and students, relentless pursuit of academic excellence, and dedication to IUPUI’s vision as an urban research university with national and global impact.

Vision

The IUPUI School of Science is recognized in the state of Indiana, nationally and internationally as a major contributor of high quality fundamental and applied research. For undergraduate education and graduate training, the School is recognized in the state of Indiana and nationally as the destination of choice for students seeking the highest quality science education that provides students with basic science education and problem solving skills they need to succeed. The School offers an environment that is supportive to a diverse population of students, faculty, and staff.

Administration

Administrative Officers

- JOHN F. DiTUSA, Ph.D., Dean
- RAJEEV R. RAJE, Ph.D., Associate Dean for Planning and Finance
- JILIANG LI, Ph.D., Associate Dean for Research and Graduate Education
- JANE R. WILLIAMS, Ph.D., Associate Dean for Academic Affairs and Strategic Initiatives

Departmental Chairpersons

- THEODORE R. CUMMINS, Ph.D., Department of Biology

- PARTHA BASU, Ph.D., Department of Chemistry and Chemical Biology
- SHIAOFEN FANG, Ph.D., Department of Computer and Information Science
- KATHY J. LICHT, Ph.D., Department of Earth Sciences
- JEFFREY X. WATT Ph.D., Department of Mathematical Sciences
- RICARDO S. DECCA, Ph.D., Department of Physics
- STEPHEN L. BOEHM II, Ph.D., Department of Psychology

Program Directors

- THEODORE R. CUMMINS, Ph.D., Biotechnology
- GABRIEL M. FILIPPELLI, Ph.D., Environmental Science
- CHRISTINE J. PICARD, Ph.D., Forensic and Investigative Sciences
- JANE R. WILLIAMS, Ph.D., Interdisciplinary Studies
- TERI L. BELECKY-ADAMS, Ph.D., Neuroscience

Bulletin Designation and Program Planning

Bulletin Designation

All colleges and universities establish certain academic requirements that must be met before a degree is granted. These regulations concern such things as curricula and courses, majors and minors, and campus residence. Advisors, directors, and deans will aid students in meeting these requirements, but students are responsible for fulfilling them. At the end of the course of study, the faculty and the Board of Trustees vote on the conferring of degrees. If requirements have not been satisfied, degrees will be withheld pending satisfactory completion of these requirements. For this reason, students need to acquaint themselves with all regulations and to remain informed throughout their university career.

This bulletin lists the requirements and regulations in effect for students who are admitted to the School of Science in August 2022 (Fall semester). Students who enter after this date may be subject to different requirements; students who entered before August 2022 may elect to follow the graduation requirements that were in effect at the time of their admission to their degree program or the graduation requirements that became effective thereafter. However, the requirements chosen must be from only one bulletin. If a student has not completed a bachelor's degree program within eight years of admission, the student may be obliged by the major department to meet the requirements of a subsequent bulletin. Additionally, students in good standing who have not been enrolled at the university for two or more consecutive years must satisfy the requirements of the School of Science bulletin in effect upon their return.

Program Planning and Advising Guidelines

The experience of academic advisors and of successful students suggests the following guidelines for effective planning of undergraduate programs:

- Students should be thoroughly familiar with all academic requirements that must be met before a degree is granted.
- Students should seek appointments with academic advisors in their major departments before the dates established by the university calendar for registration. In such conferences students should, as a minimum objective, make certain that they review their degree requirements and that they have made an appropriate plan for the next semester.
- Each student should understand that the responsibility for determining an appropriate academic program and for meeting every degree requirement rests with the student; faculty or staff members acting in the capacity of advisors are obligated only to assist students in meeting this responsibility. Any student who needs clarification of any of the requirements for the degree program is urged to obtain this clarification from an academic advisor or from the School of Science, Science Building, Room LD 222, phone (317) 274-0625.

Degree, Minor and Certificate Programs

Degree Programs in the School of Science

The School of Science at Indiana University–Purdue University Indianapolis awards students degrees from both Purdue University (PU) and Indiana University (IU). This list shows all the degrees awarded and the institution granting the degree.

Biology

- Bachelor of Arts - PU
  - Biology
  - Biology Teaching Option
- Bachelor of Arts (Biology) / Master of Public Health ((Public Health) dual degree program - PU/IU
- Bachelor of Science - PU
- Bachelor of Science (Biology) / Master of Science (Bioinformatics) dual degree program - PU/IU
- Bachelor of Science (Biology) / Master of Public Health (Public Health) dual degree program - PU/IU
- Bachelor of Arts (Biology) / Master of Public Health ((Public Health) dual degree program - PU/IU
- Master of Science - PU
  - Non-Thesis Option
  - Thesis Option
  - Biology for Educators Concentration Option
- Master of Arts in Teaching Online Degree Program - IU
- Doctor of Philosophy - PU

Biotechnology

- Bachelor of Science - PU

Chemistry

- Bachelor of Arts - PU
  - Chemistry
  - Chemistry Teaching Option
- Bachelor of Science in Chemistry - PU
  - Biological Chemistry Concentration
  - Chemistry Option
  - Medicinal Chemistry Concentration
- Master of Science - PU
  - Non-Thesis Option

    - Thesis Option
- Doctor of Philosophy[1] - PU

Computer and Information Science

- Bachelor of Arts - PU
    - Applied Computer Science
- Bachelor of Science - PU
    - Computer Science
    - Biocomputing Option
- Bachelor of Science in Artificial Intelligence - PU
    - Data and Computational Science Concentration
- Bachelor of Science (Computer Science) / Master of Science (Computer Science) dual degree program - PU/PU
- Master of Science - PU
    - Project Option
    - Thesis Option
- Master of Science - Computational Data Science
- Doctor of Philosophy - PU

Environmental Science

- Bachelor of Science - IU
    - Earth and Water Resources Concentration
    - Environmental Management Concentration
    - Environmental Remote Sensing & Spatial Analysis Concentration

Forensic and Investigative Sciences

- Bachelor of Science in Forensic and Investigative Sciences - PU
    - Forensic Biology Concentration
    - Forensic Chemistry Concentration
- Master of Science - PU
    - Non-Thesis Option
    - Thesis Option

Geology

- Bachelor of Arts - IU
- Bachelor of Science - IU
- Bachelor of Science (Geology) / Master of Science (Geology) dual degree program - IU/IU
- Master of Science - IU
- Doctor of Philosophy in Applied Earth Sciences - IU

Interdisciplinary Studies

- Bachelor of Science - PU

Mathematical Sciences

- Bachelor of Science - PU
    - Actuarial Science Concentration
    - Applied Math Option
    - Applied Statistics Concentration
    - Pure Math Option
    - Math Education
- Bachelor of Science (Mathematical Sciences) / Bachelor of Science (Physics) double major - PU
- Master of Science - PU
    - Pure/Applied Math
    - Applied Statistics
    - Computational Data Science
    - Math Education
- Doctor of Philosophy (Mathematics) - PU
    - Applied Math
    - Pure Math
    - Mathematical Statistics
- Doctor of Philosophy (Biostatistics)[2] - IU

Neuroscience

- Bachelor of Science - PU
- Bachelor of Science (Neuroscience) / Master of Science (Biomedical Engineering) dual degree program - PU

Physics

- Bachelor of Science - PU
    - Physics
    - Biophysics Option
    - Physics Teaching Option
- Bachelor of Science (Physics) / Bachelor of Science (Electrical Engineering) dual degree program - PU
- Bachelor of Science (Physics) / Bachelor of Science (Mathematical Sciences) double major - PU
- Bachelor of Science (Physics) / Master of Science (Mechanical Engineering) dual degree program - PU
- Master of Science - PU
- Doctor of Philosophy[1] - PU

Psychology

- Bachelor of Arts - PU
- Bachelor of Science - PU
- Master of Science - PU
    - Industrial/Organizational (I/O) Psychology
    - Clinical Psychology
    - Applied Social and Organizational Psychology - IU
- Doctor of Philosophy in Addiction Neuroscience - PU
- Doctor of Philosophy in Applied Social and Organizational Psychology - IU
- Doctor of Philosophy in Clinical Psychology - PU

Several departments participate in the joint M.D.-Ph.D. program with the Indiana University School of Medicine. In this program, students concurrently earn an Indiana University Doctor of Medicine degree and a Ph.D. degree in the School of Science.[1]

1. Indiana University Ph.D. Programs, pursued at IUPUI, in departments or programs of the Indiana University School of Medicine in which School of Science faculty hold adjunct appointments.
2. Indiana University Ph.D. program, pursued at IUPUI, in collaboration with the Richard M. Fairbanks School of Public Health. The degree is awarded

through the Richard M. Fairbanks School of Public Health.

Minors in the School of Science (PU)

- Applied Computer Science
- Biology
- Chemistry
- Computer and Information Science
- Forensic and Investigative Sciences
- Health Psychology
- Mathematics
- Neuroscience
- Physics
- Psychology

Minors in the School of Science (IU)

- Geology
- Geochemistry

Graduate Minors in the School of Science (for eligible IU doctorate programs)

- Computer Science

Certificate Programs in the School of Science (PU)

The School of Science at Indiana University–Purdue University Indianapolis also awards Purdue University (PU) certificates.

Computer and Information Science

Undergraduate

- Certificate in Applied Computer Science
- Certificate in Data Analytics

Graduate

- Certificate in Biocomputing
- Certificate in Biometrics
- Certificate in Computer Security
- Certificate in Databases and Data Mining
- Certificate in Software Engineering

Contact Information

The School of Science
IUPUI
Science Building, LD 222
402 N. Blackford Street
Indianapolis, IN 46202-3276

Phone: (317) 274-0625
Fax: (317) 274-0628
E-mail: science@iupui.edu

Contacts for Academic and Student Affairs

Joseph L. Thompson
Executive Director
Academic and Student Affairs
E-mail: jlthomp@iupui.edu

Academic Affairs

Jane R. Williams
Associate Dean
Academic Affairs and Strategic Initiatives
E-mail: jrwillim@iupui.edu

Diana S. Sims-Harris
Director
Student Affairs
E-mail: dsimshar@iupui.edu

Darryl Newsom
Administrative Recorder
E-mail: danewsom@iupui.edu

Molly Rondeau
Academic Affairs Coordinator
E-mail: mrondeau@iupui.edu

Amy Christoffersen
Assistant to the Dean
E-mail: amychris@iu.edu

Undergraduate Student Affairs and Outreach

Lori Hart
Associate Director of Undergraduate Enrollment
Marketing and Public Relations
E-mail: lorihart@iupui.edu

Jasdeep Bagga
Web & Digital Media Specialist
Marketing and Public Relations
Email: jsbagga@iu.edu

Graduate Student Affairs

Jiliang Li
Associate Dean
Research and Graduate Education
E-mail: jilili@iupui.edu

LaSonya McGraw
Contracts and Grants Manager
Research and Graduate Education
E-mail: laykelly@iu.edu

Lana M. Forbes
Contracts and Grants Specialist
Research and Graduate Education
E-mail: ldmatthe@iu.edu

Annetta F. Hill
Contracts and Grants Specialist
Research and Graduate Education
E-mail: anfhill@iupui.edu

Angel A. Campbell
Administrative Specialist
Research and Graduate Education
E-mail: acampbel@iupui.edu

Pre-Professional and Career Preparation (PREPs)

Jaime Sperandio
Director of Pre-Professional and Career Advising
Office of Pre-Professional and Career Preparation (PREPs)
E-mail: jsperan@iupui.edu

Allie Medellin
Assistant Director of Interships and Career Advising
E-mail:alexmede@indiana.edu

Katie Coby
Pre-Professional Advising
E-mail: ktcoby@iu.edu

Academic Policies & Procedures

- Academic Regulations
- Academic Standing

Academic Regulations

See the Office of the Registrar's website for general information about grades. The following policies are specific to the School of Science.

Pass/Fail Option During the four years of their undergraduate program, all undergraduates in good standing (with an overall GPA of 2.00 or higher) may enroll in up to eight elective courses to be taken with a grade of P or F. The Pass/Fail option is open for a maximum of two courses per year, including summer sessions. For this option, the year is defined as August 15 to August 15. The Pass/Fail option form is available in School of Science departmental offices and in the School of Science, LD 222.

The course selected for Pass/Fail grading must be an elective. It may not be used to satisfy any of the school area requirements, nor may it be counted as a part of the student's major. If the course is at the 300-level or higher, with a grade of P, the course may apply to the 32 credit hour School of Science residency requirement. After the form is submitted to the Office of the Registrar, a grade of P cannot be subsequently changed to a grade of A, B, C, or D.

For additional information, visit the Student Central website: https://studentcentral.iupui.edu/grades-progress/pass-fail.html

Withdrawal for Undergraduate and Graduate Students

Students may officially withdraw from classes without penalty during the first half of a semester or session if they secure the approval of their advisor; a grade of W (Withdrawal) is recorded on the final grade report. Students may withdraw from classes during the second half of a semester or session only under extraordinary circumstances. In such cases, the student must secure the approval of their advisor, the instructor of the course, and the dean of their school; the instructor may assign a grade of W or F. A written justification from a doctor, member of the clergy, advisor, etc., must be presented indicating that the student could not have withdrawn earlier. The grade so assigned is recorded on the final grade report. The necessary form for withdrawal from a course is available in School of Science departmental offices and in the School of Science, LD 222. To maintain integrity as to how students are accountable in this area, the policy for School of Science students is considered to be the policy for all students served by the School, regardless of academic unit or school.

Students who alter their schedules, whether by personal incentive or by departmental directive, must follow correct withdrawal procedures. Students who do not follow these procedures risk jeopardizing their record by incurring a failing grade in a course not properly dropped, or they risk not receiving credit for work done in a course that has not been properly added.

This policy applies to students in both undergraduate and graduate programs.

Grade Replacement Policy for Undergraduate Students Only (this policy is not available to graduate students)

The Grade Replacement Policy is available only to undergraduate students pursuing their first bachelor's degree. It may be exercised for a maximum of 15 credit hours, no more than two times for a given course, with each replacement counting toward the 15 credit hour limit.

Grade replacements must be made in sequential order. The repeated course grade must be the same as or higher than the grade in the previous attempt in the course.

Replaced grades completed prior to the Fall 2021 semester will remain on the student's transcript with an X placed beside the grade to note that the grade was excluded. Replaced grades completed in the Fall 2021 semester or later will not be listed on the student's transcript but will be noted with an X.

Once a grade replacement has been processed, it cannot be reversed.

Grade replacement is available only for courses taken at Indiana University.

A science major interested in the Grade Replacement Policy should speak with their academic advisor or contact the School of Science, LD 222.

For more information about the policy, visit https://studentcentral.iupui.edu/grades-progress/grade-replacement.html

Fresh Start through Academic Renewal (Fresh Start) (this policy is not available to graduate students)

For students whose first attempt at an undergraduate degree from IU did not go well, Fresh Start may be the key to successfully returning to IUPUI. The policy allows students to start over with a cumulative GPA of 0.00 Students who are eligible for Fresh Start:

- Undergraduate students
- Students pursuing their first bachelor's degree from IU
- Students who have not enrolled at any IU campus for 36 or more consecutive months (3 years)

Application for Fresh Start must be made by the last day of classes in the second (major) term of enrollment after returning from the 36+ month hiatus. Students apply through their school of enrollment by speaking with their academic advisor. The school completes the initial review. Applications that meet the eligibility criteria are forwarded to the Associate Vice Chancellor for Undergraduate Education for approval.

For courses in which the student received a P, an S, or a grade of C or better, the credit hours will count toward the degree but won't be factored into the GPA. In courses where the student received a grade lower than a C, the credit hours will not be counted toward the degree and will not be factored into the GPA.

The Fine Print

The policy is available for courses taken on any IU campus. For students who transferred to IUPUI from a

Purdue campus into a Purdue program where transfer credit applied to the record retained GPA, the Purdue courses are eligible for the application of the Fresh Start policy.

The policy will apply to all terms of IU or Purdue enrollment, regardless of the campus on which the courses were completed, for the purposes of determining the IUPUI degree progress and completion.

Students receiving Fresh Start at IUPUI who subsequently become degree-seeking students on another IU campus are subject to the policies in effect for the IU campus from which they receive their degree. Students receiving a similar academic forgiveness or academic Fresh Start on another IU campus are not eligible for IUPUI Fresh Start.

Application for Fresh Start may be made only once.

Grades awarded based on violation of the IU Code of Student Rights, Responsibility, and Conduct will not be removed from the cumulative GPA by application of Fresh Start.

Students who are approved for Fresh Start will restart with a cumulative GPA of 0.00. These students must complete a minimum of 30 hours on the IUPUI campus after their return in order to meet the graduation residency requirement.

For more information about this policy visit: https://studentcentral.iupui.edu/grades-progress/grade-forgiveness.html

Special Credit

Special credit by examination, by credentials, and/or by experience may be awarded in order to help qualified students earn their degrees more quickly. Each instructional department determines which of its courses are available for special credit and establishes procedures to determine student eligibility, administer evaluations for special credit, and grade students. The evaluations are as comprehensive as those given in the course. Credit earned by examination will be assigned an A (highest passing grade) or S (passing grade). Credit earned by credentials and/or experience will be assigned an S. An S (passing) grade is considered to be equivalent to performance at a minimum grade level of C.

Responsibility for initiating a request for special credit in a specific course normally rests with the student. To find out if special credit is warranted, the student should consider meeting first with the department chair, advisor, or course instructor.

For additional information, refer to the front part of this bulletin under “Special Credit" or go to the following website: https://facultystaffcentral.iupui.edu/enrollment/special-credit.html

Auditing Courses

University policy permits the auditing of courses, but audited courses may not be retaken later for academic credit. Written permission from the instructor to audit a class must be obtained before the student attempts to register. See the Student Central website for general information about auditing courses.

Incomplete Grade Process for Undergraduate and Graduate Students

You can ask your instructor for a grade of Incomplete if you satisfactorily competed a substantial portion of your coursework, but extenuating circumstances during the term prevented you from completing all coursework as of the end of the semester.

Your instructor has the right to set a specific date, up to one year, by which you must complete all unfinished work

In some cases, your instructor may recommend or require you to attend another term (or portion of a term) of a course to remove your I. In this case, don’t register for the course a second time. Instead, make arrangements with your instructor to sit in on the course as required. Note that sitting in on a course does not count as part of your full-time or part-time load for financial aid purposes or for loan deferments. If your original instructor isn’t available or is no longer with IUPUI, contact the chair of the school or department that offers the course for assistance.

Once you’ve completed the work the instructor will change your I to the appropriate letter grade. You can track the progress of your request or check your academic record for grade information.

If you fail to complete the coursework and turn it in to your instructor in the time allowed, your I will automatically become an F.

See the IUPUI Student Central website for information: https://studentcentral.iupui.edu,/grades-progress/incompletes.html

This policy applies to students in both undergraduate and graduate programs.

Review of Final Grade in a Course

A student has the right to request and receive a review of the student’s final grade in a course. However, the request for such a review must be made in a timely manner; that is, within one year of the completion of the course. This policy applies to students in both undergraduate and graduate programs.

Petition for Grade Change

Faculty Petition A faculty member may request a change of grade for a student. This request can be honored only after approval of the department chair and the School of Science Executive Director for Academic and Student Affairs.

Student Petition In certain cases, a student may request a change of grade. Students should contact the School of Science, LD 222, for information about procedures and time limits for applicable cases. This option is primarily used by undergraduate students and is generally not available for graduate students. Information is available at https://studentcentral.iupui.edu/grades-progress/grade-changes/index.html.

Residency Requirements

For undergraduate students: Residence at IUPUI for at least two semesters and completion, while at IUPUI, of at least 32 credit hours of work in courses at the 300 level or higher are required.

At least four courses totaling a minimum of 12 credit hours in the major subject must be completed at IUPUI.

With the approval of the executive Director of Academic and Student Affairs or the Associate Dean for Academic Affairs, students who have had at least four semesters of resident study may complete up to 15 credit hours of the senior year at another approved college or university. In order to transfer back to IUPUI, a transfer course msut be a grade of C or higher. Students should be aware that completing coursework at another college or university may result in a postponment of their graduation for at least one semester.

For graduate students: At least 30 academic credits are required for the master's degree and at least 90 academic credits are required for the Ph.D. Some programs may require more credits. The maximum number of didactic transfer credits allowed is 12 hours, but some programs may allow fewer. The student's major department and the Office of the Associate Dean for Research and Graduate Education determine acceptability of transfer credits from another college or university. No work may be transferred from another institution unless the grade is a B or higher.

Students must meet graduate school resident study requirements. At least one-half of the total credit hours used to satisfy a Purdue master's degree must be earned while in residence at IUPUI. At least 30 credit hours of IU graduate work must be completed while enrolled on a campus of Indiana University to satisfy the master's degree. At least one-third of the total credit hours used to satisfy degree requirements must be earned (while registered for doctoral study) in continuous residence on the IUPUI campus. The major department should be consulted for other more specific rules.

Candidates for Baccalaureate Degrees

Students are considered to be candidates in good standing for baccalaureate degrees awarded by the School of Science when they have been admitted as regular students by the Undergraduate Admissions Center, when their last semester's grade point average is not below a 2.00, and when their cumulative grade point average is not below this same level (2.00).

Degree Grade Point Average

The School of Science computes a school grade point average, which is the basis for recommending the awarding of a degree. This grade point average is computed at the completion of the degree program. Only the most recent grade in repeated courses counts in computing the school grade point average for the purpose of graduation. Remedial courses and courses that overlap are also excluded. Other course exclusions may apply.

Double Major

A double major is awarded to students who complete the requirements for two Purdue Bachelor of Science degree programs or two Purdue Bachelor of Arts degree programs in the School of Science. Students who plan to double major must have their programs approved by both major departments and the academic dean or director. A form to declare a double major can be obtained from the School of Science, LD 222. A student declaring a double major must satisfy the departmental requirements for the second major as stated in the School of Science bulletin in effect when the second major is approved.

Double Degree

A student may be awarded two degrees by completing bachelor's degree programs from two different schools at IUPUI or by simultaneously completing two baccalaureate major programs from the School of Science, one leading to a Purdue Bachelor of Arts degree and the other leading to a Purdue Bachelor of Science degree, or one leading to a Purdue degree and the other leading to an Indiana University degree. A student who plans to pursue a double degree must receive approval from the two major departments and the academic deans of the schools awarding the degrees. A form to petition for a double degree can be obtained from the School of Science, LD 222. A student who declares a double degree, and who is accepted by a department in the School of Science for the additional degree program, must satisfy the requirements for that program as stated in the School of Science bulletin in effect when the additional degree program is approved.

Change of Major within the School of Science

A student who desires to change majors within the School of Science should petition the School of Science by completing the Internal Admissions Application. If the petition is approved, the student may be placed under the bulletin in effect during the time of admission into the new major.

Second Baccalaureate Degree

Normally the holder of a bachelor's degree who wishes to pursue a further educational goal is encouraged to consider a graduate degree program. However, a student interested in pursuing a second degree should apply through the IUPUI Undergraduate Admissions Center, Campus Center Room 255, 420 University Boulevard, Indianapolis, IN 46202. Further information and application forms may be obtained at this address, by calling (317) 274-4591, or online at https://admissions.iupui.edu/.

In order to be admitted to the degree program, the applicant must meet admission requirements of the School of Science and of the department. If admitted, the candidate will be placed under the bulletin in effect during the time of admission into the second-degree program.

Degrees Awarded with Distinction

IUPUI recognizes outstanding performance in course work by awarding bachelor's degrees with distinction. Purdue degrees are awarded with distinction and highest distinction. Indiana University degrees are awarded with distinction, high distinction, and highest distinction.

To award graduation with distinction for baccalaureate degrees, there must be at least 20 students in the respective pool of Spring semester candidates.

To be eligible for graduation with distinction, candidates must complete all the requirements of their degree programs. Additionally, the following conditions apply:

- A candidate for a baccalaureate degree with distinction must have a minimum of 65 credit hours of course work from Purdue University or Indiana University applicable to the graduation index (degree grade point average) on record.

- The minimum graduation index for distinction (Purdue and IU degrees) shall be no less than the 90th percentile of the graduation indexes of all the graduates in the school for the spring semester, provided that the index is at least 3.30;
- Of those who qualify for distinction under these rules for the Spring semester, the six-tenths of the baccalaureate graduates having the highest graduation indexes shall be designated as graduating with high distinction (IU degrees only);
- Of those who qualify for distinction under these rules for the Spring semester, the three-tenths of the baccalaureate graduates having the highest graduation indexes shall be designated as graduating with highest distinction (Purdue and IU degrees);
- The minimum graduation indexes determined for the Spring semester for graduation with distinction, high distinction, and highest distinction shall be applied for graduation with those respective levels of distinction for the subsequent Summer sessions and Fall semester.

Academic Standing

Science Scholars List and Dean's Honor List (Undergraduate Only)

The School of Science recognizes exceptional academic performance in baccalaureate and associate degree programs before graduation from the university by periodically publishing the Science Scholars List and the Dean's Honor List. This recognition does not apply to students pursuing graduate level degrees.

Science Scholars List eligibility includes:

- Full-time enrolled student (between 12 or more credit hours) who has completed at least 26 credit hours of course work at IUPUI and who has a semester and IU cumulative grade point average (GPA) of 3.75 or higher.
- Part-time enrolled student (between 5 and 11 credit hours) who has completed at least 26 credit hours of course work at IUPUI and who has a semester and IU cumulative grade point average (GPA) of 3.75 or higher.

Dean's Honor List eligibility includes:

- Full-time enrolled student (12 or more credit hours) who has a semester grade point average (GPA) of 3.50 or higher.
- Part-time enrolled student (between 5 and 11 credit hours) who has completed at least 26 credit hours of course work at IUPUI and who has a semester and IU cumulative grade point average (GPA) of 3.50 or higher.

Courses assigned a deferred grade (R) will count toward the 12 credit hour minimum required of full-time students. Courses taken on a Pass/Fail basis will not count toward the 12 credit hour minimum. Students who received an Incomplete (I) will not be placed on the Science Scholars List or the Dean's Honor List. No Science Scholars List or Dean's Honor List is published for the summer sessions.

Academic Warning (Undergraduate Only)

A student whose IU semester grade point average (GPA) falls below a 2.00, but whose IU cumulative GPA is a 2.00 or higher will be placed on academic warning. Students on academic warning will be required to meet with their academic advisor before being able to register for classes. A student will be advised of academic warning status by letter from the Associate Dean for Academic Affairs. This policy does not apply to students pursuing graduate level degrees.

Academic Probation (Undergraduate Only)

A student whose IU cumulative grade point average (GPA) falls below a 2.00 will be placed on probation. The student may continue studies provided the student achieves an IU GPA of at least 2.00 for each semester while on probation. Once the IU cumulative GPA is at least 2.00, the student will be removed from probationary status. A student will be advised of probationary status by letter from the Associate Dean for Academic Affairs. This policy does not apply to students pursuing graduate level degrees.

Dismissal (Undergraduate Only)

A student on probation who has completed a minimum of 12 IUPUI grade point average (GPA) hours is subject to dismissal if the student fails to attain an IU semester GPA of at least 2.00 in any two consecutive IUPUI semesters (Fall and Spring), including the semester that the student was first placed on probation and when the student's IU cumulative GPA is below a 2.00. This portion of the policy does not apply to students pursuing graduate level degrees.

(Graduate and Undergraduate)

A student can also be dismissed from the university when, in the opinion of the Associate Dean for Academic Affairs of the School of Science, the student has ceased making progress in the degree program. This policy may be applied to students at either the undergraduate or graduate level.

Readmission (Undergraduate Only)

A student dismissed for the first time must remain out of school at least one regular (Fall or Spring) semester. During the semester out of school, the student may petition the School of Science for readmission. A student dismissed for the second time must remain out of school at least two regular semesters (Fall and Spring), but may petition for readmission during the second semester out of school. Readmission after a second dismissal is extremely rare.

In order to allow sufficient time for considering a petition for readmission, a student eligible to submit a petition should do so before June 15 for the Fall semester, October 15 for the Spring semester, or March 15 for either Summer session.

A student readmitted will be so informed by letter from the Associate Dean for Academic Affairs. The letter will indicate any conditions and restrictions affecting readmission and continuance in the degree program.

Area Requirements

Area Requirements for Baccalaureate Degrees

The faculty of the School of Science has adopted the following degree requirements for the Bachelor of Arts and Bachelor of Science degrees. Students may follow the School of Science and departmental requirements that are in effect when they enter the School of Science, or they

may choose new requirements that become effective after that date.

School of Science requirements are the minimal requirements in various areas, and individual departments may require more, as stated in their degree descriptions. Students should consult with departmental advisors in planning their courses of study.

- Bachelor of Arts Degree and Bachelor of Science Degree Requirements

Bachelor of Arts Degree and Bachelor of Science Degree Requirements

The requirements for these bachelor's degree programs include the common general education core approved by the faculties of both the School of Liberal Arts and the School of Science. This general education core, together with the major, is a curriculum based on the IUPUI Principles of Undergraduate Learning (see the front part of this bulletin for a description of these principles).

First-Year Experience Course

Each beginning freshman and transfer student (with less than 19 credit hours) in both the Bachelor of Arts and Bachelor of Science programs in the School of Science is required to take either SCI-I120 Windows on Science (1 cr.) or an equivalent freshman experience course that may be offered by a department in which the student is a major. Beginning computer science majors are encouraged to take CSCI 12000 Windows on Computer Science (1 cr.).

Area I English Composition and Communication Competency

Both Bachelor of Arts and Bachelor of Science students are required to take two courses in English composition worth at least 3 credit hours each and COMM-R110 Fundamentals of Speech Communication (3 cr.). The English composition requirement is partially satisfied by completing ENG-W131 (or ENG-W140 Honors). The second composition course must have ENG-W131 (or ENG-W140) as a prerequisite. An appropriate course in technical or research writing may be used to complete the second composition course requirement. Consult departmental guidelines. A grade of C or higher must be obtained in both composition courses.

Area II World Language Competency

1. A first-year proficiency in a world language is required for the Bachelor of Arts degree program. Note that American Sign Language may be used to satisfy this requirement. This requirement may be satisfied in one of the following ways:

- by completing first-year courses (8-10 credit hours) in a single language with passing grades;
- by completing a second-year or third-year course with a grade of C or higher;
- by taking a placement test and placing into the 200 level or higher. See the School of Liberal Arts section of this bulletin for items related to the placement test, courses numbered 117, nonnative speakers, and credit for lower division language courses.

2. Check the department section of the bulletin for any reference to a language proficiency requirement for a Bachelor of Science degree program (e.g. Mathematical Sciences).

Area III

IIIA Arts and Humanities, Social Sciences, and Cultural Understanding Competencies

Four courses totaling 12 credit hours are required. The courses are to cover each of four areas:

1. One course in arts and humanities from List H

2. One course in social sciences from List S

3. One additional course from either List H or List S

4. One course in cultural understanding from List C

Courses taken from lists H, S, and C must be outside the student's major. For example, psychology majors cannot take a PSY-B course to satisfy one of the List H, S, or C requirements below.

It is recommended that the student see an academic advisor for updated lists.

Note that some courses may appear on more than one list. A cross-listed course may apply to only one of the required areas specified by the lists.

List H: Arts and Humanities

- ART 21000 History of Architecture 1 (3 cr.)
- CLAS-C101 Ancient Greek Culture (3 cr.)
- CLAS-C102 Roman Culture (3 cr.)
- CLAS-C205 Classical Mythology (3 cr.)
- COMM-T130 Introduction to Theatre (3 cr.)
- ENG-L105 Appreciation of Literature (3 cr.)
- ENG-L115 Literature for Today (3 cr.)
- ENG-L202 Literary Interpretation (3 cr.)
- ENG-L203 Introduction to Drama (3 cr.)
- ENG-L204 Introduction to Fiction (3 cr.)
- ENG-L205 Introduction to Poetry (3 cr.)
- ENG-L207 Women and Literature (3 cr.)
- ENG-L213 Literary Masterpieces I (3 cr.)
- ENG-L214 Literary Masterpieces II (3 cr.)
- ENG-W206 Introduction to Creative Writing (3 cr.)
- ENG-W207 Introduction to Fiction Writing (3 cr.)
- ENG-W208 Introduction to Poetry Writing (3 cr.)
- ENG-W210 Literacy and Public Life (3 cr.)
- ENG-W260 Film Criticism (3 cr.)
- FILM-C292 Introduction to Film (3 cr.)
- HER-E101 Beginning Drawing I (3cr.)
- HER-E105 Beginning Painting I (3 cr.)
- HER-E109 Color and Design for Non-Art Majors (3 cr.)
- HER-E111 Metalsmithing and Jewelry Design (3 cr.)
- HER-E201 Photography I (3 cr.)
- HER-E209 Drawing for Interior Design (3 cr.)
- HER-H100 Art Appreciation (3 cr.)
- HER-H101 History of Art 1 (3 cr.)
- HER-H102 History of Art 2 (3 cr.)

- HER-H200 Understanding Contemporary Art (3 cr.)
- HER-H221 Art Past and Present (3 cr.)
- HIST-H195 Introduction to Digital Humanities (3 cr.)
- MHHS-M201 Introduction to Medical Humanities and Health Studies (3 cr.)
- MUS-E241 Introduction to Music Fundamentals (3 cr.)
- MUS-L100 Guitar Elect/Secondary (2 cr.)
- MUS-L101 Beginning Guitar Class (2 cr.)
- MUS-M174 Music for the Listener (3 cr.)
- MUS-V100 Voice Elective and Secondary (1 - 4 cr.)
- MUS-Z111 Introduction to Music Theory (3 cr.)
- MUS-Z201 History of Rock and Roll Music (3 cr.)
- NEWM-N100 Foundations of New Media (3 cr.)
- NEWM-N102 Digital Media Imagery (3 cr.)
- NEWM-N131 Game On! A History of Video Games
- NEWM-N201 Design Issues in Digital Media (3 cr.)
- NEWM-N260 Scriptwriting (3 cr.)
- PHIL-P110 Introduction to Philosophy (3 cr.)
- PHIL-P120 Ethics (3 cr.)
- PHIL-P162 Logic (3 cr.)
- PHST-P105 Giving & Volunteering in America (3 cr.)
- PHST-P211 Philanthropy and the Humanities (3 cr.)
- REL-R133 Introduction to Religion (3 cr.)
- REL-R173 American Religion (3 cr.)
- REL-R180 Introduction to Christianity (3 cr.)
- REL-R212 Comparative Religions (3 cr.)
- REL-R243 Introduction to New Testament (3 cr.)
- REL-R257 Introduction to Islam (3 cr.)

List S: Social Sciences

- BUS-F260 Personal Finance (3 cr.) NOTE: BUS-F260 is equivalent to F-151, F-152 and F-251 combined
- BUS-F151 Personal Finances of the College Student (1 cr.)
- BUS-F152 Basic Financial Planning and Investment (1 cr.)
- BUS-F251 Managing Personal and Financial Risk (1 cr.)
- BUS-W200 Introduction to Business & Management (3 cr.)
- BUS-X100 Business Administration: Introduction (3 cr.)
- COMM-C180 Introduction to Interpersonal Communication (3 cr.)
- COMM-M150 Mass Media & Contemporary Society (3 cr.)
- ECE 32700 Engineering Economics (3 cr.)
- ECON-E101 Survey of Economic Issues & Problems (3 cr.)
- ECON-E201 Introduction to Microeconomics (3 cr.)
- ECON-E202 Introduction to Macroeconomics (3 cr.)
- EDUC-P251 Educational Psychology for Elementary Teachers (1-4 cr.)
- ENG-Z205 Introduction to the English Language (3 cr.)
- FOLK-F101 Introduction to Folklore (3 cr.)
- GEOG-G110 Introduction to Human Geography (3 cr.)
- GEOG-G130 World Geography (3 cr.)
- HER-U101 Design Thinking (3 cr.)
- HIST-H105 American History I (3 cr.)
- HIST-H106 American History II (3 cr.)
- HIST-H108 Perspectives: World to 1800 (3 cr.)
- HIST-H109 Perspectives: World 1800 to Present (3 cr.)
- HIST-H113 History of Western Civilization I (3 cr.)
- HIST-H114 History of Western Civilization II (3 cr.)
- HLSC-H200 Survey of U.S. Health Care System Services (3 cr.)
- HLSC-H 220 Aging and the Older Person (3 cr.)
- HPER-F255 Human Sexuality (3 cr.)
- HPER-F258 Marriage and Family Interaction (3 cr.)
- HPER-H195 Principles of Lifestyle Wellness (3 cr.)
- INFO-I202 Social Informatics (3 cr.)
- INFO-I270 Intro to Human-Computer Interaction Prin and Practices (3 cr.)
- INFO-I275 Intro to Human-Computer Interaction Theory (3 cr.)
- JOUR-J110 Foundations of Journalism and Mass Communication (3 cr.)
- ME 32700 Engineering Economics (3 cr.)
- MSPT-Z100 Motorsports Studies (3 cr.)
- NEWM-N132 Game Design Psycology: Theory and Prototyping (3 cr.)
- OLS 20000 Introduction to Sustainable Principles and Practices (3 cr.)
- OLS 25200 Human Behavior in Organizations (3 cr.)
- OLS 26300 Ethical Decisions in Leadership (3 cr.)
- OLS 27400 Applied Leadership (3 cr.)
- PBHL-A140 Preparing for Disasters (3 cr.)
- PBHL-H101 Inflencing the Public's Health (3 cr.)
- PBHL-P109 Introduction to Public Health (3 cr.)
- PBHL-S120 Introduction to Community Health (3 cr.)
- PHST-P210 Philanthropy and the Social Sciences (3 cr.)
- PHST-P212 Philanthropy and Civic Engagement (3 cr.)
- POLS-Y101 Introduction to Political Science (3 cr.)
- POLS-Y103 Introduction to American Politics (3 cr.)
- POLS-Y217 Introduction to Comparative Politics (3 cr.)
- POLS-Y219 Introduction to International Relations (3 cr.)
- PSY-B110 Introduction to Psychology (3 cr.) NOTE: Course does not count for List S for psychology majors.
- SOC-R100 Introduction to Sociology (3 cr.)
- SOC-R121 Social Problems (3 cr.)
- SPEA-J101 American Criminal Justice System (3 cr.)
- SPEA-J150 Public Safety in America (3 cr.)
- SPEA-V170 Introduction to Public Affairs (3 cr.)
- SPEA-V221 Nonprofit & Voluntary Sector (3 cr.)
- SPEA-V222 Principles of Sustainability (3 cr.)
- SWK-S221 Human Growth and Development in the Social Environment (3 cr.)
- SWK-S251 History and Analysis of Social Welfare Policy (3 cr.)
- WOST-W105 Introduction to Women's Studies (3 cr.)

List C: Cultural Understanding

- AFRO-A140 Introduction to African American and African Diaspora Studies (3 cr.)
- AFRO-A150 Survey of the Culture of Black Americans (3 cr.)
- AFRO-A152 Introduction to African Studies (3 cr.)
- AMST-A101 Introduction to American Studies (3 cr.)
- AMST-A102 Asian American Culture (3 cr.)
- ANTH-A104 Cultural Anthropology (3 cr.)
- ASL-A131 First Year ASL I (3-5 cr.)
- ASL-A132 First Year ASL II (3-5 cr.)
- ASL-A211 Second Year ASL I (3-5 cr.)
- ASL-A212 Second Year ASL II (3-5 cr.)
- CLAS-C213 Sport & Competition in the Ancient World (3 cr.)
- CLAS-L131 Beginning Latin I (3-5 cr.)
- CLAS-L132 Beginning Latin II (3-5 cr.)
- COMM-C282 Experiencing Intergroup Dialogue (3 cr.)
- COMM-C299 Communicating Queer Identity (3 cr.)
- EALC-C131 Beginning Chinese I (3 - 5 cr.)
- EALC-C132 Beginning Chinese II (3-5 cr.)
- EALC-C201 Second Year Chinese I (2-4 cr.)
- EALC-C202 Second Year Chinese II (2-4 cr.)
- EALC-J131 Beginning Japanese I (3-5 cr.)
- EALC-J132 Beginning Japanese II (3-5 cr.)
- EALC-J201 Second Year Japanese I (2-4 cr.)
- EALC-J202 Second Year Japanese II (2-4 cr.)
- EDUC-E201 Multicultural Education and Global Awareness (3 cr.)
- ENG-L245 Introduction to Caribbean Literature (3 cr.)
- FREN-F131 First Year French I (3-5 cr.)
- FREN-F132 First Year French II (3-5 cr.)
- FREN-F203 Second Year French I (3-4 cr.)
- FREN-F204 Second Year French II (3-4 cr.)
- GER-G131 First Year German I (3-5 cr.)
- GER-G132 First Year German II (3-5 cr.)
- GER-G203 Second Year German I (3-4 cr.)
- GER-G204 Second Year German II (3-4 cr.)
- HIST-H100 Introduction to History (3 cr.)
- INTL-I100 Introduction to International Studies (3 cr.)
- LATS-L101 Introduction to Latino Studies (3 cr.)
- LATS-L228 An Interdisciplinary Look at U/S/ Latino/a Identities (3 cr.)
- MUS-M394 Survey of African American Music (3 cr.)
- MUS-Z105 Traditions in World Music (3 cr.)
- NAIS-N101 Introduction to Native American and Indigenous Studies (3 cr.)
- NELC-A131 Basic Arabic I (3-5 cr.)
- NELC-A132 Basic Arabic II (3-5 cr.)
- NELC-A200 Intermediate Arabic I (3-5 cr.)
- NELC-A250 Intermediate Arabic II (3-5 cr.)
- PBHL-A120 Regional Cultures and Mortality (3 cr.)
- PSY-B203 Ethics and Diversity in Psychology (3 cr.) NOTE: PSY-B203 does not count for List C for psychology major.
- REL-R101 Religion and Culture (3 cr.)
- REL-R103 The Bible and Culture (3 cr.)
- SPAN-S131 First Year Spanish I (3-5 cr.)
- SPAN-S132 First Year Spanish II (3-5 cr.)
- SPAN-S203 Second Year Spanish I (3-4 cr.)
- SPAN-S204 Second Year Spanish II (3-4 cr.)
- SWK-S102 Understanding Diversity in a Pluralistic Society (1-4 cr.)
- TCM 18000 Exploring Intercultural Technical Communication (3 cr.)
- TSEM-T208 Global Tourism Geography (3 cr.)
- TSEM-T234 Cultural Heritage Tourism (3 cr.)

For the most current list of courses in the areas of Arts and Humanities, Social Sciences and Cultural Understanding, please refer to the IUPUI General Education Curriculum.

IIIB Purdue Civics Literacy Requirement

All undergraduate students who enter a Purdue degree program, either as a new freshman or as a transfer student effective Fall 2022, will be required to complete the Purdue Civics Literacy Proficiency. This is not required of undergraduate students pursuing an IU degree program in the School of Science.

To obtain this proficiency, students will complete an educational activity as part of a Civics Literacy Pathway and pass the Purdue Civics Knowledge Test. There are two different pathways:

- *Civics Literacy Podcast Pathway* - Complete 12 podcasts created by the Purdue Center for C-Span Scholarship & Engagement that use C-Span material, in addition to passing the Purdue Civics Knowledge Test.
- *Approved Course Pathway* - Complete an approved Civics Literacy course, such as HIST-H105 or POLS-Y103, with a grade of at least C-, in addition to passing the Purdue Civics Knowledge Test.

The Purdue Civics Knowledge Test must be taken through the IUPUI Testing Center, but may be retaken as many times as needed to achieve successful completion.

IIIC Life and Physical Sciences Competency

Both Bachelor of Arts and Bachelor of Science students are required to complete at least four science lectures courses totaling a minimum of 12 credit hours outside the major department. At least one of the courses must have a laboratory component.

Courses that do not count in Area IIIC include AST-A130; BIOL-N100, BIOL-N200, CHEM-C100, FIS 10500, GEOL-G103, GEOL-G130, PHYS 10000, PHYS 14000, PHYS 20000, and all agriculture courses.

NOTE: This is not a complete list. If you have a question about whether a course is applicable or not, please speak with your academic advisor prior to registering to confirm.

Topics or variable credit hour courses (e.g., BIOL-N222) must receive approval from the School of Science Academic Dean's Office. Consult with your major department or the School of Science Academic Dean's Office for additional course restrictions.

Courses that do not count for any credit toward any degree program in the School of Science include, but are not limited to, BIOL-N120 and PHYS 01000.

Except for laboratory courses combined with corresponding lecture courses, 1 credit hour and, in general, 2 credit hour courses do not apply to this area.

In addition, students must obtain grades of C- or higher in their Area IIIC courses. However, a single grade of D+ or D will be allowed for one course only. Check with the major department for additional restrictions or requirements. Some majors may require a minimum grade of C or higher.

Note that if credit has been established for both GEOL-G132 and GEOL-G107, then only GEOL-G107 may apply to Area IIIC. In this case, GEOL-G132 may count as a general elective provided that credit was established in GEOL-G132 preceding GEOL-G107.

Note that GEOG-G107 Physical Systems of the Environment (3 cr.)/GEOG-G108 Physical Systems of the Environment: Laboratory (2 cr.) may apply to Area IIIC with approval of the student's major department. Also, GEOG-G185 Global Environmental Change (3 cr.) is an acceptable substitute for GEOL-G185 Global Environmental Change (3 cr.).

IIID Analytical Reasoning Competency

Bachelor of Arts students must have at least one course of at least 3 credit hours in mathematics and one course of at least 3 credit hours in computer programming.

Bachelor of Science students must have at least two courses beyond college algebra and trigonometry, totaling 6 credit hours. In addition, one course of at least 3 credit hours in computer programming is required. Courses in applied statistics are not acceptable.

MATH-M010, 00100, MATH-M001, 00200, 11000, 11100, 12300, 13000, 13200, 13600; BUS-K201, BUS-K204, CSCI-N100-level courses; CIT 10600 do not count for any credit toward any degree in the School of Science. Computer Science CSCI-N241 and CSCI-N299 do not count in this area, but may count as general electives.

Students must obtain grades of C- or higher in their Area IIID courses. However, a single grade of D+ or D will be allowed for one course only. Check with the major department for additional restrictions or requirements. Some majors may require a minimum grade of C or higher.

Area IV

Major Department

Consult the listing of the major department for courses required within the major subject as well as courses required by the major department in the other areas (e.g. Biotechnology, Environmental Science, and Forensic & Investigative Sciences).

Capstone Experience Course

Each undergraduate major in the School of Science is to be provided a Capstone Experience (research, independent study/project, practicum, seminar, or field experience). The capstone, required of all majors, is to be an independent, creative effort of the student that is integrative and builds on the student's previous work in the major. See departmental sections of the bulletin for specific information about capstone courses.

Undergraduate Programs

The Purdue School of Science offers the following undergraduate degree programs:

Baccalaureate Degrees

- Biology (B.A.)
- Biology (B.S.)
- Biology Secondary School Teaching
- Biotechnology
- Chemistry (B.A.)
- Chemistry (B.S., ACS certified)
- Chemistry Secondary School Teaching
- Computer and Information Science
- Earth Science Secondary School Teaching
- Environmental Science
- Forensic and Investigative Sciences (B.S. FEPAC accredited)
- Geology (B.A.)
- Geology (B.S.)
- Interdisciplinary Studies
- Mathematics
- Mathematics Teaching B.S.
- Neuroscience
- Physics
- Physics Secondary School Teaching
- Psychology (B.A. & B.S.)

General Requirements

School of Science requirements are the minimal requirements in various areas, and individual departments/programs may require more, as stated in their degree descriptions. Students should consult with departmental/program advisors in planning their courses of study.

1. A minimum of 120 credit hours for all programs must be completed. Approval must be obtained from the School of Science to use as credit toward graduation any course that was completed 10 or more years previously.
2. A minimum grade point average of 2.00 is required.
3. A minimum of 24 credit hours must be taken in a major subject (see program requirements) with a minimum grade point average of 2.00. No grade below C- is acceptable in the major subject. Some majors may have higher minimum grade requirements (see program requirements).
4. At least four courses totaling a minimum of 12 credit hours in the major subject must be completed at IUPUI (see departmental/program requirements).
5. Residence at IUPUI for at least two semesters and completion, while at IUPUI, of at least 32 credit hours of work in courses at the 300 level or higher are required.
6. With the approval of the Executive Director of Academic and Student Affairs or the Associate Dean for Academic Affairs, students who have had at least four semesters of resident study may complete up to 15 credit hours of the senior year at another approved college or university. In order to transfer

back to IUPUI, a transfer course must be a grade of C or higher.

7. Courses taken on the Pass/Fail option may be applied only as general electives and not toward degree AREA requirements of the school or department/program. Courses taken on the Pass/Fail option may apply to the 32 credit hours residency requirement listed in item 5 if the course is at the 300-level or higher.

8. No more than 64 credit hours earned in accredited junior or community colleges can be applied toward a degree.

9. Students may enroll in independent study (correspondence) courses for general electives up to a maximum of 12 credit hours with permission of the Executive Director of Academic and Student Affairs or the Associate Dean for Academic Affairs. Independent study (correspondence) courses may not apply to the 32 credit hours residency requirement listed in item 5. Independent study (correspondence) courses may not apply to course requirements in minors or certificates.

10. With permission of the appropriate department or program, credit may be earned through special credit examination. Credits earned by special credit examination may be used toward the total credit hours required and to satisfy AREA requirements for a degree.

11. The following courses do not count for any credit toward any degree program in the School of Science: AGR 10100; BIOL-N120; BUS-K201, BUS-K204; CSCI-N100-level courses; CIT 10600; all remedial and developmental courses; EDUC-U205, EDUC-W200, EDUC-W201, EDUC-X100, EDUC-X150, EDUC-X151, EDUC-X152; ENG-G010, ENG-G011, ENG-G012, ENG-W001, ENG-W031; MATH-M010, MATH 00100, MATH-M001, MATH 00200, MATH 11000, MATH 11100, MATH 12300, MATH 13000, MATH 13200, MATH 13600; PHYS 01000; UCOL-U112, UCOL-U210.

    NOTE: This is not a complete list. The School and department/program reserve the right to exclude course credit when it is deemed as overlapping with other earned credit or it is determined to be remedial in nature.

    - Note that CHEM-C100 may count for general elective credit only if the student has not already established credit in CHEM-C101 or CHEM-C105/CHEM-C106, or equivalent courses. Otherwise, CHEM-C100 does not count for credit in any given degree program.
    - Note that if credit has been established for both GEOL-G132 and GEOL-G107, then only GEOL-G107 may apply to AREA IIIC. In this case, GEOL-G132 may count as a general elective provided that credit was established in GEOL-G132 preceding GEOL-G107.

12. No more than 6 credit hours of studio, clinical, athletic, or performing arts course work will be approved unless the additional credit hours are required to complete a (or were previously applied to an earned) certificate, minor, or second degree. Verification of academic intent or program completion of a certificate, minor, or second degree is required. Also, any athletic or performance-type credit earned through military service that is eligible for transfer to IUPUI will count and not be considered as part of the 6-credit hour minimum. Consult a school or departmental/program advisor with questions.
13. No more than 8 credit hours of military credit can apply towards the degree program.

14. An online application for a degree or certificate graduation must be completed by the following deadlines. Beginning Spring 2016 semester of graduation, only students who are not enrolled in any other course are required to enroll in CAND 99100. Authorization for this course will be given once the application has been submitted. Applications must be submitted by January 15 for August graduation; May 15 for December graduation; and October 15 for May graduation. If not enrolled in any other courses, students should also register for the appropriate section of CAND 99100 (0 credit hours) during their final semester before graduation. Degree candidates for December, May, or August graduation of a particular academic year may participate in the May Commencement (e.g. students having graduated in December 2015, May 2016, or August 2016 will participate in the May 2016 Commencement Exercises). Students completing a certificate program do not participate in Commencement Exercises.
15. In general, credit is not allowed for both of two overlapping courses. Examples of course overlaps include **(NOTE: This is not a complete list.)**:

    - BIOL-N100 and BIOL-K101/BIOL-K103
    - BIOL-N100 and BIOL-K102/BIOL-K104
    - BIOL-N212/BIOL-N213 and BIOL-N217
    - BIOL-N214/BIOL-N215 and BIOL-N261
    - CHEM-C101/CHEM-121 and CHEM-C105 and/or CHEM-C106
    - CHEM-C102 and CHEM-C341/CHEM-C343
    - CHEM-C110 and CHEM-C341
    - CHEM-C110/CHEM-C115 and CHEM-C341/CHEM-C343
    - CHEM-C360 and CHEM-C361
    - CHEM-C325 and CHEM-C410/CHEM-C411
    - GEOL-G110 and GEOG-G107
    - GEOL-G185 and GEOG-G185
    - GEOL-G221 and GEOL-G306
    - GEOL-G222 and GEOL-G306
    - MATH-M119 and MATH 22100 or MATH 23100 or MATH 16300 or MATH 16500
    - MATH 15100 or 15900 and MATH 15300/15400
    - MATH 15100 and MATH 15900
    - MATH 22100/MATH 22200 and MATH 23100/MATH 23200

- MATH 22100/MATH 22200 and MATH 16300/MATH 16400 or MATH 16500/MATH 16600
- MATH 23100/MATH 23200 and MATH 16300/MATH 16400 or MATH 16500/MATH 16600
- MATH 16300 and MATH 16500
- MATH 16400 and MATH 16600
- PHYS-P201/PHYS-P202 or PHYS 21800/PHYS 21900 and PHYS 15200/PHYS 25100
- PSY-B320 and BIOL-L391 Addictions (IU East)
- SCI-I120 and UCOL-U110
- STAT 30100 and PSY-B305

In addition, any course that is retaken is considered an overlap. Consult with your academic advisor regarding other overlapping courses.

See statements about required First-Year Experience Course and Senior Capstone Experience in the description of the Bachelor of Arts degree and the Bachelor of Science degree programs.

Minors and Certificate Programs

Minors

Minors are often awarded with the completion of a bachelor's degree, but may be awarded earlier. Independent Study (correspondence) courses may not be used to fulfill course requirements in a minor program. Check with the department or program offering the minor for additional restrictions or requirements.

- Applied Computer Science (minor)
- Biology
- Chemistry
- Computer and Information Science
- Environmental Science
- Forensic and Investigative Sciences
- Geology
- Geochemistry
- Health Psychology
- Mathematics
- Neuroscience
- Physics
- Psychology

Certificate Program

- Applied Computer Science (certificate)
- Data Analytics

IUPUI Honors College and Science Honors

The School of Science Honors Program offers students from any School of Science major the opportunity to build on the school's challenging curricula through deeper, more engaging learning experiences in the classroom, in the lab, and throughout campus.

The IUPUI Honors College is open to students in both the Purdue and Indiana University degree programs. Students with an overall grade point average (GPA) of 3.5 after their first full academic year of work, entering freshmen with a minimum combined math and verbal (critical reading) SAT score of 1250 (taken prior to March 2016) or 1310 (taken March 2016 or later), or ACT of 28, and those with a cumulative high school GPA of 3.75 (weighted) are invited to apply for the Honors Program. The deadline to apply for entering Freshmen is November 15. Continuing students will apply via Science Honors. Applications for Science Honors are due mid-April each year. Students must have at least four semesters remaining after admission to complete the Science Honors Program. Students with a GPA of more than 3.5 who are not enrolled in the Honors College may be permitted to take honors courses. They should, however, discuss the matter with their academic advisor and the Honots College before doing so.

In general, students may take no more than 6 credit hours of honors coursework each semester. Students may earn honors credit by taking special Honors College courses (HON-H300, HON-H399, HON-H400), by taking specially designated honors course sections, by doing special overseas or internship work, or by contracting for honors credit using an H-Option contract in conjunction with regular classes.

H-Option contracts are the most popular and frequent way that students earn honors credit. An H-Option requires that a student work out with the instructor of a course a specific contract for a paper, field project, oral presentation, etc., early in the semester. The contract is not merely an exentsion of the regular class work, but an opportunity not provided by regular assianments. The Honors College reviews all contracts prior to students beginning projects.

In order to receive an honors notation at graduation, students must complete 24 hours of honors coursework with at least a 3.3 cumulative GPA. For students entering the Honors College via Science Honors, 12 of the required 24 hours must be science courses. In order to remain in good honors acadeic standing, student also must maintain a 3.3 semester and cumulative GPA, enroll in honors coursework each semester, achieve a B or higher in all honors courses, and take honors coursework each fall and spring semester.

For additional information, contact the IUPUI Honors College, 0124 University Library, 755 W. Michigan Street, Indianapolis, IN 46202-5164; phone (317) 274-2660; www.honorscollege.iupui.edu

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Diana Sims-Harris, M.S., Honors Program Advisor
dsimshar@iupui.edu

Departments & Centers

- Teaching Certification
- PREPs Careers
- PreProfessional Programs
- Honors Program
- Undergraduate Research

Pre-Professional and Career Preparation for Science Students: PREPs

PREPs provides comprehensive career services and pre-professional advising for all School of Science undergraduate students, graduate students, and alumni. This includes individual appointments, walk-in advising, workshops, and classroom presentations. Our staff can help with each step of the career development process including career exploration, developing professional experience through internships, job shadowing and volunteering, and preparing for professional school, graduate school and the world of work. We help students learn to identify and articulate their unique skills and strengths, particularly through creating effective résumés, cover letters, personal statements and preparing for interviewing and networking. Since most students seek higher education in order obtain good career prospects or to advance to graduate or professional school, PREPs should be a component of your academic and professional planning.

The PREPs Office is located in University Tower - 200. Get more information at science.iupui.edu/career-services/index.html.

Jaime Sperandio
Director
Office of Pre-Professional and Career Preparation (PREPs)
E-mail: jsperan@iupui.edu

Allie Medellin
Assistant Director
Employer & Career Services
E-mail: alexmede@indiana.edu

Katie Coby
Pre-Professional Advising
E-mail: ktcoby@iu.edu

Teaching Certification

Becoming a Licensed Teacher

Top quality science and mathematics teachers are in high demand, and the IU School of Education at IUPUI is recognized as a leader in urban education. Students who want to become teachers of middle school and/or high school science or mathematics must take specific programs of study aligned to the standards for teaching these subject areas. Teachers must fully understand the content they teach, the realities of schools, and methods for successfully teaching every child. This requires earning a major or a degree in the School of Science and completing a teacher preparation program in the School of Education.

Mathematics and science majors who want to become teachers need to seek advising from the School of Science as soon as possible so that they take the right courses as they complete their majors. Mathematics majors often find they can complete both their major in mathematics and the (as part of their bachelor's degree. Science majors typically complete their bachelor's degree in science and then enter the (as post baccalaureate students, earning the first half of their master's degree in this 12-month teacher education program. The *Transition to Teaching* program is also an option for mathematics graduates or returning students.

Admission to either the undergraduate (LTTL) or the graduate (T2T) teacher education program is competitive. Students must complete a formal application and have most of the required courses in the major, passing PRAXIS test scores, a clear criminal history check, and at least a 2.50 overall GPA. Specific information about admission to each program is available on the School of Education Web site.

Both the *Learning to Teach/Teaching to Learn* program and the *Transition to Teaching* program enable students to earn Rules 2002 Indiana Teacher Licenses. The LTTL program consists of 43 credit hours of undergraduate study, sequenced across four semesters including a final semester of student teaching. The T2T program is 18 credit hours (plus program fees) of graduate study done while practice teaching in schools everyday for one school year.

Note: Information about teacher education and licensing may change for many reasons, including legislative mandates and state policies. Students need to check for current information on the School of Education web site and meet with School of Education advisors regularly.

Student Learning Outcomes

- Biology
- Biotechnology
- Chemistry
- Computer and Information Science
- Environmental Science
- Forensic and Investigative Sciences
- Geology
- Interdisciplinary Studies
- Mathematics
- Neuroscience
- Physics
- Psychology

Bachelor of Arts & Bachelor of Science in Biology

Students who graduate with a B.A. or B.S. in Biology will be able to:

1. Demonstrate knowledge of how biological molecules such as DNA, RNA, proteins, lipids, and carbohydrates contribute to the structure and function of prokaryotic and eukaryotic cells.
2. Integrate the cellular, molecular and physiological basis of how organisms develop structure, carry out functions, sense and control their environment, and respond to external change.
3. Describe how genetic principles associated with natural selection contribute to the functioning of an organism and the evolutionary diversity of life on earth.
4. Access, evaluate, and communicate information relevant to the study of biological sciences.

5. Work safely and effectively with basic laboratory techniques and instrumentation.
6. Exhibit problem solving and critical thinking skills needed to design and implement laboratory projects, and gather, analyze and draw conclusions from data.
7. Apply basic principles of chemistry, math, and other disciplines to the functioning of living systems.
8. Successfully complete a laboratory or literature-based research project with supervision from a faculty sponsor.

Bachelor of Arts in Biology - Secondary School Teaching

Students who graduate with a B.A. in Biology - Secondary School Teaching will be able to:

1. Demonstrate knowledge of how biological molecules such as DNA, RNA, proteins, lipids, and carbohydrates contribute to the structure and function of prokaryotic and eukaryotic cells.
2. Integrate the cellular, molecular and physiological basis of how organisms develop structure, carry out functions, sense and control their environment, and respond to external change.
3. Describe how genetic principles associated with natural selection contribute to the functioning of an organism and the evolutionary diversity of life on earth.
4. Access, evaluate, and communicate information relevant to the study of biological sciences.
5. Work safely and effectively with basic laboratory techniques and instrumentation.
6. Exhibit problem solving and critical thinking skills needed to design and implement laboratory projects, and gather, analyze and draw conclusions from data.
7. Apply basic principles of chemistry, math, and other disciplines to the functioning of living systems.
8. Successfully complete a laboratory or literature-based research project with supervision from a faculty sponsor.
9. Satisfy the learning outcomes specified by the School of Education for undergraduate students.

Biotechnology

Students who graduate with a B.S. degree in Biotechnology (B.S.B.):

1. Enter IUPUI with the ***Skills And Knowledge Standards For Associate Degree In Biotechnology Programs In Indiana*** (Indiana Commission for Higher Education) as an outcome of prior completion of an Associate Degree in Biotechnology from Ivy Tech Community College.

2. Demonstrate knowledge of how biological molecules such as DNA, RNA, proteins, lipids, and carbohydrates contribute to the structure and function of prokaryotic and eukaryotic cells.

3. Integrate the cellular, molecular, genetic, and biochemical basis of how organisms carry out functions, sense and control their environment, and respond to external change.

4. Access, evaluate, and communicate information relevant to the study of biological sciences.

5. Work safely and effectively with basic laboratory techniques and instrumentation.

6. Exhibit problem solving and critical thinking skills needed to design and implement laboratory projects, and gather, analyze and draw conclusions from data.

7. Apply basic principles of chemistry, math, and other disciplines to the functioning of living systems.

8. Successfully complete a biotechnology-based internship or research project prior to attending IUPUI.

Chemistry

Bachelor of Arts in Chemistry (B.A.)

Students who graduate with a B.A. in Chemistry will be expected to:

1. Understand major concepts and theoretical principles in organic chemistry, analytical chemistry, and physical chemistry.
2. Exhibit problem solving and critical thinking skills relevant to the field of chemistry.
3. Access, retrieve, and interpret accurate and meaningful information from the chemical literature.
4. Communicate scientific information effectively, in both oral and written formats.
5. Work effectively in teams in both classroom and laboratory.
6. Design, carry out, record, analyze the results and draw conclusions from chemical experiments.
7. Use instrumentation for chemical analysis and separation.
8. Use computers in experiments, data analysis, and in communication.
9. Understand and follow safety guidelines in chemical labs.
10. Be aware of and abide by ethical standards in chemical discipline.
11. Integrate knowledge from mathematics, physics, and other disciplines in support of chemistry.

Bachelor of Science in Chemistry (B.S.)

Students who graduate with a B.S. in Chemistry will be expected to:

1. Understand major concepts, theoretical principles, and experimental findings in organic chemistry, analytical chemistry, inorganic chemistry, physical chemistry and biochemistry.
2. Exhibit problem solving and critical thinking skills relevant to the field of chemistry.
3. Access, retrieve, and interpret accurate and meaningful information from the chemical literature.
4. Communicate scientific information effectively, in both oral and written formats.
5. Work effectively in teams in both classroom and laboratory.
6. Design, carry out, record and analyze the results of chemical experiments.
7. Use instrumentation for chemical analysis and separation.
8. Use computers in experiments, data analysis, and in communication.

9. Understand and follow safety guidelines in chemical labs.
10. Be aware of and abide by ethical standards in chemical discipline.
11. Integrate knowledge from mathematics, physics and other disciplines in support of chemistry.
12. Conduct research projects with supervision.

Bachelor of Arts in Chemistry Secondary School Teaching (B.A.)

Students who graduate with a B.A. in Chemistry will be expected to:

1. Understand major concepts and theoretical principles in organic chemistry, analytical chemistry, and physical chemistry.
2. Exhibit problem solving and critical thinking skills relevant to the field of chemistry.
3. Access, retrieve, and interpret accurate and meaningful information from the chemical literature.
4. Communicate scientific information effectively, in both oral and written formats.
5. Work effectively in teams in both classroom and laboratory.
6. Design, carry out, record, analyze the results and draw conclusions from chemical experiments.
7. Use instrumentation for chemical analysis and separation.
8. Use computers in experiments, data analysis, and in communication.
9. Understand and follow safety guidelines in chemical labs.
10. Be aware of and abide by ethical standards in chemical discipline.
11. Integrate knowledge from mathematics, physics, and other disciplines in support of chemistry.
12. Satisfy the learning outcomes specified by the School of Education for undergraduate students.

Computer and Information Science

Bachelor of Science, Computer and Information Science

The Department's Undergraduate Committee states the following Student Learning Outcomes. After graduation, a student should be able to:

1. Write software programs in multiple programming languages.
2. Understand the theoretical foundations of computer science, including the study of discrete computational structures.
3. Understand and use different programming language paradigms such as procedural, object-oriented, etc.
4. Use different data structures such as linked lists, arrays, stacks, trees, graphs, hash tables, etc. to improve efficiency of software, and mathematically or experimentally analyze them and operations on them.
5. Know a diverse array of computational algorithms and their analysis techniques, as related to searching, sorting, optimization, and graph problems.
6. Know fundamental limitations of designing efficient algorithms and the theoretical meaning of the P?=NP problem.
7. Know the basic concepts in formal language theory and their application to compiler design.
8. Understand the basic design of computer architecture and their relationship to software design.
9. Understand and design the basic functionalities of different computer operating systems.
10. Acquire knowledge in multiple advanced areas of computer science, such as databases, data mining, multimedia, graphics, computing security, networking, software engineering, bio-computing, etc.
11. Design, develop, and test small scale software projects.
12. Write scientific project reports and software documentation.

Bachelor of Arts, Applied Computer Science

The Department's Undergraduate Committee states the following Student Learning Outcomes. After graduation, a student should be able to:

1. Write software programs in multiple programming languages.
2. Understand and apply the theoretical foundations of computer science, including the study of discrete computational structures.
3. Understand and use different programming language paradigms such as procedural, object-oriented, etc.
4. Use different data structures such as linked lists, arrays, stacks, trees, graphs, hash tables, etc. to improve efficiency of software, and mathematically or experimentally analyze them and operations on them.
5. Know a diverse array of computational algorithms and their analysis techniques, as related to searching, sorting, optimization, and graph problems.
6. Acquire knowledge in multiple applied areas of computer science, such as databases, data mining, multimedia, graphics, computing security, networking, software engineering, bio-computing, web programming and system administration.
7. Design, develop, and test small scale software projects.
8. Write scientific project reports and software documentation.
9. Appreciate and understand the value of human diversity.

Bachelor of Science, Artificial Intelligence, Data and Computational Science Concentration

The Department's Undergraduate Committee states the following Student Learning Outcomes. After graduation, a student should be able to:

1. Communicate in written and oral forms in such a way as to demonstrate their ability to present information clearly, logically, and critically.
2. Apply mathematical, computing, theoretical and hardware concepts when developing solutions of common computing and hardware applications.
3. Successfully complete significant programming projects.

4. Apply artificial intelligence, machine learning and/or data analytics tools and technologies to solve data related problems and applications.
5. In the self-selected AI depth area (dependent on their plan of study choice) students will demonstrate a depth of knowledge appropriate to pursue graduate study and/or lifelong learning in that area.
6. Understand the impact of artificial intelligence and intelligent systems solutions in a global, economic, environmental, and societal context and an understanding of professional and ethical responsibilities.

Certificate in Fundamentals of Data Analytics

Upon completion of the Certificate in Fundamentals of Data Analytics, students will be able to:

1. Understand basic theoretical underpinnings of Data Analysis
2. Design, develop and maintain a relational database
3. Scrub a dataset to third form normal
4. Produce SQL queries on various table joins in a relational database
5. Conduct a no-SQL data analysis.
6. Create a data model and simulation.
7. Create and interpret pivot tables.
8. Create and interpret compelling visual presentations of analyzed data.
9. Conduct a programmatic data analysis that utilizes clustering, association rules, regression and visualization.
10. Conduct a programmatic data analysis that produces and analyzes 2 and 3 D plots, image enhancement, image analysis, image transformation and registration.
11. Conduct a programmatic data application to explore vectors, objects, functions and procedures
12. Understand statistical analysis for uni- and multi-variate factors.
13. Understand basic statistical principles including probability, sampling, confidence intervals, significance tests, correlation and regression.

Certificate in Applied Computer Science

Upon completion of the Certificate in Applied Computer Science, students will be able to:

1. Understand fundamental concepts of computer science.
2. Create standards-compliant internet sites using current technologies.
3. Learn and utilize tools and techniques to manage software projects to successful completion.
4. Utilize current methodologies to analyze and solve problems commonly found in industry.
5. Develop moderately complex software solutions to typical business/industry problems.

Bachelor of Science in Environmental Science (B.S.)

Broad Earth Sciences Undergraduate Program Goals

Upon graduating, students with an undergraduate degree in Environmental Science (BSES) will:

- gain access to employment in professions of their choosing related to Earth Science, Science Education, and/or Environmental Science.
- gain acceptance to reputable graduate programs in the Earth Sciences, Environmental Sciences, or a program of their choosing.
- successfully complete state and/or national professional competency examinations in Earth Sciences.

Student Learning Outcomes for BS degree in Environmental Science (BSES)

Students who graduate with a BSES degree will achieve the following objectives:

1. Solve environmental science problems using the scientific method and critical thinking.
2. Evaluate physical, chemical and biological cycles related to surficial earth processes and how they operate to describe integrated earth systems from a local to global scale.
3. Demonstrate competence in communicating environmental science problems to a broad audience through written, oral, and visual means.
4. Describe the structure and function of major environmental systems.
5. Effectively apply analytical skills, including basic measurement and monitoring skills, and use of appropriate technology.
6. Understand current thinking and research on the nature, causes, and solutions of environmental problems as they affect human health and the environment.
7. Develop knowledge in advanced disciplines of environmental sciences and evaluate inter-relationships between disciplines.

Specialization leading to an advanced understanding of one of the three component areas that are central to the BSES program:

Earth and Water Resources

1. Understand interactions between land, soil, and water and quantitatively assess processes in soils, hydrogeology, and biogeochemistry.
2. Describe physical, chemical, and biological interactions and processes affecting soil and water resources.
3. Apply advanced analytical techniques related to environmental quality assessments.

Environmental Remote Sensing and Spatial Analysis

1. Develop spatial analytical techniques using remote sensing (satellite and airborne sensors), geographic information system (GIS), and global positioning system (GPS) technologies.
2. Integrate technologies of remote sensing and spatial analysis to problems of environmental modeling and analysis.

Environmental Management

1. Apply skills needed to characterize hazards, track the fate and transport of pollutants.
2. Identify health and environmental effects of pollutants and plan and manage programs to control environmental hazards.

3. Identify and solve problems in solid and hazardous waste, water quality and wastewater treatment, and air quality.

Forensic and Investigative Sciences

Students who graduate from the Forensic and Investigative Sciences program will learn:

Program Level Student Learning Outcomes

Aligned with IUPUI Plus+

1. Generalize the forensic science system in the United States including crime scene investigation, crime laboratories and organization, specialized disciplines, and preparation for a career in forensic science
    1. Communicator: Evaluates Information and Conveys Ideas Effectively
    2. Community Contributor: Builds Community and Behaves Ethically
2. Identity common pattern evidence in forensic science and determine the appropriate analytical techniques used to examine patterned evidence, such as fingerprints, tool marks, physical matches, and firearms
    1. Problem Solver: Thinks Critically and Analyzes, Synthesizes, and Evaluates
    2. Innovator: Investigate and Creates/Designs
3. Interpret the use of chemical and instrumental techniques in forensic analysis and examine common chemical evidence, such as illicit drugs, fire residue, explosives, inks, and paint
    1. Problem Solver: Thinks Critically and Analyzes, Synthesizes, and Evaluates
    2. Innovator: Investigate and Creates/Designs
4. Identify and analyze forensic biological evidence, such as bodily fluids, blood spatter, DNA and interpret evidence using population genetics
    1. Problem Solver: Thinks Critically and Analyzes, Synthesizes, and Evaluates
    2. Innovator: Investigate and Creates/Designs
5. Recognize and demonstrate the use of ethics, bias, criminal and civil laws, rules of evidence, and expert testimony in the practice of forensic science
    1. Community Contributor: Behaves Ethically and Anticipates Consequences
    2. Innovator: Confronts Challenges and Makes Decisions
6. Characterize common microscopes used in analysis of trace evidence and investigate common trace evidence with microscopes such as fibers, hairs, glass, biological and chemical materials
    1. Problem Solver: Thinks Critically and Analyzes, Synthesizes, and Evaluates
    2. Innovator: Investigate and Creates/Design
7. Design a forensic science research project, formulate original ideas and present findings professionally
    1. Communicator: Evaluates Information and Conveys Ideas Effectively
    2. Innovator: Investigate and Creates/Designs

FIS 20500

1. Describe crime scene investigation procedures and the role of forensic science in crime scene investigations
2. Describe the fundamentals of crime laboratory culture and organization along with the possible job functions of forensic scientists
3. Identify, characterize, and individualize evidence and various types of physical evidence
4. Explain the rules of evidence, ethics in forensic science, and quality assurance and control
5. Summarize and interpret techniques used in areas of forensic science by generalizing each area with specific types of evidence analysis; topics include, fingerprints, impressions, firearms, toolmarks, footwear, questioned documents, and computer forensics
6. Explain the role of specialized disciplines in forensic science in criminal and death investigations; disciplines include, taphonomy, pathology, entomology, anthropology and odontology

FIS 20600

1. Identify and investigate the basics of forensic chemistry and forensic biology evidence and job functions
2. Explain the principles and terminology associated with microscopy, spectroscopy, and separation methods
3. Identify and apply microscopy, spectroscopy, and separation techniques to forensic science
4. Classify, Illustrate and Identify commonly encountered forensic evidence in casework
5. Interpret the use of common forensic evidence and the different methods used to analyze evidence; common evidence includes Blood Spatter, DNA, Population Genetics, Illicit Drugs, Toxicology, Fire Residue, Explosives, Fibers, Hairs, Glass, Soil, Paint

FIS 30100

1. Differentiate how commonly encountered trace evidence, such as fibers, hairs, glass, biological and chemical evidence, is analyzed in a forensic laboratory
2. Explain the principles, instrumentation and applications of microscopic techniques such as stereomicroscopy, compound light microscopy, and polarized light microscopy
3. Investigate the application of physical matches and impression evidence comparison such as fingerprints, tire treads, firearms, footwear and tool mark analysis used in forensic science

FIS 30101

1. Prepare and examine trace evidence samples such as glass, hairs, fibers, chemical and biological materials and patterned evidence samples such as fingerprints and tool marks
2. Analyze and compare samples using microscopic techniques such as stereomicroscope, compound light microscopy, and polarized light microscopy

FIS 30500

1. Describe the fundamentals of crime laboratory culture, organization and quality assurance and control used in forensic science laboratories
2. Define ethics/conduct and demonstrate how ethics/ conduct are applied in the analysis of forensic evidence and to the presentation of expert testimony in court
3. Identify the major features of the Code of Ethics of the American Academy of Forensic Sciences and of other major forensic science organizations
4. Distinguish the different types of bias encountered in forensic science and demonstrate methods to reduce or eliminate bias in forensic science

FIS 41500

1. Describe how ethics are applied to the presentation of expert testimony in court
2. Recognize the United States system of justice including the structure, participants, stages, philosophies and dynamics
3. Distinguish the role of an expert witness in the justice system and correlate how to present and communicate forensic examinations and findings in a court of law
4. Summarize the sources and evolution of the law of the United States and the development of the rules of evidence and specifically the admission of expert testimony and evidence in a court of law
5. Apply the evidentiary rules and law of evidence in the collection of evidence, examination of the evidence, and preparation of scientific reports and testimony
6. Demonstrate the ability to conduct accurate, comprehensive and focused scientific investigations and apply appropriate rules of evidence
7. Conduct a literature search on a forensic science research topic and communicate your findings orally and in writing

FIS 49000 - Faculty-Mentored Research Capstone

1. Conduct literature search on a forensic science topic using peer-reviewed resources
2. Synthesize and communicate ideas on a forensic science topic in a professional presentation

FIS 48000 - Forensic Science Professional Capstone

1. Prepare a graduate school application and resume and cover letter for a job search in the forensic science field
2. Identify ways to network appropriately, demonstrate proper interview skills and recognize skills, talents, and interests that help inform searching for a suitable and engaging workplace
3. Identify ways to manage workplace stress

Bachelor of Arts & Bachelor Science in Geology

Broad Earth Sciences Undergraduate Program Goals

Upon graduating, students with an undergraduate degree in Geology (BA and BS) will:

- gain access to employment in professions of their choosing related to Earth Science, Science Education, and/or Environmental Science.
- gain acceptance to reputable graduate programs in the Earth Sciences, Environmental Sciences, or a program of their choosing.
- successfully complete state and/or national professional competency examinations in Earth Sciences.

Student Learning Outcomes for BA and BS in Geology

Students who graduate with a BA or BS Degree will achieve the following objectives:

1. Solve earth science problems using the scientific method and critical thinking.
2. Describe spatial and temporal variations in Earth processes through modeling, mapping, observation and measurement.
3. Understand the evolution of physical Earth and life as reflected in the geologic time scale.
4. Understand the structural and chemical controls on the physical properties and behavior of Earth materials.
5. Evaluate how physical, chemical and biological cycles are integrated into Earth systems from the local to global scale.
6. Understand how events of the geologic past control the current distribution of resources.
7. Assess the impact of physical and chemical cycles on human health and welfare.
8. Evaluate impacts and potential mitigation strategies for natural hazards, resource utilization, climate and environmental change.
9. Demonstrate competence in communicating Earth science problems to a broad audience through written, oral and visual means.
10. Understand the interdependence of the diverse sub-disciplines of Earth science.

Student Learning Outcomes for BA in Earth Science Secondary School Teaching

Upon graduating, students with an undergraduate degree in Earth Science Secondary School Teaching will:

- gain access to employment in professions of their choosing related to Earth Science, Science Education, and/or Environmental Science.
- gain acceptance to reputable graduate programs in the Earth Sciences, Environmental Sciences, or a program of their choosing.
- successfully complete state and/or national professional competency examinations in Earth Sciences.
- satisfy the learning outcomes specified by the School of Education for undergraduate students.

Bachelor of Science in Interdisciplinary Studies (B.S.)

“The purpose of the Bachelor of Science (B.S.) in Interdisciplinary Studies Program is to provide an opportunity for IUPUI students to construct individual majors that are science-based, interdisciplinary, and not represented by an existing major program”. Interdisciplinary Studies Majors create individualized

courses of study; each student, in consultation with his or her faculty mentor, will individually develop student learning outcomes. The following SLOs, however, are common for all Interdisciplinary Studies Majors:

1. Create and develop an individualized plan of study for the proposed major, the interdisciplinary nature between science and at least one other discipline.
2. Design, in consultation with a faculty mentor, 4-6 individualized Student Learning Outcomes that specify an action or outcome of the plan of study that is *observable, measurable, and capable of being demonstrated.*
3. Successfully design, present, and defend an experimental or literature-based research project or internship experience, culminating with a written report or presentation of the findings.

Bachelor of Science in Mathematics and Mathematics Education (B.S.)

The Department of Mathematical Sciences synthesized the IUPUI's Principles of Undergraduate Learning, the National Council of Teachers of Mathematics Standards, and the Mathematics Association of America's competencies for undergraduate mathematics majors to create the following 10 Student Learning Outcomes for the undergraduate mathematics programs. Students will be able to:

1. Understand and critically analyze mathematical arguments.
2. Understand, appreciate, and identify connections between different areas of mathematics.
3. Understand, appreciate, and solve some applications of mathematics to other subjects.
4. Develop a deeper knowledge and competence of at least one area of mathematics.
5. Develop and demonstrate abstract reasoning in a mathematical context.
6. Develop and demonstrate the principle modes of discovery in mathematics.
7. Develop and demonstrate careful and ethical analysis of data.
8. Develop and demonstrate problem-solving skills.
9. Demonstrate effective communication skills of mathematical ideas precisely and clearly, both orally and in writing.
10. Utilize a variety of technological tools (CAS, statistical packages, programming languages, etc.) in analyzing and solving mathematical problems.

Concentrations include: Applied Mathematics, Pure Mathematics, Actuarial Science, Applied Statistics, and Secondary School Teaching

All majors should work on a senior-level project that requires them to analyze and create mathematical arguments and leads to a written and oral report (capstone).

Bachelor of Science in Neuroscience (B.S.)

Profiles of Learning

Upon successful completion of the neuroscience major, students will have developed the capacity to perform tasks related to each of the IUPUI Profiles of Learning, including:

Communicator Profile:

- Be able to research and evaluate questions relating to Neuroscience and related topics
- Be prepared to discuss different topics in Neuroscience from multiple levels of organization
- Communicate Neuroscientific information in a clear, reasoned manner, both verbally and in writing

Problem Solver Profile:

- Integrate knowledge of nervous system function to explain complex processes underlying behavior
- Connect curricular and extracurricular experiences to potential future careers
- Identify various career options in neuroscience to prepare for and pursue one's chosen profession

Innovator Profile:

- Synthesize theoretical and empirical neuroscience information sufficient to then formulate hypotheses, design experiments, and engage in scientific research
- Understand, appreciate and utilize the development, organization, and function of the nervous system to provide new and inventive solutions to community health challenges
- Create new therapeutic treatments based on interpretation of quantitative scientific data

Community Contributor:

- Help build and connect local and global neuroscience communities
- Be able to adjust behaviors and help others adjust behaviors based on new scientific information
- Connect curricular and extracurricular experiences to potential future careers

Bachelor of Science in Physics (B.S.)

Students who graduate with a B.S. in Physics will achieve the following objectives:

1. Know and understand the basic and advanced concepts of classical and modern physics.
2. Master the mathematical skills relevant to the study of physics.
3. Apply the knowledge of physics and mathematics to solve physical problems.
4. Design and perform laboratory experiments in physics.
5. Use computers and software to solve physics problems and to obtain and analyze experimental data.
6. Successfully collaborate with peers, attain the necessary skills, and develop the work ethic to perform and complete physics research.
7. Prepare a written technical document and deliver an oral presentation relevant to physics.
8. Apply her or his skills to other areas or problems.

Bachelor of Science in Physics Teaching (B.S.)

Students who graduate with a B.S. in Physics Teaching will achieve the following objectives:

1. Know and understand the concepts of classical and quantum physics at an intermediate level.

2. Master the mathematical skills relevant to the study of physics.
3. Apply the knowledge of physics and mathematics to solve physical problems.
4. Design and perform laboratory experiments in physics.
5. Use computers and software to solve physics problems and to obtain and analyze experimental data.
6. Prepare a written technical document and deliver an oral presentation relevant to physics.
7. Satisfy the learning outcomes specified by the School of Education for undergraduate students.

Bachelor of Arts and Bachelor of Science in Psychology

Student graduating with a B.A. or B.S. in Psychology will demonstrate the following learning outcomes.

Goal 1: Knowledge Base in Psychology

Student Learning Outcomes

1.1 Describe key concepts, principles, and overarching themes in psychology

1.2 Demonstrate working knowledge of psychology's content domains (biological, developmental, cognitive, social)

1.3 Describe how concepts, principles, and themes in psychology are applied to individual, social, and organizational issues

Goal 2: Scientific Inquiry

Student Learning Outcomes

2.1 Use scientific reasoning to interpret psychological phenomena

2.2 Demonstrate psychology information literacy

2.3 Interpret, design, and gain experience in conducting basic psychological research

Goal 3: Critical Thinking

Student Learning Outcomes

3.1 Generate essential questions to solve problems

3.2 Gather and assess relevant information to come to well-reasoned conclusions

3.3 Recognize and assess assumptions and biases of self and others

Goal 4: Ethical and Social Responsibility in a Diverse World

Student Learning Outcomes

4.1 Apply ethical standards to evaluate psychological science and practice

4.2 Build and enhance interpersonal relationships

4.3 Exhibit respect for members of diverse groups

Goal 5: Communication

Student Learning Outcomes

5.1 Demonstrate effective writing for different purposes

5.2 Exhibit effective presentation skills for different purposes

5.3 Demonstrate professionalism in formal and informal communication with others

Goal 6: Professional Development

Student Learning Outcomes

6.1 Apply psychological content and skills to career goals

6.2 Exhibit self-efficacy and self-regulation

6.3 Develop meaningful professional direction for life after graduation

General Requirements for Graduate Degrees

Students must be seeking graduate degrees and meet the general requirements of the Indiana University Graduate School or the Purdue University Graduate School, depending on the degree. Specific requirements of the individual department in which the student enrolls must also be met. Special departmental requirements are listed under the major department.

At least 30 academic credits are required for the master's degree and at least 90 academic credits are required for the Ph.D. Some programs may require more credits. The maximum number of didactic transfer credits allowed is 12 hours, but some programs may allow fewer. The student's major department and the Office of the Associate Dean for Research and Graduate Education determine acceptability of transfer credits from another college or university. No work may be transferred from another institution unless the grade is a B or higher.

Students must meet graduate school resident study requirements. At least one-half of the total credit hours used to satisfy a Purdue master's degree must be earned while in residence at IUPUI. At least 30 credit hours of IU graduate work must be completed while enrolled on a campus of Indiana University to satisfy the master's degree. At least one-third of the total credit hours used to satisfy degree requirements must be earned (while registered for doctoral study) in continuous residence on the IUPUI campus. The major department should be consulted for other more specific rules.

All non-native speakers of English must submit results of the Test of English as a Foreign Language (TOEFL). A minimal score of 550 on the paper version/PBT TOEFL or a minimal score of 213 on the computer-based version/ CBT TOEFL is required. Departments may set higher standards. Applicants in the Indianapolis area may substitute the IUPUI English as a Second Language (ESL) Placement Examination for the TOEFL. See the English for Academic Purposes web site for additional information. Information about this test is also available from the Office of International Affairs online at http://international.iupui.edu/.

Each student must file a plan of study that conforms to the departmental and disciplinary requirements. This is normally done in consultation with a faculty advisory

committee. A tentative plan of study should be drawn up in advance of registration for the first semester of graduate work. The student and the graduate advisor should do this. Students and advisors should pay careful attention to the deadlines established by the graduate schools for filing plans of study.

Students must meet the grade and grade point average requirements. Only grades of A, B, or C are acceptable in fulfilling graduate school requirements in any plan of study. An advisory committee or department may require higher performance than C in certain courses. Grades of Pass (P) are not acceptable. Specific cumulative grade point average requirements, if any, are determined by the individual departments.

Students must fulfill departmental requirements regarding oral and written examinations. These requirements vary by program and students should consult the major department. The graduate school has no general requirement for oral and written examinations for the non-thesis master's degree.

Graduate Non-Degree Study

A student who has previously earned a bachelor's degree may enroll in graduate courses without making formal application as a degree-seeking student. Application as a graduate non-degree student is, however, required and may be obtained through the IUPUI Graduate Office at the Web site www.iupui.edu/~gradoff/gnd.

Additional information can be obtained at the IUPUI Graduate Office, University Library, Room UL 1170, 755 West Michigan Street, Indianapolis, IN 46202; phone (317) 274-1577. Students should consult the major department to determine how many credits earned in a non-degree status may be transferred into a graduate degree program.

Contact Information

Department of Biology

723 West Michigan Street, SL 306
Indianapolis, IN 46202-5132
Phone: (317) 274-0577; fax: (317) 274-2846
https://science.iupui.edu/biology/

Department of Chemistry and Chemical Biology

Science Building, LD 326
402 North Blackford Street
Indianapolis, IN 46202-3274
Phone: (317) 274-6872, fax: (317) 274-4701
https://science.iupui.edu/chemistry/

Department of Computer and Information Science

Engineering, Science and Technology Building, SL 280
723 West Michigan Street
Indianapolis, IN 46202-5132
Phone: (317) 274-9727; fax: (317) 274-9742
https://science.iupui.edu/cs/

Department of Earth Sciences

Engineering, Science, and Technology Building, SL 118
723 West Michigan Street
Indianapolis, IN 46202-5132
(317) 274-7484; fax (317) 274-7966
https://science.iupui.edu/earthsciences/

Forensic and Investigative Sciences Program

Science Building, LD 326
402 North Blackford Street
Indianapolis, IN 46202-3274
Phone: (317) 274-8969; fax: (317) 274-4701
https://science.iupui.edu/forensic/

Department of Mathematical Sciences

Science Building, LD 270
402 North Blackford Street
Indianapolis, IN 46202-3216
Phone: (317) 274-6918; fax: (317) 274-3460
https://science.iupui.edu/math/

Department of Physics

Science Building, LD 154
402 North Blackford Street
Indianapolis, IN 46202-3273
Phone: (317) 274-6900; fax: (317) 274-2393
https://science.iupui.edu/physics

Department of Psychology

Science Building, LD 124
402 North Blackford Street
Indianapolis, IN 46202-3275
Phone: (317) 274-6947; fax: (317) 274-6756
https://science.iupui.edu/psychology/

Degree Programs

Graduate Certificates

Purdue University Graduate Certificates, offered through the Department of Computer and Information Science, include Databases and Data Mining, Computer Security, Software Engineering, Biocomputing, and Biometrics. For more information on these graduate certificates visit the Computer and Information Science department website.

Master of Science Degrees

Purdue University Master of Science degrees are offered in all School of Science departments except Earth Sciences, which offers an Indiana University Master of Science degree in Geology. The Department of Psychology also offers an Indiana University Master of Science degree in Applied Social and Organizational Psychology. All departments award either a thesis or nonthesis option.

- Applied Social and Organizational Psychology
- Applied Statistics
- Biology
- Chemistry
- Computer and Information Science
- Computational Data Science (Computer and Information Science)
- Computational Data Science (Mathematical Sciences)
- Forensic and Investigative Sciences (Thesis Track FEPAC Accredited)
- Geology
- Industrial Organizational Psychology
- Mathematics
- Mathematics Education
- Physics
- Psychology

Doctor of Philosophy Degrees

Purdue Univeristy Ph.D. degrees are offered in the departments of Biology, Chemistry and Chemical Biology, Computer and Information Science, Mathematical Sciences, Psychology and Physics.

Indiana University Ph.D. degrees are offered in Applied Earth Sciences by the Department of Earth Sciences and in Applied Social and Organization Psychology by the Department of Psychology.

Indiana University Ph.D. Programs pursued at IUPUI in departments or programs of the Indiana University School of Medicine in which School of Science faculty hold adjunct appointments are available.

- Addiction Neuroscience
- Applied Earth Sciences
- Applied Social and Organizational Psychology
- Biology
- Chemistry
- Clinical Psychology
- Computer and Information Science
- Mathematics
- Physics

Joint M.D. - Ph.D. Degrees

Several departments participate in the joint M.D. - Ph.D. program with the Indiana University School of Medicine. In this program, students concurrently earn an Indiana University Doctor of Medicine degree in the School of Medicine and a Ph.D. degree arranged through the School of Science. Students interested in this option should consult the program in which they wish to earn the Ph.D.

Admissions

- Biology
- Chemistry
- Computer and Information Science
- Earth Sciences
- Forensic and Investigative Sciences
- Mathematics
- Physics
- Psychology

Biology, MS & PhD

Students must hold a baccalaureate degree from an accredited institution of higher learning and demonstrate good preparation in the following subjects: Biological Sciences, Organic Chemistry, Physics, and Mathematics.

A minimum graduation grade-point index of 3.00 or equivalent is required for unconditional admission. An undergraduate GPA of 3.00 or higher does not guarantee admission. Applicants with GPAs of 3.00 or slightly above will be expected to have a science course GPA of 3.00.

Transfer Students

Transfer credits from other institutions of higher learning cannot be used to replace the minimum of 9 hours of Biology Department course work required for the M.S. thesis degree. Up to 12 hours of Biology graduate credits taken at IUPUI by graduate non-degree students may be transferred to the non-thesis option. At least half of the coursework hours in a Ph.D. program of study must be taken while enrolled at IUPUI.

Application Process

REMEMBER: ALL MATERIALS MUST BE SUMBITTED TO THE DEPARTMENT BEFORE THE GRADUATE COMMITTEE WILL REVIEW YOUR FILE.

Online Application

In the online application, please make sure you complete all sections. This includes the Personal Statement, Departmental Question, and Recommendations sections. It is helpful to include your name on all typed, uploaded documents.

In the Educational Objective Section, you must select: **Academic Objectives: Biology (Purdue University)**

For the **Personal Statement:** Provide a statement (approximately 750 words) that identifies your academic goals, career objectives, why you are applying to this specific program, and the qualifications you have that make you a strong candidate for this program. For M.S. Thesis and Ph.D. applicants, identify at least one faculty member with whom you would be interested in working.

In the **Departmental Question** section, you must specify which program you are pursuing. The choices are as follows: Pre-Professional Non-Thesis, M.S. Non-Thesis, M.S. Thesis, and Ph.D. Simply write a sentence saying "I am applying for the .... program." and upload it.

The last step before submitting an on-line application is the application fee. ***You must pay this fee in order to submit your application.***

IMPORTANT NOTE: An email will be sent to you when our department receives your complete application. If you do not receive an application submission email within 3-4 weeks, please email or call to verify that we have it. We have several students who mistakenly select the wrong Academic Objective and their application goes to another department. It is important to check your email to verify we received your application. If your application is misdirected, it can be easily switched over to our department.

Letters of Recommendation

At least 2 letters should come from professors in previous science courses and should address the applicant's aptitude and potential in a science program at the graduate level.

The preferred method is using the online section within the application. If you have a person who does not wish to fill out the recommendation online, he or she may write a standard letter and mail it to the department. They can also include an optional recommendation form, but it is NOT required (click here to print the form). You may call the Department of Biology at (317) 274-0577, or e-mail biograd@iupui.edu, with your address to have the optional form mailed to you. We also accept "committee packets" that universities put together for their students.

Official Transcripts

Send two (2) official copies of transcripts from all attended institutions (including any IU campus) directly to the Biology Department:

IUPUI Biology Department

ATTN: Graduate Secretary

723 West Michigan Street, SL 306
Indianapolis, IN 46202

Official GRE and TOEFL Scores

(TOEFL scores are for international students only)*

The GRE and/or subject tests are not required for Ph.D. and Thesis M.S. applicants; however, if submitted, the results are added to the applicant's file for consideration.

Only non-thesis M.S. applicants are required to take the Graduate Record Examination** (GRE) General test. Minimal score requirements for new GRE tests are as follows:

A combined GRE score of 295 for the verbal and quantitative sections

- Verbal score of 146 or greater
- Quantitative score of 145 or greater
- 5 score on the analytical portion of the test

MCAT or DAT scores will be considered ONLY for the Pre-Professional Non-Thesis M.S. program. An MCAT combined total score of 497 or greater (new test) taken within the last 3 years can be submitted or a DAT total score of 17 or greater, taken within the last 3 years can be submitted.

GRE and TOEFL codes: IUPUI = 1325, Biology Department = 0203

*Test of English as a Foreign Language (TOEFL) with a minimum score of 80 (out of 120) is required. Moreover, minimum scores for specific sections are as follows: Writing – 18; Speaking – 22; Listening – 16; Reading – 19.
**To find testing sites or to find scores, visit the ETS website at www.ets.org.

Application Deadlines

Ph.D.: Priority deadline of December 15. After this date please contact the Director of Graduate Studies (Dr. Nicolas Berbari or email biograd@iupui.edu).

M.S. Thesis (full time with support): May 1 for Fall entry or October 1 for Spring entry

Pre-Professional Non-Thesis and M.S. Non-Thesis: August 1 for Fall entry or December 1 for Spring entry

Chemistry, MS & PhD

Applications for full-time study should be completed by January 15th for entry the following fall semester to ensure complete consideration for fellowships and other financial support.

Late applications will be considered only if full-time positions are available. Applications for part-time graduate admission may be submitted up to two months prior to the intended starting date.

University Code: 1325

Application Process

Graduate Application Form: Complete the application online using the Online University Application.

Letters of Recommendation: We require three letters of recommendation from people familiar with you and your student and/or professional career. Your references will receive an automatic notification of a request for a letter of recommendation when you submit your application. Letters on letterhead are also acceptable and should be addressed to Graduate Admissions, c/o Department of Chemistry and Chemical Biology.

Transcripts: One original copy of the official transcript(s) of all previous university work is required. All degrees awarded should be documented. A list of university courses and their titles that do not appear on the transcript(s) should also be sent to us.

GRE: All students are required to take the Graduate Record Examination general test. Please have the documentation of your score mailed directly to us from Educational Testing Service.

TOEFL: Foreign students must take the TOEFL or IELTS. The minimum scores required for admission are 80 (with subscores of 19-reading, 16-listening, 22-speaking, and 18-writing) for the TOEFL internet-based test. or 6.5 (ELTS),

Application Fee: An application fee will be charged which may be paid by credit or debit card.

Fellowships & Assistantship: If you are interested in applying for a fellowship, please download and mail to us the form: "Release of Confidential Information to the University Fellowship Subcommittee."

Note: Fall semester deadline to be considered for a Fellowship or a Teaching Assistantship is January 15th. In addition, University Fellowships are available.

Letters of recommendation and transcripts, should be mailed to:

Graduate Admissions Committee

Department of Chemistry and Chemical Biology

Indiana University-Purdue University Indianapolis

402 North Blackford Street, LD 326
Indianapolis, IN 46202-3274

Graduate Continuing Non-Degree (GCND) Students

Graduate Continuing Non-Degree (GCND) students who wish to enroll in courses, though not necessarily in a degree program, should contact the IUPUI Graduate Office. Students should be aware that no more than 12 credit hours earned as a non-degree student may be counted toward a degree program.

Computer and Information Science

Master of Science in Computer Science (M.S.)

Master of Science in Computational Data Science (M.S.)

Doctor of Philosophy in Computer Science (Ph.D.)

Graduate Certificate Programs

Graduate Certificate in Computer and Information Science

Admission criteria and the application process for Graduate Certificate programs are identical to those of the M.S. program; please consult the M.S. program information.

MS in Computer Science

The applicant to the graduate program must have a four-year bachelor's degree or equivalent. Interested students with 3-year degree should contact the department for information.

The applicant's record should exhibit outstanding achievement as indicated by the grade point average for each degree over his or her entire academic record. An applicant is expected to have a GPA of at least a 3.00 on a scale of 4.00. The record should also demonstrate strong individual accomplishments and recommendations from independent references.

Applicants who do not have a Bachelor's degree in Computer Science or a related field may be required to take prerequisite courses and pass with a grade of B+ or higher.

Application Deadlines

Fall Semester: January 15 (deadline to complete applications in order to be considered for University Fellowship nomination), April 1 (general admission)

Spring Semester: September 15

Application Process

1. 1. IUPUI online application
   2. Three (3) letters of recommendation.
   3. Statement of purpose
   4. Official transcripts, marksheets and evidence of degrees awarded (diploma/degree certificate) from each post-secondary school attended. If the original documents are in not in English, you must submit a certified translation of each official transcript and degree certificate. Notarized copies are NOT acceptable.
   5. Demonstration of English proficiency: Students whose native language is not English must demonstrate English proficiency through one of the following options:
      1. Official TOEFL* score report with the following minimum scores from a single test occurrence:
         80 iBT Total Section minimums are 19 Reading, 14 Listening, 18 Speaking & Writing
      2. Official IELTS (International English Language Testing System) score report with the following minimum scores: **6.5** Overall Band Score - section minimums are 6.5 Reading, 6.0 Listening & Speaking, 5.5 Writing
      3. International applicants who have received a degree in the U.S. are exempted from the TOEFL/IELTS requirement only if the degree was awarded within the last 3 years.
      4. TOEFL "MyBest" scores are not accepted.
   6. GRE* scores: GRE scores are not required for applicants to the Computer Science MS program, however applicants are still strongly encouraged to submit scores for consideration.

*GRE and TOEFL school code: **1325**

GRE department code: **0402**
TOEFL department code: **78**

All test scores must be reported officially to IUPUI from the testing agency. Electronic copies of all academic documents should be attached to the online application. If you are unable to submit electronic copies of academic documents, please contact the department for alternative options. If you have additional questions during the application process, do not hesitate to contact a graduate advisor at (317) 274-9727 or email us at admissions@cs.iupui.edu

MS in Computational Data Science

Qualified graduate students are those that meet the MS admission criteria of the Computer & Information Science Department or Mathematical Sciences Department. Students will be admitted according to the department to which they applied (Computer & Information Science or Mathematical Sciences). The Graduate Committee of each department will be responsible for evaluating the case-by-case applications.

Prerequisite coursework and/or degrees:
4-year Bachelor's degree in Computer Science, Engineering, Mathematics, Statistics or related fields. 4-year Bachelor's degree in any other area of study will be considered on a case-by-case basis, based on the coursework and corresponding grades in the applicant's transcripts, as well as on the overall potential of successfully completing this program.

GPA: Entering students are expected to have a minimum cumulative grade point average (GPA) equivalent to at least 3.00 on a 4.00 scale.

Application Deadlines

Fall Semester: January 15 (deadline to complete applications in order to be considered for University Fellowship nomination), April 1 (general admission)

Spring Semester: September 15

Application Process

1. 1. IUPUI online application
   2. Three (3) letters of recommendation.
   3. Statement of purpose
   4. Official transcripts, marksheets and evidence of degrees awarded (diploma/degree certificate) from each post-secondary school attended. If the original documents are in not in English, you must submit a certified translation of each official transcript and degree certificate. Notarized copies are NOT acceptable.
   5. Demonstration of English proficiency: Students whose native language is not English must demonstrate English proficiency through one of the following options:
      1. Official TOEFL* score report with the following minimum scores from a single test occurrence:
         80 iBT Total Section minimums are 19 Reading, 14 Listening, 18 Speaking & Writing
      2. Official IELTS (International English Language Testing System) score report with the following minimum

scores: **6.5** Overall Band Score. Section minimums are 6.5 Reading, 6.0 Listening & Speaking, 5.5 Writing.
3. International applicants who have received a degree in the U.S. are exempted from the TOEFL/IELTS requirement only if the degree was awarded within the last 3 years.
4. TOEFL "MyBest" scores are not accepted.

6. GRE* score: GRE scores are not required for applicants to the Computational Data Science MS program, however applicants are still strongly encouraged to submit scores for consideration.

*GRE and TOEFL school code: **1325**
GRE department code: **0402**
TOEFL department code: **78**

All test scores must be reported officially to IUPUI from the testing agency. Electronic copies of all academic documents should be attached to the online application. If you are unable to submit electronic copies of academic documents, please contact the department for alternative options. If you have additional questions during the application process, do not hesitate to contact a graduate advisor at (317) 274-9727 or email us at admissions@cs.iupui.edu.

PhD in Computer Science

Applicants must have a four-year bachelor's or equivalent degree. We place great weight on the quality of the institution. The applicant must have adequate computer science background, as determined by the admissions committee.

Applicants who begin a graduate program in computer science at another institution should complete at least a year in that program before applying to us. If the program is a master's program, we normally require completion of the program before registration here. If the program is a doctoral program, we ask for evidence of eligibility to continue that program.

Admissions Requirements:

- A B.S. degree in Computer Science or a related field is desirable.
- Background knowledge requirements - core CS topics, Data Structures, Math, etc. Applicants with deficiencies in these areas may be recommended to enroll in courses in Data Structures, Computer Architecture, Operating Systems, etc. as needed with guidance from faculty. Please contact the graduate program coordinator if you have questions about background knowledge requirements.
- We strongly encourage outstanding candidates from other disciplines to apply.

GPA. We expect our entering students to have a grade point average (GPA) equivalent to at least 3.00 (A = 4, B = 3, C = 2, D = 1, F = 0) in all their courses as well in computer science and mathematics courses.

Application Deadlines

Fall Admission: January 15 with consideration for University Fellowship nomination. April 1 for general admission consideration.

Spring Admission: September 15

Application Process

1. IUPUI online application
2. 3 letters of recommendation
3. Statement of purpose
4. Official transcripts, marksheets and evidence of degrees awarded (diploma/degree certificate) from each post-secondary school attended. If the original documents are not in English, you must submit a certified translation of each official transcript and degree certificate. Notarized copies are NOT acceptable.
5. Demonstration of English proficiency: Students whose native language is not English must demonstrate English proficiency through one of the following options:
    1. Official TOEFL* score report with the following minimum scores from a single test occurrence: **80** iBT Total - Section minimums are 19 Reading, 14 Listening, 18 Speaking & Writing
    2. Official IELTS (International English Language Testing System) score report with the following minimum scores: **6.5** Overall Band Score - Section minimums are 6.5 Reading, 6.0 Listening & Speaking, 5.5 Writing
    3. International applicants who have received a degree in the U.S. are exempted from the TOEFL/IELTS requirement only if the degree was awarded within the last 3 years.
    4. TOEFL "MyBest" scores are not accepted.

6. GRE* scores: GRE scores are required for all applicants to the PhD program, however there is no specific minimum score requirement that must be met.

*GRE and TOEFL school code; 1325
GRE department code: 0402
TOEFL department code: 78

All test scores must be reported officially to IUPUI from the testing agency. Electronic copies of all academic documents should be attached to the online application. If you are unable to submit electronic copies of academic documents, please contact the department for alternative options. If you have additional questions during the application process, do not hesitate to contact a graduate advisor at (317) 274-9727 or email us at admissions@cs.iupui.edu.

Earth Sciences

Ph.D. in Applied Earth Sciences

The Ph.D. program prepares students for academic positions or research and leadership positions in local, state, national, or private environmental organizations. The goal of the program is to prepare future researchers and leaders who assess complex environmental systems

and assist in providing sound options and solutions for optimizing human-environment interactions.

To apply, fill out the Online Application Form provided by the IUPUI Graduate Office.

NOTE: The suggested application submission date is January 15th. Submission in mid-January maximizes the prospective student's opportunity to receive financial aid.

Master of Science in Geology

The IUPUI graduate program in Geology leads to a Master of Science degree from Indiana University. We offer a thesis and non-thesis option; however, typically only thesis-option students are considered for funding. Our thesis option requires 21 - 24 credit hours of graduate level courses and 6 - 9 credit hours of a research thesis. Our non-thesis option requires 33 credit hours of graduate level coursework and 3 credit hours of a research project. See Requirements of MS Degree for more details.

To apply, fill out the Online Application Form provided by the IUPUI Graduate Office.

NOTE: The suggested application submission date is January 15th. Submission in mid-January maximizes the prospective student's opportunity to receive financial aid. However, the Department of Earth Sciences will consider applications for admission throughout the year.

Forensic and Investigative Sciences, MS

The M.S. Program in Forensic Science, which awards a Purdue University degree, requires 30 credit hours of study beyond the baccalaureate level. It is designed for students seeking careers as professional forensic scientists who desire employment in the criminal justice field or a related area. There are two ways to complete the MS, the thesis MS or the non-thesis, accelerated MS. The MS Thesis Program is FEPAC-accredited.

The **admission requirements** are as follows:

- A Bachelor's degree from an accredited institution in the physical or life sciences including chemistry, biology, forensic science, pharmacology/toxicology, or a related science
- A minimum GPA of 3.00 for all undergraduate work

The program will serve full time students who meet the above requirements as well as students who are presently employed full time in a forensic science laboratory or other analytical laboratory.

The M.S. Program in Forensic Science, which awards a Purdue University degree, requires 30 credit hour of study beyond the baccalaureate level. It is designed for students seeking careers as professional forensic scientists who desire employment in the criminal justice field or a related area.

Students must apply in one of the following concentrations; forensic chemistry or forensic biology. All students take a core of required courses which include a professional issues course, a law course and a clinical law course. Each concentration contains specific required courses taken by students in that concentration.

Both thesis and non-thesis options are available. The full-time thesis M.S. program consists of 30 semester credit hours. It is anticipated that the program is competed within two years. The thesis program requires 17 credit hours of course work and 13 credit hour of thesis completion and defense (research). Students who desire a non-thesis M.S. degree (full or part-time) must complete 30 credit hours of coursework approved by the department and it is expected the program is completed within 12 calendar months. This may include up to six credits of internship.

How to Apply for the Full-Time Thesis MS

Application to the program can be done completely online. The online application is called the "Indiana University Graduate Centralized Application System (CAS)"

You will be directed to create an account to begin your application. The application can be filled out in stages and saved along the way so you can return to it later. The eApp has provisions for uploading your personal statement, supplemental questions, and listing contact names for two letters of recommendation.

These people will automatically be emailed and asked to input their letters of recommendation.

Please arrange for your previous academic institutions to send official, sealed transcripts to FIS Graduate Admissions, 402 N. Blackford St., LD 326, Indianapolis, IN 46202. International applicants will need to provide transcripts in both native language and English, as well as a certificate of diploma.

The Forensic and Investigative Sciences Program accepts applications once a year for beginning matriculation in the Fall semester. The deadline for applying to the program is **January 15** of the year you wish to start. Applications must be complete by **January 15** or they will not be considered. Applicants must submit the following:

1. The completed application which will also require
    - Two letters of recommendation. These would normally be from professors who can evaluate your ability to successfully complete graduate work in forensic science
    - A personal statement that discusses your educational and work background, interest and experience (if any) in forensic science, and research interests if you are full time. Supplemental questions requests information about which degree (thesis or non-thesis) and track (forensic biology or chemistry) is applied for along with requiring a list of relevant coursework.
2. Official final transcripts from all higher education institutions that you attended.

Applications are not normally considered on a rolling basis. They are generally considered en masse after the January 15th deadline. You will be notified within a few weeks after the decision is made. If your application is not successful for the thesis program, it will be automatically considered for the non-thesis program.

How to Apply for the Non-Thesis MS

Application to the program can be done completely online. The online application is called the "eApp Online Admissions Application."

You will be directed to create an account to begin your application. The application can be filled out in stages and saved along the way so you can return to it later. The CAS system has provisions for uploading your personal statement, supplemental questions for, and listing contact names for two letters of recommendation. These people will automatically be emailed and asked to input their letters of recommendation.

The Forensic and Investigative Sciences Program review of applications will begin in late February and will continue on a rolling basis until the **March 15** deadline. Applications will also be considered for the Spring term if there is availability (completed applications by December 1).

Applicants must submit the following:

1. The completed application which will also require
   - Two letters of recommendation. These would normally be from professors who can evaluate your ability to successfully complete graduate work in forensic science
   - A personal statement that discusses your educational and work background, interest and experience (if any) in forensic science, and research interests if you are full time. Supplemental questions requests information about which degree (thesis or non-thesis) and track (forensic biology or chemistry) is applied for along with requiring a list of relevant coursework.
2. Official final transcripts from all higher education institutions that you attended.

Mathematics

Master of Science in Mathematics (M.S.)
Master of Science in Computational Data Science (M.S.)

Doctor of Philosophy in Biostatistics (Ph.D.)
Doctor of Philosophy in Mathematics (Ph.D.)

MS in Mathematics

Application Process

1. IUPUI online application
2. A statement of personal and professional goals (300-500 words). This can be submitted as part of the online application or sent directly to the department.
3. A resume or CV. This can be submitted as part of the online application or sent directly to the department.
4. Three letters of recommendation. These are submitted through the online application.
5. Official transcripts and evidence of degrees awarded from each post-secondary school attended. If the original documents are not in English, you must submit a certified translation of each official transcript and degree certificate. Notarized copies are NOT acceptable.
6. Demonstration of English proficiency*: Students whose native language is not English must demonstrate English proficiency through one of the following options:
   1. Official TOEFL score report not more than two years old with the following minimum scores: **550** (paper), or **79** (internet)
   2. Official IELTS (International English Language Testing System) score of at least **6.5**.
   3. Complete approved university-level coursework from U.S. or other English-speaking country.
   4. Graduate from an approved ELS Language Center (Level 112 or higher)
   5. Complete post-secondary education and hold designated exempt country citizenship.
7. Non-waiveable, non-refundable application fee for domestic and international applicants.
8. International Student Financial Information Form (For international students only)
9. GRE (optional) Required for applicants who wish to be considered for financial support.
10. Supplemental Question Form. This can be submitted as part of the online application or sent directly to the department.

*If you are a native speaker of English, you are not required to demonstrate English proficiency. An exception will be granted for non-native speakers of English who have completed a post-secondary degree at a college or university in a native-English speaking country within two years of the anticipated enrollment semester and for non-native speakers of English who are U.S. citizens or permanent residents.

NOTE: All documents submitted become the property of IUPUI. After one year of **no** enrollment, hard copies will be discarded.

Send application materials the following address.

Graduate Admissions Committee
IUPUI Department of Mathematical Sciences
402 N. Blackford Street, LD 270
Indianapolis IN 46202-3216

Email: mathgrad@iupui.edu
Phone: 1-317-274-6918
Fax: 1-317-274-3460

Admission Deadlines

Fall Semester

- Assistantship consideration: March 1
- All international applicants: March 1
- All other applicants: May 1*

Spring Semester

- All international applicants: October 1
- All domestic applicants: November 1*

Due to schedule of course offerings, it is not always feasible to begin the program in the Spring semester. Email mathgrad@iupui.edu for more information before applying for Spring admission.

Summer Semester

- April 1**

*If you cannot provide all application materials by the date indicated above, we encourage you to apply to the Graduate Non-Degree program through the IUPUI Graduate School Office. This program will allow you to take courses towards your intended degree program,

and you may transfer up to 12 credit hours into the M.S. program, subject to graduate committee approval. Email mathgrad@iupui.edu for more information.

**This deadline applies for an M.S. Math Education major only. Due to schedule of course offerings, it is not always feasible to begin the program in the Summer semester (with the exception of math education). Email mathgrad@iupui.edu for more information before applying for Summer admission (unless you are math education).

MS in Computational Data Science

Qualified graduate students are those that meet the MS admission criteria of the Computer & Information Science Department or Mathematical Sciences Department. Students will be admitted according to the department to which they applied (Computer & Information Science or Mathematical Sciences). The Graduate Committee of each department will be responsible for evaluating the case-by-case applications.

Prerequisite coursework and/or degrees:

4-year Bachelor's degree in Computer Science, Engineering, Mathematics, Statistics or related fields. 4-year Bachelor's degree in any other area of study will be considered on a case-by-case basis, based on the coursework and correspoonding grades in the applicant's transcripts, as well as on the overall potential of successfully completing this program.

GPA: Entering students are expected to have a minium cumulative grade point average (GPA) equivalent to at least 3.00 on a 4.00 scale.

GRE: Scores on the Graduate Record Exam (GRE) must be submitted for admission consideration.

Application Process

1. IUPUI online application
2. A statement of personal and professional goals (300-500 words). This can be submitted as part of the online application or sent directly to the department.
3. A resume or CV. This can be submitted as part of the online application or sent directly to the department.
4. Three letters of recommendation. These are submitted through the online application.
5. Official transcripts and evidence of degrees awarded from each post-secondary school attended. If the original documents are not in English, you must submit a certified translation of each official transcript and degree certificate. Notarized copies are NOT acceptable.
6. 4-year Bachelor's degree in Mathematics, Computer Science, Engineering, Statistics or related fields. 4-year Bachelor's degree in any other area of study will be considered on a case-by-case basis, based on the coursework and corresponding grades in the applicant's transcripts, as well as on the overall potential of successfully completing this program.
7. GPA - Entering students are expected to have aminimum cumulative GPA equivalent to at least 3.00 on a 4.00 scale.
8. Demonstration of English proficiency*: Students whose native language is not English must demonstrate English proficiency through one of the following options:
    1. Official TOEFL score report not more than two years old with the following minimum scores: **80** (TOEFL), Section minimum requirements in addtion to the minimum Total requirement: 18 Writing, 18 Speaking, 14 Listening, 19 Reading.
    2. Official IELTS (International English Language Testing System) score of at least **6.5**.
    3. Complete approved university-level coursework from U.S. or other English-speaking country.
    4. Graduate from an approved ELS Language Center (Level 112 or higher)
    5. Complete post-secondary education and hold designated exempt country citizenship.
9. Non-waiveable, non-refundable application fee for domestic and international applicants.
10. International Student Financial Information Form (For international students only)
11. GRE (optional) Required for applicants who wish to be considered for financial support.
12. Supplemental Question Form. This can be submitted as part of the online application or sent directly to the department.

*If you are a native speaker of English, you are not required to demonstrate English proficiency. An exception will be granted for non-native speakers of English who have completed a post-secondary degree at a college or university in a native-English speaking country within two years of the anticipated enrollment semester and for non-native speakers of English who are U.S. citizens or permanent residents.

NOTE: All documents submitted become the property of IUPUI. After one year of **no** enrollment, hard copies will be discarded.

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Admission Deadlines

Fall Semester

- Assistantship consideration: March 1
- All international applicants: March 1
- All other applicants: May 1*

Spring Semester

- All international applicants: October 1
- All domestic applicants: November 1*

Due to schedule of course offerings, it is not always feasible to begin the program in the Spring semester. Email mathgrad@iupui.edu for more information before applying for Spring admission.

Summer Semester

- April 1**

*If you cannot provide all application materials by the date indicated above, we encourage you to apply to the Graduate Non-Degree program through the IUPUI Graduate School Office. This program will allow you to take courses towards your intended degree program, and you may transfer up to 12 credit hours into the M.S. program, subject to graduate committee approval. Email mathgrad@iupui.edu for more information.

**This deadline applies for an M.S. Math Education major only. Due to schedule of course offerings, it is not always feasible to begin the program in the Summer semester (with the exception of math education). Email mathgrad@iupui.edu for more information before applying for Summer admission (unless you are math education).

PhD in Biostatistics

The Ph.D. in Biostatistics is offered jointly with the Department of Biostatistics in the Indiana University School of Medicine and the Indiana University Fairbanks School of Public Health.

Admission Requirements

Applications are invited from individuals with strong quantitative and analytical skills and a strong interest in biological, medical and/or health related sciences. This program requires completion of at least 90 credit hours of graduate work. A maximum of 30 credit hours completed in either a previous degree program, or in graduate non-degree status, may contribute towards this requirement, subject to program approval. However, transfer of credit hours completed in graduate non-degree status is limited to no more than 12. All course grades must be a B or higher in order to be considered for transfer into the program.

Application Process

1. IUPUI online application
2. A statement of personal and professional goals (approximately 750 words). This can be submitted as part of the online application or sent directly to the department.
3. A resume or CV. This can be submitted as part of the online application or sent directly to the department.
4. Three letters of recommendation. These are submitted through the online application.
5. Official transcripts and evidence of degrees awarded from each post-secondary school attended. If the original documents are in not in English, you must submit a certified translation of each official transcript and degree certificate. Notarized copies are NOT acceptable.
6. Non-native speakers of English must provide proof of English proficiency. See the IUPUI Office of International Affairs English Language Requirements for details.
    1. Non-waiveable, non-refundable application fee of $60 for domestic applicants and $60 for international applicants.
    2. International Student Financial Information Form (For international students only; download and print the form).
    3. ALL applicants must submit official general GRE test scores.
7. See http://biostatgradprograms.iupui.edu/admissions/ for additional information
8.

NOTE: All documents submitted become property of IUPUI. After one year of **no** enrollment, hard copies will be discarded.

Admission Deadlines

Fall Semester

- All applicants: December 15

Applications are considered for Fall entry only; application entries for Spring (January) and Summer (June) will not be considered. However, any prospective applicant who would like to start taking classes during a Spring or Summer session is welcome to do so as a graduate non-degree student. A separate application is required.

PhD in Mathematics

Admission Requirements

Applications are invited from individuals with a strong background in mathematics who either have an M.S. in mathematics or else have been admitted to our combined M.S.- Ph.D. program. This program requires completion of at least 90 credit hours of graduate work. An M.S. degree from an accredited university may contribute up to 30 credit hours toward this requirement, subject to approval.

Application Process

1. IUPUI online application
2. A statement of personal and professional goals (300-500 words). This can be submitted as part of the online application or sent directly to the department.
3. A resume or CV. This can be submitted as part of the online application or sent directly to the department.
4. Three letters of recommendation. These are submitted through the online application.
5. Official transcripts and evidence of degrees awarded from each post-secondary school attended. If the original documents are not in English, you must submit a certified translation of each official transcript and degree certificate. Notarized copies are NOT acceptable.
6. Demonstration of English proficiency*: Students whose native language is not English must demonstrate English proficiency through one of the following options:
    1. Official TOEFL score report not more than two years old with the following minimum scores: **570** (paper), **230** (computer), or **80** (internet: writing 18, speaking 18, listening 14, reading 19)
    2. Official IELTS (International English Language Testing System) score of at least **6.5**.
    3. Official PTE (Pearson Test of English) score of at least **58**.
7. Non-waiveable, non-refundable application fee for domestic and international applicants.

8. International Student Financial Information Form (For international students only; download and print the form).
9. The GRE general test scores are required and the GRE Math Subject Test is recommended. Score reports should be submitted directly from the testing service (ETS).
10. Supplemental Question Form. This can be submitted as part of the online application or sent directly to the department.

*If you are a native speaker of English, you are not required to demonstrate English proficiency. An exception will be granted for non-native speakers of English who have completed a post-secondary degree at a college or university in a native-English speaking country within two years of the anticipated enrollment semester and for non-native speakers of English who are U.S. citizens or permanent residents.

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Email: mathgrad@iupui.edu
Phone: 1-317-274-6918
Fax: 1-317-274-3460

Admission Deadlines

Fall Semester

- Fellowship consideration: February 1
- Assistantship consideration: March 1
- All international applicants: March 1
- All other applicants: May 1

Spring Semester

- All international applicants: October 1
- All domestic applicants: October 1

Due to schedule of course offerings, it is not always feasible to begin the program in the Spring semester. Email mathgrad@iupui.edu for more information before applying for Spring admission.

Physics, MS & PhD

Students seeking to enroll in the physics graduate programs should have a background in the usual undergraduate courses in physics, mathematics and other sciences. Graduates from related fields of study in pure and applied sciences, and engineering, may be accepted on a probationary basis until they have completed any necessary undergraduate courses in physics.

Letters of Recommendation: We require three letters of recommendation from people familiar with the the applicant's academic and/or professional performance. (See Letters of recommendation.)

Transcripts: An original copy of the official transcript(s) from all previously attended university programs is required. All degrees awarded should be documented. A list of university courses and their titles that do not appear on the transcript(s) should also be sent to us.

GRE: The Graduate Record Examination general test is required. The subject test in physics is not required, but is strongly encouraged. The documentation of your official GRE score(s) must be sent directly to us by the Educational Testing Service.

TOEFL: Foreign students must take the TOEFL or IELTS. The minimum scores required for admission are 79 (TOEFL internet-based test, (with partial minima of 18 in speaking, 18 in writing, 14 in listening, and 19 in reading)); 213 (TOEFL computer-based test); or 6.5 (IELTS).

Physics Placement Test: A placement test will be given to all new students in the week before the start of their first semester in our program. The purpose of the test is to identify problem areas in physics and mathematics and to decide a plan of study for each student. A second test might be given in the second semester on a case-by-case basis.

Online Application: Please be sure to complete the Supplemental Questions section by answering the questions about your motivation, skills, and interest in physics and physics research. Also note the specific area of Physics that interests you. Apply now.

Application Fee: An application fee will be charged which may be paid by credit or debit card.

Fellowships & Assistantship: Please make sure you submit the application package in a timey manner to be considered for Fellowships and Assistantships offered at the Department and Campus level. If you have any doubt about the timinig, please contact physics@iupui.edu.

Note: The application deadline to receive full consideration for Financial Aid is January 15 for the fall semester and July 15 for the spring semester.

Director of Graduate Programs

Department of Physics

IUPUI School of Science

402 N. Blackford St., LD 154
Indianapolis IN 46202-3273

Psychology

All applicants must have a bachelor's degree from an accredited institution. A master's degree is not required for admission into the Ph.D. programs.

Applicants must:

- submit three (3) letters of recommendation (including the recommendation form),
- submit a personal statement, and
- provide official transcripts (2 copies) of past academic work.

The Graduate Record Examination (GRE) is optional for applicants for the Addiction Neuroscience, Applied Social and Organizational Psychology and Industrial/ Organizational Psychology programs. It is recommended for the Clinical Psychology program.

Admission Deadlines

- December 1 (Clinical Psychology Ph.D.)

- December 1 (Addiction Neuroscience Ph.D.)
- December 15 (Applied Social and Organizational Psychology, Ph.D.)
- February 1 (Industrial/Organizational Psychology M.S.)

Online Applications

Applications are completed online and additional information is available on the Department of Psychology website (https://science.iupui.edu/psychology/).
Call **317-274-6945** or email gradpsy@iupui.edu for additional information.

Apply to the Graduate Program

Addiction Neuroscience Ph.D.

Admission Requirements

Addiction Neuroscience Ph.D.

All admission materials must be submitted by December 1.

Admitted Students enter the program beginning in the Fall semester. The Addiction Neuroscience (AN) program is designed for full-time students only.

Admission Materials

1. Apply online
2. A minimum undergraduate GPA (grade point average) of 3.20*
3. A personal statement expressing interest in addiction neuroscience and detailing any relevant research experience.
4. Three (3) letters of recommendation (including the recommendation form) ideally from faculty or others who can speak to the applicant's preparation for graduate level work in addiction neuroscience..
5. Two (2) official transcripts of all undergraduate and graduate coursework.
6. International students must submit TOEFL (Test of English as a Foreign Language) scores unless the student has a bachelor's degree from a predominantly English-speaking country (check here for the official list).
7. Verbal and quantitative Graduate Record Examination (GRE) scores are optional.

*Majors in the life sciences (psychology, biology, or chemistry) are particularly encouraged to apply, but other degrees will be given full consideration with appropriate course work. Academic preparation and performance in the life sciences (e.g., experimental psychology and behavioral neuroscience; cell and systems biology; chemistry) are given high priority in considering candidates for admission. Note that the candidate's entire application package will be reviewed as a comprehensive and holistic representation of the likelihood for success in graduate studies; no one part of the application materials is deemed "most important".

Women and minorities are strongly encouraged to apply.

Financial support is typically provided to all students in good standing.

For more information about the program, contact Dr. Cristine Czachowski (cczachow@iupui.edu@.

Applied Social and Organizational Psychology Ph.D. (Ph.D.)

Admission Requirements

Applied Social and Organizational Psychology Ph.D.

Admitted students enter the program beginning in the Fall Semester. The Applied Social and Organizational Psychology (ASOP) program is designed for full-time students only.

All admission materials must be submitted by December 15.

Admission Materials

1. A graduate school application that can be electronically submitted
2. A full set of undergraduate and graduate transcripts
3. Three (3) letters of recommendation
4. International students must submit TOEFL (Test of English as a Foreign Language) scores *unless* the student has a bachelor's degree from a predominantly English-speaking country (check here for the official list).
5. A personal statement
6. Departmental Questions

Admission Requirements

- A bachelor's degree in psychology from an accredited institution is highly desirable, but applicants with a bachelor's degree in a similar area with coursework in social science statistics and research methods will be considered. Applicants with graduate degrees (preferably in psychology or a related social science field) will also be considered.
- An undergraduate and graduate GPA (grade point average) of 3.20 or higher on a 4-point scale.
- Three (3) favorable letters of recommendation, ideally from faculty or others who can speak to the applicant's preparation for graduate level work in psychology. The recommendation form must be attached to all reference letters and may be submitted by the recommenders through the online application or mail. Download the Recommendation form if you plan to submit your letters by mail.
- A personal statement expressing an interest in applied social and organizational psychology.
- Relevant research experience, preferably in psychology or a related social science.

Clinical Psychology Ph.D.

Students will be admitted to the program only at the beginning of the Fall Semester. The Clinical Psychology (CP) program is designed for full#time students only.

All admission materials must be submitted by December 1.

Admission Materials

1. A graduate school application that can be electronically submitted
2. A full set of undergraduate and graduate transcripts
3. Three (3) letters of recommendation
4. Verbal and quantitative GRE (Graduate Record Examination) scores recommended, but not required.
5. Foreign students must submit TOEFL scores (Test of English as a Foreign Language) *unless* student

has a bachelor's degree from a predominantly English-speaking country (check here for the official list).
6. A personal statement.
7. Departmental Questions.

Admission Requirements

- An undergraduate and graduate GPA (grade point average) of 3.20 or higher on a 4-point scale.
- Three (3) favorable letters of recommendation. The recommendation form must be attached to all reference letters and may be submitted by the recommenders through the online application or mail. Download the Recommendation form if you plan to submit your letters by mail.
- A personal statement displaying an interest in the field of clinical psychology with a focus in clinical health psychology, severe mental illness/psychiatric rehabilitation, or substance use.
- Prior research experience is strongly recommended, but not required, for admission.

Undergraduate Prerequisites

Except in unusual circumstances, students admitted to the program are expected to have completed at least 15 credit hours in psychology.

Although there are no specific undergraduate course prerequisites for program entry, students without coursework in the following areas will likely be at a disadvantage when taking some of the required courses and may be asked by their instructors to complete some remedial activity prior to enrolling in the graduate course (e.g., reading an undergraduate text or taking an undergraduate course):

1. Tests and Measurement
2. Statistics
3. Abnormal Psychology

Industrial/Organizational Psychology M.S.

Admission Requirements

All applicants must have a bachelor's degree from an accredited institution. Admitted students enter the program beginning in the Fall semester. The Industrial/Organizational (I/O) Psychology program is designed for full-time students only.

All admission materials must be submitted by February 1.

1. Apply online
2. Students must have an undergraduate GPA (grade point average) of at least 3.00 on a 4-point scale
3. Three (3) strong letters of recommendation (including the recommendation Form) ideally from faculty or others who can speak to the applicant's preparation for graduate level work in psychology.
4. A personal statement expressing an interest in industrial/organizational psychology.
5. Two (2) official transcripts of all undergraduate and graduate coursework.
6. International students must submit TOEFL (Test of English as a Foreign Language) scores unless the student has a bachelor's degree from a predominantly English-speaking country (check here for the official list).
7. Relevant research experience, preferably in psychology or a related social science.

Student Learning Outcomes

- Addiction Neuroscience
- Applied Social and Organizational Psychology
- Biology
- Chemistry
- Clinical Psychology
- Computer and Information Science
- Forensic and Investigative Sciences
- Geology
- Industrial Organizational Psychology
- Mathematics
- Physics
- Psychology

Biology

Master of Science in Biology (M.S.)

Students pursuing the Biology Pre-Professional M.S. will be able to:

1. Integrate biological knowledge and information incorporating cellular, molecular, genetic, physiological, and biochemical approaches.
2. Use critical thinking to access, analyze and evaluate information relevant to the study of biological sciences.
3. Develop proficiency in reading, interpreting, and evaluating primary scientific literature.
4. Summarize and present scientific ideas and biological information in a formal setting, in writing and orally, to faculty or fellow students.

Students pursuing the Biology Thesis M.S. will be able to:

1. Conduct independent research under the supervision of a research advisor to design, test, and analyze original laboratory and/or field experiments.
2. Demonstrate the ability to read, interpret, and incorporate the results of primary literature into the research design.
3. Employ rigorous approaches to data collection, replication of experimental results, set up of experimental controls and sampling design, and organization of raw data.
4. Summarize, describe and analyze patterns in data, interpret results and draw conclusions from data to defend an argument.
5. Present and communicate research results to peers through a poster presentation, research seminar and/or publication of results.
6. Write and defend a thesis that demonstrates mastery in at least one discipline of biological sciences.

Master of Arts for Teachers (MAT) (M.S.)

Students pursuing the Biology M.S. for Teachers will:

1. Gain the ability to break down and analyze biological concepts for an undergraduate audience
2. Gain the ability to develop and analyze hypotheses and experiments
3. Gain a fluency with scientific literature

4. Gain a richer understanding of biology in the natural world around us

Doctor of Philosophy in Biology (Ph.D.)

In addition to the above outcomes, students completing the Ph.D. in Biology will be able to:

1. Demonstrate a comprehensive knowledge in biological sciences through successful completion of a qualifying and preliminary examination.
2. Document an original contribution to biology through independent experimental design, peer-reviewed publication of results, and presentation and defense of a thesis.

Graduate Certificate in Biology

Students pursuing the Graduate Certificate in Biology will:

1. Gain the ability to break down and analyze biological concepts for an undergraduate audience
2. Gain the ability to develop and analyze hypotheses and experiments
3. Gain a fluency with scientific literature
4. Gain a richer understanding of biology in the natural world around us

Chemistry

Master of Science in Chemistry (M.S.)

In addition to the stated SLOs for B.A. and B.S. students, those who graduate with a M.S. in Chemistry will be expected to:

1. Demonstrate increased depth of understanding in most sub-disciplines of chemistry.
2. Integrate sub-disciplines of chemistry and other disciplines as applicable in problem solving and research.
3. Read and understand peer-reviewed chemical literature, and apply in field of study.
4. Present and communicate results to peers through poster, seminar, and/or publishing.
5. Identify chemical problems and design experiments to solve these problems.
6. Teach effectively in labs or recitations in lower-level undergraduate chemistry courses.
7. For thesis MS, propose major area of research and conduct independent research under the mentoring of a research advisor.
8. For thesis MS, write and defend the thesis.

Doctor of Philosophy in Chemistry (Ph.D.)

In addition to the above learning outcomes for the M.S. degree, Chemistry Ph.D. students upon graduation will be expected to:

1. Think critically and creatively.
2. Propose original research project and conduct this research independently, including project design, analysis, and conclusion.
3. Demonstrate mastery of chemistry in at least one discipline of chemistry.
4. Communicate and defend scholarly works.

Computer and Information Science

Graduate Certificates

The CIS department offers graduate certificates in Biocomputing, Computer Security, Software Engineering, Databases and Data Mining, and Biometrics. After graduation, a student should be able to:

1. Demonstrate a sound understanding of computing principles in the chosen area of study (Biocomputing, Biometrics, Computer Security, Databases and Data Mining, Software Engineering).
    1. As evident from appropriate grades earned to satisfy the core course requirement for a specific certificate program
2. Demonstrate an ability to work in a group.
    1. As evident from successfully developing moderately intense collaborative projects (e.g., semester projects in courses)
3. Demonstrate an ability to solve moderately complex problems in the chosen area of study.
    1. As evident from successful completion of elective courses in Computer Science or related fields, as required by the Certificate program(s)

Master of Science in Computer and Information Science (M.S.)

After graduation, a student should be able to:

1. Demonstrate a sound understanding of general fundamental computing concepts (e.g., algorithms, programming languages, operating systems, etc.).
    1. As evident from appropriate grades earned to satisfy the core course requirements
2. Demonstrate a relatively in-depth understanding of a subarea.
    1. As evident from successfully completing a series of courses in a sub-area (e.g., databases)
3. Demonstrate an ability to successfully work in a group and/or demonstrate an ability to successfully carry out moderately complex software projects.
    1. As evident from successfully developing moderately intense collaborative projects (e.g., semester projects in courses) and/or
    2. As evident from software development assignments/projects in courses (e.g., projects in networking course)

Additional Expectation from M.S. students choosing Thesis or Project Option:

1. Demonstrate an ability to systematically carry out scientific research (empirical and/or theoretical) on a moderately complex problem.

Master of Science in Computational Data Science (M.S.)

After graduation, a student should be able to:

1. Synthesize data analysis principles across the statistical and computer sciences in topics such as pattern analysis, prediction, and big data processing.
2. Construct data science algorithms, including derivation and programming implementation in a variety of languages and platforms (C++, Python, Java, SAS, R, Matlab).
3. Be able to assess new programming language trends in industry, by gaining solid background in computing and algorithmic thinking.
4. Differentiate the processes from "raw data to outcome", which spans from considering the domain-specific constraints and charactertistics (e.g., static vs. sequence, sparsity, dimensionality, etc.) to efficient method implementation, as software with desired specifications.
5. Integrate advanced knowledge in a broad range of related topics, such as survival analysis in Computer Science.
6. Assess different solutions to specific data-specific problems.
7. Summarize state-of-the-art data science methods and applications in scientific project reports and software documentation.

Doctor of Philosophy in Computer and Information Science (Ph.D.)

In addition to the above M.S. outcomes, Ph.D. students will:

1. Demonstrate an ability to develop original solutions and their validation that extend the state-of-art in a chosen specialization to significant research problem(s) as evident from publications in highly-ranked conferences/journals.

Forensic and Investigative Sciences

Master of Science in Forensic and Investigative Sciences (M.S.)

- Understand and describe the development of forensic science in the world and US and how we arrived at the present system.
- Describe the judicial system and the role of forensic science within it.
- Explain the development of the rules of evidence that pertain to the introduction of scientific evidence.
- Describe the major ethical issues facing forensic scientists today.
- Summarize the methods of collection and preservation of physical evidence and maintenance of the chain of custody.
- Describe the various schemes of classification of evidence and their importance.
- Compare the methods and strategies of the presentation of scientific evidence in court.
- Understand types of impression evidence including fingerprints, footwear, tire treads, toolmarks, and bullets and cartridge casings.
- Apply understanding of impression to analyze fingerprints, footwear, tire treads, toolmarks, and bullets and cartridge casings.
- Understand applications of light microscopy such as: stereomicroscopy, compound light microscopy, and polarizing light microscopy.
- Demonstrate common techniques used with light microscopy.
- Integrate instrumental microscopy techniques in the examination of trace evidence.
- Apply knowledge of the rules of evidence to promote effectiveness in the collection of evidence, examination/analysis of the evidence, and in the preparation of scientific reports and testimony.
- Describe the kinds of evidence that require a scientific foundation for admission.
- Demonstrate the ability to conduct accurate comprehensive and focused scientific investigations and apply appropriate rules of evidence.
- Interpret and implement standards of forensic practice as established by the rules of evidence.
- Apply knowledge of forensic science to case scenarios, and will exhibit increased mastery of the written and verbal presentation of scientific evidence generally.
- Demonstrate an overall knowledge of the legal system and more specifically, the criminal justice system in the courts of the United States and Indiana.
- Summarize the basic practical and legal aspects of some forensic techniques.
- Conduct a critical evaluation of the limitations and capabilities of some techniques for the purposes of writing reports and testifying in court.
- Demonstrate proper techniques for courtroom testimony and the use of exhibits.

Specialized Outcomes for Students Completing the Thesis Track:

- Conduct a literature search on a forensic science research topic.
- Participate in the design of a research project.
- Carry out experiments to properly collect data.
- Ability to document research data.
- Ability to evaluate and interpret research data.
- Effectively communicate research results through written, oral and visual presentations.

Specialized Outcomes for Students Completing the Non-Thesis Track:

- Conduct a literature search relevant to an area of research or laboratory procedure.
- Understand and describe an appropriate experimental design for laboratory projects.
- Generate a complete proposal for an independent laboratory project.
- Summarize the transition from a scientist to a manager/leader, including leadership assessment, time management, communication and effective delegation.
- Analyze the key components of quality assurance, including implementation of ISO 17025 and the essential national conversation about the accreditation of forensic science laboratories.
- Compare and contrast the best practices with regards to staff motivation, employee evaluation, conflict resolution, effective negotiations, creative problem-solving, collaborative decision-making and teambuilding.

- Integrate the concepts of revenue, expenses, assets, liability, appropriation and fiscal year within the context and resource constraints of a forensic science laboratory.
- Differentiate the processes of budgeting, forecasting and financial reporting in a forensic science laboratory.

Specialized Outcomes for Students Completing the Forensic Biology Concentration:

- Explain the principles, instrumentation and forensic applications of the following to biological evidence analysis:
  - Collection and preservation of evidence
  - Presumptive and confirmatory tests
  - Introduction to DNA typing
  - Single source DNA profiling
- Describe the biological composition, origins, significance for the most commonly encountered types of biological evidence such as blood, semen, and hair.
- Determine the appropriate scheme to be used on biological evidence as it were to be found at a crime scene.
- Demonstrate an understanding of the general concepts of population genetics.
- Differentiate between the main theories.
- Apply knowledge to generate a break-down of several examples through individual presentations of research articles.
- Describe practical examples of population genetics usage
- Recognize and explain the techniques used such as GWAS and Forensic DNA profiling statistics.
- Formulating results using several different Population Genetics computer software on sample data.

Specialized Outcomes for Students Completing the Forensic Chemistry Concentration:

- Describe the major effects of alcohol and drugs on the human body.
- Describe the main legal issues surrounding alcohol and illicit drugs.
- Provide detailed information regarding the analytical methods for alcohol and drugs.
- Identify major areas of research focused on alcohol and drug analysis.
- Explain the principles, instrumentation and forensic applications of the following to trace evidence analysis:
  - Chromatography Techniques: TLC, HPLC, and GC
  - Energy-Induced Methods: EDS, XRF and XRPD
  - Spectroscopy Techniques: UV/vis/ fluorescence, FTIR and Raman
  - Mass Spectrometry using EI, CI and ESI
- Describe the chemical composition, origins, significance and instrumental methods for the most commonly encountered types of trace evidence such as ink, paint, fibers, explosives, and ignitable liquids.
- Determine the appropriate analytical scheme to be used on trace evidence.

Geology

Broad Earth Sciences Graduate Program Goals

Upon graduating, students with a graduate degree (MS in Geology or PhD in Applied Earth Sciences) will:

- Broadly understand and explain the significance of major research questions in one or more areas of earth sciences.
- Formulate testable scientific hypotheses.
- Carry out independent research in one or more subfields of earth sciences, using appropriate field, experimental, analytical, and/or computational methods.
- Describe, synthesize, and interpret the results of a scientific investigation orally and in writing.

Student Learning Outcomes for the M.S. Degree Program

Students who graduate with an MS degree* will achieve the following objectives:

1. Demonstrate the ability to synthesize current research questions and approaches in one or more subfields of Earth Sciences by critical evaluation of primary scientific literature.
2. Write a research proposal that presents a testable hypothesis, outlines the types of data needed to test the hypothesis, and describes how the collected data will be used to test the hypothesis.
3. Devise and implement a field, experimental, analytical, and/or computational plan aimed at collecting and analyzing the data necessary to address a specific scientific question.
4. Communicate research results to peers via poster or oral presentation, or publication in peer-reviewed journals, meeting abstracts, and/or technical reports.
5. Write and defend their research results (orally or in poster format) to demonstrate mastery of the material and an ability to communicate the results and significance of their work.

**numbers 1-5 apply to thesis-option MS graduates. Number 1 applies to non-thesis option MS graduates.*

Student Learning Outcomes for the PhD in Applied Earth Sciences

Students who graduate with a Ph.D. in Applied Earth Science will achieve the following objectives:

1. Conduct independent research under the supervision of a research advisor to design, test, and analyze the results of original laboratory and/or field experiments.
2. Demonstrate the ability to read, interpret, and incorporate the results of primary literature into the research design.
3. Employ rigorous approaches to sampling design and data collection, replication of experimental results, set up of experimental controls, and organization of raw data.

4. Summarize, describe and analyze patterns in data, interpret results and draw conclusions from data to defend or refute a hypothesis.
5. Demonstrate a comprehensive knowledge of applied earth sciences through successful completion of preliminary and qualifying examinations.
6. Document an original contribution to applied earth sciences through publication of peer-reviewed results, and presentation and defense of an original dissertation.

Mathematics

Master of Science in Mathematics (M.S.)

Degree concentrations include: Applied Mathematics, Pure Mathematics, Applied Statistics, and Math Education. In addition to the Student Learning Outcomes for the B.S. degree, those who graduate with a M.S. degree in Mathematics will be able to:

1. Demonstrate increased depth of understanding in most sub-disciplines of mathematics.
2. Integrate sub-disciplines of mathematics and other disciplines as applicable in problem solving.
3. Read and understand peer-reviewed mathematical literature.
4. Identify mathematical problems and design solutions to solve these problems.

Master of Science in Mathematics - Applied Statistics Concentration (M.S.)

1. Demonstrate increased depth of understanding in most sub-disciplines of mathematics.
2. Integrate sub-disciplines of mathematics and other disciplines as applicable in problem solving.
3. Read and understand peer-reviewed mathematical literature.
4. Identify mathematical problems and design solutions to solve these problems.
5. Develop a deeper knowledge and competence in the area of applied statistics.

Master of Science in Mathematics Teaching (M.S.)

In this program, it is intended that students:

1. Develop an increased appreciation for higher mathematics
2. Learn about the sources and history of secondary mathematics
3. Learn about how abstract algebra forms the foundation for high school algebra and solving for the roots of an equation
4. Learn a deeper appreciation for mathematical analysis in order to be able to teach calculus effectively in the high school
5. Study alternate forms of geometry, including projective or hyperbolic geometry, in order to inform their teaching of proofs in high school geometry
6. Learn the art of probabilistic and statistical thinking
7. Depending on the students' interests, learn more about solving differential equations and applied mathematics
8. Study the logical foundations of mathematics in set theory or through construction and development of the number systems

Master of Science in Computational Data Science (M.S.)

After graduation, a student should be able to:

1. Synthesize data analysis principles across the statistical and computer sciences in topics such as pattern analysis, prediction, and big data processing.
2. Construct data science algorithms, including derivation and programming implementation in a variety of languages and platforms (C++, Python, Java, SAS, R, Matlab).
3. Be able to assess new programming language trends in industry, by gaining solid background in computing and algorithmic thinking.
4. Differentiate the processes from "raw data to outcome", which spans from considering the domain-specific constraints and charactertistics (e.g., static vs. sequence, sparsity, dimensionality, etc.) to efficient method implementation, as software with desired specifications.
5. Integrate advanced knowledge in a broad range of related topics, such as survival analysis in Computer Science.
6. Assess different solutions to specific data-specific problems.
7. Summarize state-of-the-art data science methods and applications in scientific project reports and software documentation.

Doctor of Philosophy in Mathematics (Ph.D.)

In addition to the Student Learning Outcomes for the M.S. degree, those who graduate with a Ph.D. degree in Mathematics will be able to:

1. Demonstrate a basic understanding of the fundamental ideas underlying the basic mathematical disciplines.
2. Demonstrate the ability to recognize significant research problems.
3. Demonstrate the ability to analyze problems, reach research solutions, and transmit the fundamental ideas to others.
4. Demonstrate a comprehensive knowledge in mathematical sciences through successful completion of a qualifying and preliminary examination.
5. Document an original contribution to mathematics through independent experimental design, peer-reviewed publication of results, and presentation and defense of an original thesis.

Doctor of Philosophy in Biostatistics (Ph.D.)

In addition to the Student Learning Outcomes for the M.S. degree, those who graduate with a Ph.D. degree in Biostatistics will be able to:

1. Demonstrate a basic understanding of the fundamental ideas underlying the basic mathematical disciplines.
2. Demonstrate the ability to recognize significant research problems.

3. Demonstrate the ability to analyze problems, reach research solutions, and transmit the fundamental ideas to others.
4. Demonstrate a comprehensive knowledge in biostatistics through successful completion of a qualifying and preliminary examination.
5. Document an original contribution to biostatistics through independent experimental design, peer-reviewed publication of results, and presentation and defense of an original thesis.

Physics

Master of Science in Physics (M.S.)

Student will demonstrate the following learning outcomes:

1. Students demonstrate proficiency in the core areas of physics (Classical Mechanics, Electromagnetism, Thermal Physics and Quantum Physics), and have knowledge of math sufficient to perform the calculations needed to apply their knowledge (Linear Algebra, Ordinary and Partial Differential Equations, Vector Calculus).
2. The most important outcome of their Masters is an ability to carry out a research project under the supervision of a faculty member. Research includes written and verbal communication. The written portion is demonstrated in a thesis or report. The ability to communicate verbally is demonstrated during the first part of the defense, which is open to the public. It is not required but expected that students will present their research at scientific conferences.

The students' progress towards their MS degree is evaluated by their advisors and advisory committee.

Doctor of Philosophy in Physics (Ph.D.)

Students will demonstrate the following learning outcomes:

1. Students demonstrate expertise in core areas of physics (Electromagnetism, Thermal Physics and Quantum Physics), as well as in other areas associated specifically with their research.
2. They demonstrate proficiency in widely used areas of mathematics (Linear Algebra, Ordinary and Partial Differential Equations, Vector Calculus) and in the use of advanced mathematical tools needed in their physics courses and their research.
3. The most important outcome of their PhD is an ability to perform substantial independent research in collaboration with a faculty member. Their research culminates in an original project, written as a Thesis and defended in an examination, which has a public part and a meeting with the examination committee. It is also expected that the student's research findings are published in scientific journals.
4. Communication skills are emphasized throughout the PhD program. During the program, students write reports as part of their graduate courses and need to demonstrate English proficiency as TAs in recitations and instructional laboratories. In addition, PhD students are required to present their research results at scientific conferences either in the form of oral or poster presentations. At the end of the program, the student's PhD Thesis and examination establish the student's ability to communicate verbally and in scientific writing at a high level. Students also write reports in their courses, they have to present their research results at conferences, and it is expected that they will publish their results in scientific journals.
5. Their ability of PhD students to plan and design a research plan is evaluated at a Preliminary exam when, if successful, they are fully admitted into the PhD program. Students in the PhD program meet at least once a year with their advisory committee to report on their progress.

Doctor of Philosophy in Addiction Neuroscience (Ph.D.)

Graduate students earning a Purdue University Ph.D. in Addiction Neuroscience on the IUPUI campus will demonstrate the following abilities related to the research focus of the degree:

1. Demonstrate knowledge of key concepts in the psychological and brain sciences, including the methods, history, and theoretical and empirical foundations, with special emphasis on the neuroscience of addiction.
2. Demonstrate the knowledge and skills necessary to conduct, analyze, interpret, and communicate original research and scholarship in behavioral neuroscience, particularly in addiction neuroscience.
3. Demonstrate understanding of the neural mechanisms and processes associated with the causes and consequences of substance abuse, including integration across genetic, neurobiological, developmental, and behavioral levels.
4. Think critically and creatively to solve problems and generate new knowledge in behavioral neuroscience in general, with focus on and application to problems of drug abuse and addiction.
5. Conduct research in the behavioral and addiction neurosciences in an ethical and responsible manner.

Master of Science and Doctor of Philosophy in Applied Social and Organizational Psychology (Ph.D.)

Students graduating with a Ph.D. in Applied Social and Organizational Psychology will be able to:

1. Demonstrate mastery of knowledge of the core content areas of *organizational psychology* (e.g., staffing, human resources and organizational development, work motivation, leadership, and group/team performance) and *applied social psychology* (e.g., attitudes and social cognition, social stigma, and managing a diverse workforce).
2. Apply the theory, methodologies, and data analytic procedures to conduct research on topics relevant to organizations and society.
3. Synthesize and critically evaluate psychological theory and research as they relate to human cognition, emotion, and behavior in social and organizational settings.
4. Apply skills related to the conceptualization, implementation, and evaluation of scientifically-based interventions intended to improve

organizational functioning and provide evidence-based solutions to societal problems.
5. Communicate effectively to members of the field and to the general public.
6. Demonstrate awareness of, appreciation for, and interpersonal skills regarding human diversity.
7. Behave ethically and professionally in accordance with the American Psychological Association's Ethics Code in the conduct of research and in personal and professional settings.

Clinical Psychology

Doctor of Philosophy in Clinical Psychology (Ph.D.)

Graduate students earning a Purdue University Ph.D. in Clinical Psychology on the IUPUI campus will demonstrate the following abilities:

1. Students will demonstrate knowledge in the breadth of scientific psychology, including historical perspectives of its foundations and development.
2. Students will demonstrate knowledge in the theory, methodology, and data analytic skills related to psychological research.
3. Students will demonstrate the ability to generate new scientific knowledge and theory related to the field of psychology.
4. Students will acquire knowledge and skills in the assessment of individual strengths and weaknesses, as well as the diagnosis of psychological problems and disorders.
5. Students will acquire knowledge and skills in the conceptualization, design, implementation, delivery, supervision, consultation, and evaluation of empirically-supported psychosocial interventions for psychological problems and disorders.
6. Students will demonstrate sensitivity, knowledge, and skills in regard to the role of human diversity in the research and practice of clinical psychology.
7. Students will demonstrate a working knowledge of the APA Ethics Code and will demonstrate their ability to apply ethical principles in practical contexts.

Master of Science in Industrial/ Organizational Psychology (M.S.)

Students graduating with a M.S. in Industrial/ Organizational (I/O) Psychology will be able to:

1. Demonstrate mastery of knowledge of the historical foundations of I/O psychology and its core content areas: *personnel psychology* (e.g., selection, training, and performance management) and *organizational psychology* (e.g., motivation, leadership, job attitudes, and group/team performance).
2. Apply the theory, methodologies, and data analytic procedures to conduct research in organizational settings or on topics relevant to organizations.
3. Synthesize and critically evaluate psychological theory and research as they relate to human cognition, emotion, and behavior in organizations.
4. Apply skills related to the conceptualization, implementation, and evaluation of scientifically-based interventions intended to improve organizational functioning.
5. Communicate effectively to members of the field and to the general public.
6. Demonstrate awareness of, appreciation for, and interpersonal skills regarding human diversity.
7. Behave ethically and professionally in accordance with the American Psychological Association's Ethics Code in the conduct of research and in personal and professional settings.

Psychology

Master of Science in Psychology (M.S)

Graduate students earning a Purdue University M.S. in Psychology on the IUPUI campus will demonstrate the following abilities:

1. Students will demonstrate knowledge in the breadth of scientific psychology, including historical perspectives of its foundations and development.
2. Students will demonstrate knowledge in the theory, methodology, and data analytic skills related to psychological research.
3. Students will demonstrate the ability to generate new scientific knowledge and theory related to the field of psychology.
4. Students will acquire knowledge and skills in the assessment of individual strengths and weaknesses, as well as the diagnosis of psychological problems and disorders.
5. Students will acquire knowledge and skills in the conceptualization, design, implementation, delivery, supervision, consultation, and evaluation of empirically-supported psychosocial interventions for psychological problems and disorders.
6. Students will demonstrate sensitivity, knowledge, and skills in regard to the role of human diversity in the research and practice of clinical psychology.
7. Students will demonstrate a working knowledge of the APA Ethics Code and will demonstrate their ability to apply ethical principles in practical contexts.

Admission

All students entering the School of Science must have been officially admitted to the university by the IUPUI Undergraduate Admissions Center, Campus Center, Room 255, 420 University Blvd., Indianapolis, IN 46202. Further information and application forms may be obtained at this address, by calling (317) 274-4591, or on the Web at www.enroll.iupui.edu.

Applicants should be aware that, under Indiana law, criminal convictions might result in ineligibility for admission to certain programs at IUPUI. For the School of Science, criminal convictions may also result in ineligibility for enrollment in certain courses or participation in certain projects. Questions regarding school policy on such matters should be addressed to the Executive Director of Academic and Student Affairs or the Associate Dean for Academic Affairs.

International Students

International students seeking admission to the School of Science at IUPUI must submit the international application for admission, which is available online from the IUPUI Office of International Affairs. Additional information can be obtained at IUPUI Office of International Affairs, 902 W.

New York St., ES 2126 46202; phone (317) 274-7000; fax (317) 278-2213; email: @.

Undergraduate Requirements

Beginning Students

Students entering IUPUI directly from high school should file their applications for admission early in their senior year.

Acceptance to the university as a new student is influenced by several factors. The Undergraduate Admissions Center is guided by the following:

- The applicant should be a high school graduate or be scheduled to graduate before enrolling at IUPUI.
- The extent to which the student meets or exceeds the minimum subject requirements indicated below is considered. For admission to the School of Science, the student's record should include the following course work:

Subjects	Semesters
English	8
History and Social Science	6
Algebra	4
Geometry	2
Trigonometry	1-2
Laboratory Science	6 (including chemistry and biology)
Combination of foreign language, additional mathematics, laboratory science, social science, or computer science courses	6-7

Applicants to the School of Science are strongly encouraged to complete AP science and mathematics courses if available at their high school. Applicants considering majors in physics or chemistry are encouraged to complete a calculus course in high school.

In planning high school electives, the curricula of the various departments of the School of Science contained in this bulletin should be reviewed. Departmental advisors will be glad to help with planning for admission.

- All applicants are required to take the Scholastic Aptitude Test (SAT) or the American College Test (ACT). IUPUI requires that the writing section of the test also be completed. It is recommended that these tests be taken in the spring of the junior year in high school or fall of the senior year.

The Undergraduate Admissions Center will examine the applicant's high school transcript and standardized test scores to determine both admission to the university and acceptance to the School of Science.

Students should declare a major when applying for admission so a departmental advisor can be assigned.

Transfer Students

From IUPUI Schools, Indiana University Campuses, and Purdue University Campuses

Prospective transfer students should have a minimum grade point average of 2.00 on a 4.00 scale, meet the requirements of the department or program they wish to enter, and be in good disciplinary standing. In order to be accepted for admission to the School of Science, students must first provide the materials indicated below.

- An IUPUI campus student should file a record change online form. The form and information about the process may be found at: science.iupui.edu/undergraduate/admissions.
- A Purdue University campus student must make an official application through the IUPUI Undergraduate Admissions Center at https://admissions.iupui.edu.
- A student from another Indiana University campus, must make an official application through the IUPUI Undergraduate Admissions Center using the Intercampus Transfer Application. Additional information is available at https://admissions.iupui.edu.

From Other Colleges and Universities

Students who have earned transfer credit for 12 credit hours and have a minimum cumulative grade point average of 2.00 on a 4.00 scale from other institutions may be considered for admission to the School of Science. Admittance to the school is contingent upon acceptance into a departmental program. Students should submit the following with their application for admission to the IUPUI Undergraduate Admissions Center:

- a copy of their high school record showing satisfactory completion of entrance requirements; students with less than 26 hours of transfer work must present SAT or ACT scores.
- an official transcript of work completed in all institutions previously attended
- evidence of good academic and disciplinary standing at the institution last attended

The Undergraduate Admissions Center evaluates credit from other institutions, and the major department and the School of Science determine its applicability toward degree requirements in the School of Science.

A marginal applicant may be granted admission, admitted on probation, or have admission denied.

From IUPUI to Other Indiana University and Purdue University Campuses

Students transferring from IUPUI to other Indiana University and Purdue University campuses should consult the appropriate departments at those campuses about equivalence of courses.

Transfer Credit Evaluation

The student's major department and the School of Science determine acceptability of transfer credits from another college or university to the School of Science. In some cases, a course description and/or a course syllabus may need to be reviewed by the corresponding IUPUI department for consideration of applicability to a degree requirement.

Graduate and Doctoral Requirements

For Admission requirements please refer to the IUPUI University Graduate Office.

Non-Degree Students

Undergraduate Non-Degree Program

Students who hold a bachelor's degree from IUPUI or another university may register at IUPUI as Undergraduate Non-Degree students. This enrollment status is desirable for students who need to take a small number of undergraduate courses in order to apply for medical school or other professional programs in, for example, dentistry, occupational therapy, optometry, pharmacy, physical therapy, and veterinary medicine. Students enrolled as undergraduate non-degree pay undergraduate tuition and fees, but may only register for undergraduate courses.

Undergraduate non-degree students who enroll in graduate courses may be administratively withdrawn from these courses and may forfeit tuition and associated fees. Undergraduate non-degree students may seek academic advising through the School of Science. Students enrolled as undergraduate non-degree are eligible for Stafford loans only, provided they have not used up their undergraduate financial aid eligibility. They may also seek loans or support through banks or other financial institutions. Students enrolled as undergraduate non-degree are not eligible for other forms of financial aid through IUPUI.

Graduate Non-Degree Program

The students who normally select the graduate non-degree classification are those whose intent is to take course work for personal improvement. A student who wishes to become a candidate for an advanced degree should consult with the chosen major department at the time of application for admission as a graduate non-degree student. The major department will advise applicants of the procedure for obtaining status as a degree-seeking student. An application to become a graduate non-degree student is obtained through the IUPUI Graduate Office at the following Web site: http://graduate.iupui.edu/admissions/non-degree.shtml. Additional information can be obtained at the IUPUI Graduate Office, University Library, Room UL 1170, 755 W. Michigan Street, Indianapolis, IN 46202; telephone (317) 274-1577.

No more than 12 hours of credit earned under this classification may be used on a plan of study for a Purdue University degree program without approval of the major department and the Purdue University Graduate School. Similarly, no more than 9 hours of credit earned under this classification may be used in a plan of study for an Indiana University degree program without approval of the major department.

Departments & Programs

- Biology
- Biotechnology
- Chemistry and Chemical Biology
- Computer and Information Science
- Earth Sciences
- Environmental Science
- Forensic and Investigative Sciences
- Interdisciplinary Studies
- Mathematical Sciences
- Neuroscience
- Physics
- Psychology
- Special Programs

Department of Biology

723 W. Michigan Street, SL 306
Indianapolis, IN 46202-5132
Phone: (317) 274-0577; fax: (317) 274-2846
https://science.iupui.edu/biology/

Department Chair: Theodore R. Cummins, Ph.D.

Department Advisors:

- Graduate Programs:
  - James Marrs, Ph.D. (Pre-Professional Non-Thesis)
  - Nicolas Berbari, Ph.D.

The Department of Biology offers undergraduate instructional programs leading to the Bachelor of Arts (B.A.), Bachelor of Science (B.S.) and Biotechnology B.S. degrees. These programs are designed to prepare students for a variety of careers in the biological sciences and allow sufficient flexibility to accommodate the needs and interests of students. Postgraduate activities frequently selected by biology majors include graduate schools, medical and dental schools, other health care professions, agricultural schools, industrial positions in research and technology, and secondary teaching.

The selection of a particular degree program in biology should be made in consultation with a departmental advisor.

The Department of Biology offers graduate study leading to the Master of Science (M.S.) degree. The M.S. degree program may be completed with a thesis option or with a non-thesis option. Among the non-thesis options is the M.S. degree in the teaching of biology, which is designed primarily for secondary school teachers, and a one-year preprofessional option for those seeking admission to medical or dental schools. The Doctor of Philosophy (Ph.D.) degree can be pursued in a variety of areas through the Purdue University Graduate School and through several programs and departments in the Indiana University School of Medicine.

The Department of Biology regards research as an important component of its programs at both the undergraduate and graduate levels. Students may work in such specific areas as microbial genetics, neurobiology, plant cell and molecular biology, recombinant DNA, cell biology, developmental biology, regenerative biology, microbiology, oncology, plant and animal tissue culture, and forensic biology.

- Bachelor of Arts Degree Requirements
- Bachelor of Science Degree Requirements
- Minor in Biology
- Biology Plans of Study
- Master of Science
- Doctor of Philosophy

Bachelor of Arts Degree Requirements

Degree Requirements

First-Year Experience Course Beginning freshmen and transfer students with fewer than 19 credit hours are required to take SCI-I120 Windows on Science (1 cr.) or an equivalent first-year experience course.

Area Requirements

Area I English Composition and Communication Competency

See the School of Science requirements under "Undergraduate Programs" in this bulletin.

Written Communication (6 cr.)

ENG-W131 Reading, Writing and Inquiry (3 cr.)

A second writing course with ENG-W131 as a prerequisite, e.g. ENG-W270, ENG-W150, ENG-W230, ENG-W231, ENG-W320, ENG-W350, TCM 22000, or TCM 32000.

Oral communication

COMM-R110 Fundamentals of Speech Communication (3 cr.)

Area II World Language Competency

See School of Science requirements under "Undergraduate Programs." Students must have first-year proficiency in a world language (first year sequence (131 & 132) or a 200-level world language course or 200 level world language proficiency).

Area IIIA Arts and Humanities, Social Sciences, and Cultural Understanding Competencies (12 cr.)

- List H course: Choose one course (3cr.) from this list. The list of course choices is located under the School of Science requirements "Undergraduate Programs" in this bulletin.
- List S course: Choose one course (3cr.) from this list. The list of course choices is located under the School of Science requirements "Undergraduate Programs" in this bulletin.
- One additional course from either List H or List S
- List C course: Choose one course (3cr.) from this list. The list of course choices is located under the School of Science requirements "Undergraduate Programs" in this bulletin.

For the most current list of courses in the areas of Arts and Humanities, Social Sciences and Cultural Understanding, please refer to the IUPUI General Education Curriculum.

Area IIIC Life and Physical Sciences Competency

Physics Two semesters of basic physics (PHYS-P201 / PHYS-P202 or PHYS 15200 / PHYS 25100).

Chemistry Two semesters of Principles of Chemistry with laboratories (CHEM-C105/CHEM-C125 3/2 cr.; CHEM-C106/CHEM-C126 3/2 cr.), two semesters of organic chemistry lecture and one semester of laboratory (CHEM-C341/CHEM-C343, CHEM-C342), plus prerequisite basic sequence or background to enter sequence above. The second laboratory in organic chemistry (CHEM-C344) is required for admission to some medical schools and is strongly recommended for students in most other programs. Consult a PREPs or departmental advisor.

Area IIID Analytical Reasoning Competency

MATH 15900 or MATH 15300 / MATH 15400. (Starting point for mathematics courses should be worked out with a departmental advisor based on the math placement test and/or background of the student.) The computer programming requirement may be satisfied with CSCI-N200, CSCI-N201, CSCI-N207, or CSCI-N211 (other 300+ level courses may be used with permission).

Note: Computer Science CSCI-N241 and CSCI-N299 do not count in Area IIID, but may count as general electives.

Area IV Biology Major Requirements

Required Core Sequence

- BIOL-K101 / BIOL-K103 Concepts of Biology I and II (BIOL-K102/BIOL-K104 Honors)
- BIOL-K322 Genetics and Molecular Biology
- BIOL-K324 Cell Biology
- BIOL-K341 Principles of Ecology and Evolution

Upper-Level Courses

- At least one lecture course from each of areas I-II listed below.
- Three laboratory courses beyond BIOL-K101 / BIOL-K103 selected from areas below. To receive credit for a laboratory, an accompanying pre- or co-requisite lecture must be completed with a minimum grade of C-. BIOL-K493 will count as one laboratory course only if BIOL-K490 is also taken.
- Capstone Experience. This requirement is met by taking either BIOL-K493 Independent Research (1 cr.) or BIOL-K490 Capstone (1 cr.) in the senior year. BIOL-K493 cannot be used as both a third laboratory and as a capstone. BIOL-K490 addresses the integration of knowledge in the principles of undergraduate education as well as values and ethics as they relate to the student's major. The capstone is an independent, creative effort by the student that is integrative and builds on the student's previous work in the major; it may include research projects, independent study and projects, a practicum, a seminar, and/or a field experience.
- Electives consisting of sufficient lecture and laboratory course work to total 30 credit hours (including core sequence credit hours). These credits may be selected from any of the areas listed below.
- Residency Credits. In order to graduate students must have a minimum of 32 credit hours at the 300-level or above at IUPUI. B.A. students usually need at least one 300-level course in addition to their required biology and chemistry courses to meet this requirement.

A maximum of 15 credit hours of biology earned previously at other institutions is applicable toward the major for the B.A. degree.

A minimum 2.00 GPA must be earned in BIOL-K courses; No grade lower than a C-.

Once admitted, students are expected to fulfill their course requirements within the major at IUPUI.

Areas/Electives

I. Molecular/Cellular Area

- Undergraduate Level
  - BIOL-K338 Introductory Immunology
  - BIOL-K384 Biochemistry
  - BIOL-K416 Cellular and Molecular Neuroscience
  - BIOL-K451 Neuropharmacology
  - BIOL-K484 Cellular Biochemistry
  - BIOL-K488 Endocrinology in Health and Disease
- Undergraduate and Graduate Level
  - BIOL 50700 Principles of Molecular Biology
  - BIOL 51600 Molecular Biology of Cancer
  - BIOL 54410 Sensory Systems
  - BIOL 55000 Plant Molecular Biology
  - BIOL 55900 Endocrinology
  - BIOL 56010 Neurodegenerative Diseases
  - BIOL 56100 Immunology
  - BIOL 56400 Molecular Genetics of Development
  - BIOL 57410 Molecular and Cell Bone Biology

II. Organismal Area

- Undergraduate Level
  - BIOL-K331 Developmental Biology
  - BIOL-K350 Comparative Animal Physiology
  - BIOL-K356 Microbiology
  - BIOL-K411 Global Change Biology
  - FIS 43000 Population Genetics (P: STAT 30100)
- Undergraduate and Graduate Level
  - BIOL 55600 Physiology I
  - BIOL 55700 Physiology II

Laboratory Courses (select 3)

- BIOL-K323 Genetics (BIOL-S323 Honors)
- BIOL-K325 Cell Biology (BIOL-S325 Honors)
- BIOL-K333 Developmental Biology
- BIOL-K339 Immunology
- BIOL-K342 Principles of Ecology and Evolution
- BIOL-K357 Microbiology (BIOL-S357 Honors)
- BIOL-K461 Cadaveric Human Anatomy (2 cr. count towards degree requirements)

Bachelor of Science Degree Requirements

Degree Requirements

First-Year Experience Course

Beginning freshmen and transfer students with fewer than 19 credit hours are required to take SCI-I120 Windows on Science (1 cr.) or an equivalent first-year experience course.

Area Requirements

Area I English Composition and Communication Competency

See the School of Science requirements under “Undergraduate Programs” in this bulletin.

Written Communication (6 cr.)

ENG-W131 or ENG-W140 Reading, Writing and Inquiry (3 cr.)

The second semester of English composition may be satisfied with ENG-W231, ENG-W270 (or ENG-W150), ENG-W230, ENG-W320, ENG-W350, TCM 22000, or TCM 32000.

Oral Communication (3 cr.)

COMM-R110 Fundamentals of Speech Communication (3 cr.)

Area II World Language Competency

No world language proficiency is required for a Bachelor of Science degree. However, knowledge of a world language is strongly recommended for any student planning to attend graduate school.

Area IIIA Arts and Humanities, Social Sciences, and Cultural Understanding Competencies (12 cr.)

- List H course: Choose one course (3cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.
- List S course: Choose one course (3cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.
- One additional course from either List H or List S.
- List C course: Choose one course (3cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.

For the most current list of courses in the areas of Arts and Humanities, Social Sciences and Cultural Understanding, please refer to the IUPUI General Education Curriculum.

Area IIIC Life and Physical Sciences Competency

Physics Two semesters of basic physics (PHYS-P201 / PHYS-P202 or PHYS 15200 / PHYS 25100).

Chemistry Two semesters of Principles of Chemistry with laboratories (CHEM-C105/CHEM-C125 3/2 cr.; CHEM-C106/CHEM-C126 3/2 cr.), two semesters of organic chemistry with laboratories (CHEM-C341/CHEM-C343 3/2 cr.; CHEM-C342/CHEM-C344 3/2 cr.), plus prerequisite basic sequence or background to enter sequence above. (A course in analytical chemistry or biochemistry is also strongly recommended; determination should be made in consultation with a PREPs or departmental advisor.)

Area IIID Analytical Reasoning Competency

Course work through two semesters of calculus (MATH 23100 / MATH 23200 or MATH 22100 / MATH 22200 or MATH 16500 / MATH 16600). Starting point to be worked out with departmental advisor based on the math placement test and/or background of the student. The computer programming requirement may be satisfied

with CSCI-N200, CSCI-N201, CSCI-N207, or CSCI-N211 (other 300+ level courses may be used with permission).

Note: Computer Science CSCI-N241 and CSCI-N299 do not count in Area IIID, but may count as general electives.

Area IV Biology Requirements

Required Core Sequence

- BIOL-K101 / BIOL-K103 Concepts of Biology I and II (BIOL-K102/BIOL-K104 Honors)
- BIOL-K322 Genetics and Molecular Biology
- BIOL-K324 Cell Biology
- BIOL-K341 Principles of Ecology and Evolution

Upper-Level Courses

- At least one lecture course from each of areas I and II listed below.
- Four laboratory courses beyond BIOL-K101 / BIOL-K103 selected from areas listed below. To receive credit for a laboratory course, an accompanying pre- or co-requisite lecture course must be completed with a minimum grade of C-. BIOL-K493 will count as one laboratory course only if BIOL-K490 is also taken.
- Capstone for the BS may be met with BIOL-K493 Independent Research (2 to 3 credit hours) and BIOL-K494 Senior Research Thesis (1 credit hour) or by taking the BIOL-K490 Capstone (1 credit hour). The BIOL-K493 / BIOL-K494 option will consist of the completion BIOL-K493 (research) and the preparation of a written report (BIOL-K494) on the results of the research project. The title and nature of the BIOL-K493 / BIOL-K494 sequence is to be determined in consultation with the department research sponsor. A student may complete BIOL-K493 in lieu of one of the required labs. If the student uses BIOL-K493 for a lab, they must complete BIOL-K490 for the capstone requirement.
- Electives consisting of sufficient BIOL-K lecture and laboratory course work to total 40 credit hours (including core sequence credit hours). These credits may be selected from any of the areas listed below.
- Residency Credits. In order to graduate students must have a minimum of 32 credit hours at the 300-level or above at IUPUI. B.S. students usually fulfill the requirement with required biology and chemistry courses. Transfer students may need additional 300-level hours.

A maximum of 20 credit hours of biology earned previously at other institutions is applicable toward the major for the B.S. degree.

A minimum 2.00 GPA must be earned in BIOL-K courses; No grade lower than a C- allowed.

Once admitted, students are expected to complete their course requirements within the major at IUPUI.

Areas/Electives

I. Molecular/Cellular Area

- Undergraduate Level
  - BIOL-K338 Introductory Immunology
  - BIOL-K384 Biochemistry
  - BIOL-K416 Cellular and Molecular Neuroscience
  - BIOL-K451 Neuropharmacology
  - BIOL-K484 Cellular Biochemistry
  - BIOL-K488 Endocrinology in Health and Disease
- Undergraduate and Graduate Level
  - BIOL 50700 Principles of Molecular Biology
  - BIOL 51600 Molecular Biology of Cancer
  - BIOL 54410 Sensory Systems
  - BIOL 55000 Plant Molecular Biology
  - BIOL 55900 Endocrinology
  - BIOL 56010 Neurodegenerative Diseases
  - BIOL 56100 Immunology
  - BIOL 56400 Molecular Genetics of Development
  - BIOL 57410 Molecular and Cell Bone Biology

II. Organismal Area

- Undergraduate Level
  - BIOL-K331 Developmental Biology
  - BIOL-K350 Comparative Animal Physiology
  - BIOL-K356 Microbiology
  - BIOL-K411 Global Change Biology
  - FIS 43000 Population Genetics
- Undergraduate and Graduate Level
  - BIOL 55600 Physiology I
  - BIOL 55700 Physiology II

Laboratory Courses (select 4)

- BIOL-K323 Genetics (BIOL-S323 Honors)
- BIOL-K325 Cell Biology (BIOL-S325 Honors)
- BIOL-K333 Developmental Biology
- BIOL-K339 Immunology
- BIOL-K342 Ecology
- BIOL-K357 Microbiology (BIOL-S357 Honors)
- BIOL-N461 Caderveric Human Anatomy (2 cr. count towards degree requirements)

Minor in Biology

The Department of Biology offers an undergraduate minor in biology with the following requirements:

- BIOL-K101 Concepts of Biology I (5 cr.)
- BIOL-K103 Concepts of Biology II (5 cr.)
- BIOL-K322 Genetics and Molecular Biology (3 cr.)
- BIOL-K324 Cell Biology (3 cr.)
- BIOL-K341 Principles of Ecology and Evolution (3 cr.)

At least half of the minimum 19 credit hours required to minor in biology must be completed at IUPUI. The minor requires a minimum grade point average of 2.00, and all grades must be C- or higher. Correspondence courses may not be used to fulfill requirements for the minor.

Biology Plans of Study

No single semester-by-semester plan of study will guide all students through the degree options because of the flexibility encouraged within the programs. However, one possible sequence of courses for each option is given below; variations from these examples of plans of study

should be made in consultation with a departmental advisor.

Bachelor of Arts Sample Program (120 cr. required)

Freshman Year

First Semester	
SCI-I120 Windows on Science	1
BIOL-K101 Concepts of Biology I	5
CHEM-C105 Principles of Chemistry I	3
CHEM-C125 Experimental Chemistry I	2
MATH 15300 Algebra and Trigonometry I	3
Total	**14**
Second Semester	
BIOL-K103 Concepts of Biology II	5
CHEM-C106 Principles of Chemistry II	3
CHEM-C126 Experimental Chemistry II	2
MATH 15400 Algebra and Trigonometry II	3
ENG-W131 Reading, Writing and Inquiry	3
Total	**16**

Sophomore Year

Third Semester	
BIOL-K322 Genetics and Molecular Biology	3
BIOL-K323 Genetics and Molecular Biology Lab	2
CHEM-C341 Organic Chemistry I	3
CHEM-C343 Organic Chemistry Laboratory I	2
World Language Course (Cultural Understanding)	4
Elective Course	1
Total	**15**
Fourth Semester	
BIOL-K324 Cell Biology	3
BIOL-K325 Cell Biology Laboratory	2
CHEM-C342 Organic Chemistry II	3
2nd written communication course	3
World Language Course	4
Total	**15**

Junior Year

Fifth Semester	
Molecular/Cellular Biology Lecture	3
PHYS-P201 General Physics I	5
Arts and Humanities/Social Sciences (choose from list)	3
Computer Programming Course (approved)	3
Total	**14**
Sixth Semester	
Organismal Biology Lecture/ Lab	5
PHYS-P202 General Physics II	5
Social Sciences (choose from list)	3
Elective Course	3
Total	**16**

Senior Year

Seventh Semester	
BIOL-K341 Principles of Ecology/Evolution	3
Arts and Humanities (choose from list)	3
Elective/Minor Course 300-level	3
Elective/Minor Course	6
Total	**15**
Eighth Semester	
BIOL-K490 Capstone in Biology (or BIOL-K493 Independent Research)	1
COMM-R110 Fundamentals of Speech Comm	3
Elective/Minor Courses	11
Total	**15**

Bachelor of Science Sample Program (120 cr. required)

Freshman Year

First Semester	
SCI-I120 Windows on Science	1
BIOL-K101 Concepts of Biology I	5
CHEM-C105 Principles of Chemistry I	3
CHEM-C125 Experimental Chemistry I	2
MATH 23100 Calculus for the Life Sciences I	3
Total	**14**
Second Semester	
BIOL-K103 Concepts of Biology II	5

CHEM-C106 Principles of Chemistry II	3
CHEM-C126 Experimental Chemistry II	2
MATH 23200 Calculus for the Life Sciences II	3
ENG-W131 Reading, Writing and Inquiry	3
Total	**16**

Sophomore Year

Third Semester	
BIOL-K322 Genetics and Molecular Biology	3
BIOL-K323 Genetics and Molecular Biology Laboratory	2
CHEM-C341 Organic Chemistry I	3
CHEM-C343 Organic Chemistry Laboratory I	2
Computer Programming (approved elective)	3
COMM-R110 Fundamentals of Speech Comm	3
Total	**16**
Fourth Semester	
BIOL-K324 Cell Biology	3
BIOL-K325 Cell Biology Laboratory	2
CHEM-C342 Organic Chemistry II	3
CHEM-C344 Organic Chemistry Laboratory II	2
2nd written communication course	3
Elective Course	1
Total	**14**

Junior Year

Fifth Semester	
Molecular/Cellular Biology Lecture/Lab	5
PHYS-P201 General Physics I	5
Social Sciences (choose from list)	3
Arts and Humanities (choose from list)	3
Total	**16**
Sixth Semester	
Organismal Biology Lecture/Lab	5
PHYS-P202 General Physics II	5
Arts and Humanities/Social Sciences (choose from list)	3
BIOL-K493 Independent Research	1
Total	**14**

Senior Year

Seventh Semester	
BIOL-K341 Principles of Ecology/Evolution	3
BIOL-K493 Independent Research	1
Cultural Understanding (choose from list)	3
Elective/Minor Courses	9
Total	**16**
Eighth Semester	
BIOL-K493 Independent Research	1
BIOL-K494 Capstone in Biology	1
Biology Major Courses	3
Elective/Minor Courses	9
Total	**14**

Master of Science

Degree Options

M.S. Non-thesis in Interdisciplinary Biology

This program requires a minimum of 30 credit hours of registration, at least 21 of which must be in biology. For students who wish to combine biology training with work in a secondary area as a mechanism to meet career objectives, up to 9 credit hours can be taken in the secondary area. Advanced-level undergraduate course work hours are limited to 6. Examples of secondary areas include, but are not limited to, chemistry, mathematics, public affairs, business, statistics, law, computer science, administration, and, for those interested in teaching, education. For those students with no secondary area of interest, all 30 credit hours may be taken in biology. The program requires registrations in BIOL 59500 Special Assignments and BIOL 69600 Seminar. The former consists of an independent, creative project done in association with a faculty member. Typical examples include a limited laboratory research experience or a library research assignment. The results of the project are reported both in writing and orally in BIOL 69600.

M.S. Pre-professional Non-thesis

This program also consists of a minimum of 30 credit hours, all of which must be taken over two semesters. This challenging program is highly intensified and is open only to those students who meet a high admission standard based on undergraduate GPA and GRE or MCAT or DAT scores. The program is available to those students planning careers in medicine, dentistry, optometry, or other health-related fields and differs from the interdisciplinary non-thesis M.S. by having no requirement for the BIOL 59500 and BIOL 69600 registrations.

M.S. with Thesis

This 30 credit hour program requires a minimum of 9 credit hours of 500-level and 600-level course work in biology chosen in consultation with the student's graduate advisory committee, and intensive research leading

to a thesis. Most full-time students should expect to spend at least two full years to complete this program. Areas in which research opportunities are available include: physiology, neuroscience, eye regeneration, biochemistry, plant hormones, developmental genetics, cell biology, membrane biochemistry and biophysics, plant physiological ecology, plant and animal molecular biology, and regenerative biology. The overall emphasis of the department's research program focuses on questions at the cellular, biochemical, and molecular levels. Many of the projects provide a foundation in biotechnology and an excellent preparation for biomedical and industrial applications.

Admission Requirements

- Students must hold a bachelor's degree from an accredited institution of higher learning and demonstrate good preparation in biological sciences, organic chemistry, physics, and mathematics.
- The GRE and/or subject tests are not required for Ph.D. and Thesis M.S. applicants; however, if submitted, the results are added to the applicant's file for consideration. Only non-thesis M.S. applicants are required to take the GRE General Test. In place of the GRE, non-thesis MS applicants can use MCAT or DAT test scores.
- Three letters of recommendation are required.
- A minimum graduation grade point average of 3.0 or its equivalent is required for unconditional admission.

Transfer of Credit

Transfer credit to be used in the non-thesis option may be given for up to 9 credit hours of graduate work completed elsewhere with a grade of B or higher. Such credit may be used only in the secondary area and will be accepted only after one semester of satisfactory work is completed in residence at IUPUI. Transfer credit is not accepted in the thesis option. Up to 12 hours of biology graduate credit taken at IUPUI under graduate non-degree status may be transferred to the thesis or non-thesis options.

Requirements

Grades

Only grades of A, B, or C are acceptable, although performance higher than C may be required. Pass/Fail grades are unacceptable.

Residence Requirements

Thirty (30) credit hours of registration are required for the M.S. degree. Students entering with advanced standing from another graduate school are given residence credit commensurate with the graduate work accomplished.

Final Examination

A comprehensive written or oral examination in the individual's primary area may be required of non-thesis students unless their cumulative GPA is 3.0 or higher. The final examination for thesis students will consist of a thesis defense, which will be done in conjunction with BIOL 69600 Seminar.

All students (except for the pre-professional non-thesis students) are required to take BIOL 69600 Seminar. The creative project required of all non-thesis students will provide the basis for the public presentation.

Financial Assistance

The Department of Biology has financial support available in the form of tuition-refund assistantships, associate faculty positions, fellowships, and stipends from local industry on a limited basis.

Biology, Master of Arts For Teachers (MAT)

The IU Online Master of Arts for Teachers in Biology combines coursework in education and biology to prepare students to be a dual-credit instructor at the high school and community college levels.

The educational component of the program covers instruction and curriculum, assessment, diversity and inclusive teaching, and research.

The biology component of the program covers the nature of living organisms at an advanced level. Students gain the ability to break down and analyze biological concepts for an undergraduate audience, the ability to develop and analyze hypotheses and experiments, a fluency with scientific literature, and a richer understanding of biology in the natural world around us.

Specific areas of focus include:

- Evolution
- Molecular and cellular biology, including biochemistry, cell biology, molecular and macromolecular biology, immunology, bioinformatics, and molecular genetics
- Organismal biology, including developmental biology, neurobiology, field zoology, marine community ecology, animal nutrition, ornithology, horticulture, and ecology

Of Special Interest for Teachers/Instructors Needing to Meet HLC Dual-Credit Standards

The stackable structure of the MAT in Biology is ideal for high school and community college educators wanting to teach dual-credit courses, or for high school educators wanting to teach at the community college level. This program is designed to help students meet Higher Learning Commission dual-credit qualification standards. These standards require teachers wanting to teach dual-credit courses in biology to hold either a master's degree in biology or a master's degree in another discipline (such as education), plus at least 18 credit hours of discipline-specific graduate coursework.

- Students need both discipline-specific coursework and a master's degree, the MAT in Biology meets HLC standards.
- Those who already hold a master's degree in a discipline other than biology, can meet HLC standards by completing the Graduate Certificate in Biology (see below).

This 100 percent online, consortial program is taught by IU Bloomington, IU East, IUPUI, IU Kokomo, IU Northwest, IU South Bend, and IU Southeast. This consortial model allows you to take coursework from several campuses and learn from a wide range of faculty.

Graduate Certificate in Biology

The graduate certificate in Biology is offered 100% online through IU Bloomington, IU East, IUPUI, IU Kokomo, IU Northwest, IU South Bend, and IU Southeast. This consortial model allows students to take coursework from several campuses and learn from a wide range of faculty.

Students in the IU Online Graduate Certificate in Biology, analyze and explore the nature of life and living organisms at an advanced level and gain the ability to break down and analyze biological concepts for an undergraduate audience, the ability to develop and analyze hypotheses and experiments, a fluency with scientific literature, and a richer understanding of biology in the natural world around us.

Specific areas of focus include:

- Evolution
- Ecology and environmental biology
- Organismal biology
- Cell and molecular biology, and biochemistry
- Genetics, bioinformatics, and genomics
- Anatomy and physiology
- Developmental biology

For Dual-credit and Community College Instructors needing to meet HLC standards

The Higher Learning Commission (HLC) requires all high school teachers who teach dual-credit or other college-level courses to hold a master's degree in the field, or to have a master's degree in another area (such as education), plus at least 18 credit hours of graduate coursework in the discipline. The Graduate Certificate in Biology provides these 18 discipline-specific credit hours.

The IU Online Graduate Certificate in Biology prepares students for such careers as:

- Biology dual-credit teacher (high school)
- Biology instructor (community college)

Understanding the requirements

To earn the Graduate Certificate in Biology, students must complete 18 credit hours. Requirements are broken down as follows:

- Core course (3 credit hours)
- Molecular-cellular-level electives (6 credit hours)
- Organismal-level electives (6 credit hours)
- Capstone course (3 credit hours)

Doctor of Philosophy

Doctor of Philosophy—Purdue University

The degree of Doctor of Philosophy (Ph.D.), the highest earned degree conferred by Purdue University, can be pursued in the Department of Biology at IUPUI. The doctoral degree is restricted to those scholars who have demonstrated superior ability in a recognized academic discipline. The Ph.D. degree is not awarded on the basis of time spent in residence or following the completion of any specific number of formal courses, nor is the degree granted on the basis of miscellaneous course studies and research effort. The entire Ph.D. program must be rationally related, should be highly research oriented, and should culminate in a thesis of scholarly merit indicative of the candidate's ability to conduct original research in a recognized field of specialization.

Ph.D. programs are directed by professors who work in close association with selected graduate students. In practice, doctoral programs are composed of formal courses, guided individual study in a chosen field or discipline, study in such cognate subjects as may be required by the candidate's advisory committee, and original research that serves as the basis of a scholarly thesis.

As part of their graduate training, all Ph.D. candidates are expected to teach at least quarter time for one year.

Ninety (90) credit hours of registration are required for the Ph.D. degree. Students entering with advanced standing from another graduate school are given residence credit commensurate with the graduate work accomplished.

Fields of Study

Ph.D. degrees are offered in most of the fields described for the M.S. degree. Until a major professor is named, a student is counseled by a temporary advisor. In order to help familiarize students with the department and to assist the student in the selection of a major professor, a series of laboratory rotations is available.

Admission and First Year Review

To enter the Ph.D. program, a student must satisfy the admission requirements for the M.S. with thesis option and also submit a critical review at the end of the first year of graduate study. In their second semester students write a critical review paper detailing a problem/knowledge gap in their area of research, along with an assessment of this literature to propose a specific answer to this problem. In the fall of their second year the students present the review to their graduate committee. For this first committee meeting, the student will prepare a presentation to recap the review for the committee. In addition, they may incorporate some of their preliminary data from the laboratory either linked to, or separate from, the review. As with other committee meetings, the committee will vote to pass or fail. If the student fails the committee meeting, the student will have to re-write the critical review and pass a committee meeting prior to taking the preliminary examination.

Plan of Study

Each prospective candidate for the doctoral degree, with the approval of the head of the Department of Biology, shall select a major professor from the department who will act as the chairperson of the student's advisory committee and who will direct the research. The student, in consultation with the major professor, will arrange an advisory committee of at least four faculty members (including the major professor) who have been approved to guide graduate students.

The plan of study shall include a primary area and related area or areas. The plan will be appropriate to meet the needs of the student in a chosen field as determined by the advisory committee. The Graduate School of Purdue University does not impose any minimum number of required course credit hours, but the plan shall specify the

area or field of interest in which the student proposes to study and to conduct research. The plan will include the specific courses that the student is expected to complete, all specific course and language (if any) requirements, and 2 credit hours of BIOL 69600 Seminar.

The department head and the Associate Dean of Graduate Education at IUPUI, must approve the plan of study. The graduate school dean reserves the right to refer any or all plans of study to the Purdue Graduate Council for review and approval when deemed advisable.

Preliminary Examination

After the student has completed most of the formal study to the satisfaction of the advisory committee and met any language requirement(s), the student becomes eligible to take the preliminary examination in order to advance to candidacy. The preliminary examination must be taken within one year of, and at least six months after passing the first committee meeting. The examination requires a research proposal to be written by the student in consultation with their major professor. The results of these written and oral examinations will be reported to the graduate school by the examining committee with an appropriate recommendation for the student's admission to candidacy, continued preparatory study, or discontinuation. The graduate school associate dean reserves the right to appoint additional members to the preliminary examining committee. The dean must be informed of the date and place of the examination and the membership of the examining committee at least two weeks before the examination. No examining committee shall have fewer than three faculty members.

If the student does not pass the preliminary examinations, a second meeting must be convened within 6 months. Should the preliminary examinations be failed twice, the student may not be given a third examination, except upon the recommendation of the examining committee and with special approval of the Graduate Council.

Ph.D. Dissertation

After admission to candidacy, the candidate must devote at least two semesters to research before the final examination.

The special research carried on as part of the doctoral work is expected to make a definite contribution to the candidate's chosen field of knowledge–a contribution of sufficient importance to merit publication. Each candidate must, therefore, prepare a dissertation showing the research results.

After the research has been completed and the dissertation written, the candidate shall be given a final examination in which the candidate defends the dissertation and demonstrates to the examining committee all of the capabilities for which the Doctor of Philosophy degree is awarded. The examining committee shall consist of no fewer than four members. The dean of the graduate school reserves the right to appoint additional committee members and must be informed of the place and time of the final examination at least two weeks in advance.

Doctor of Philosophy—Indiana University

The Ph.D. degree conferred by Indiana University can be pursued under the direction of faculty in the Department of Biology who hold adjunct appointments with departments or programs in the Indiana University School of Medicine. All Indiana University doctoral degrees require 90 credit hours of registration; specific course and examination requirements vary with the department or program in which the student is enrolled. Contact the graduate program director in the Department of Biology for additional information.

Biotechnology Program

IUPUI
723 W. Michigan Street, SL 306
Indianapolis, IN 46202-5132
Phone: (317) 274-0577; fax: (317) 274-2846

- **Department Chair:** Theodore R. Cummins, Ph.D.
-

This program is available only to students who have an earned Associate degree in Biotechnology from Ivy Tech Community College (ITCC).

What has become known as the biotechnology industry has been going through some transforming changes that mandate more sophisticated workforce training at many levels. In order to place central Indiana at the forefront in the preparation of a suitable workforce for existing industry as well as a flexible training program that may be attractive to biotechnology industries considering a move to Indiana, IUPUI has partnered with ITCC in central Indiana to provide an integrated training and theoretical framework for future biotechnology industry requirements.

The curriculum of the bachelor's degree also allows sufficient flexibility within the major and with electives to meet basic requirements for application to most graduate and professional programs.

No more than 64 applicable credits may transfer from a two-year or community college.

Degree Characteristics

Bachelor of Science in Biotechnology (BSB)

- 120 credit hour Purdue degree
- additional courses in the major and flexibility to add areas of specialization
- full general-education course work in the humanities and social sciences
- flexibility to become eligible for most graduate and professional degree programs

Bachelor of Science in Biotechnology (B.S.)

Degree Requirements

(ITCC: indicates course completed at Ivy Tech Indianapolis)

Area I English Composition and Communication Competency See the School of Science requirements under "Undergraduate Programs" in this bulletin.

Written Communication (6 cr.)

- ENG-W131 Reading, Writing and Inquiry (3 cr.) *(ENG 111 ITCC)*
- TCM 32000 Written Communication in Science and Industry (3 cr.)

Speech Communication (3 cr.)

- COMM-R110 Fundamentals of Speech Communication (3 cr.) *(COMM 101 ITCC)*

Area II World Language Competency No world language is required for a Bachelor of Science degree. However, knowledge of a world language is strongly recommended for any student planning to attend graduate school.

Area IIIA Arts and Humanities, Social Sciences, and Cultural Understanding Compentencies

- List H course: Choose one course (3cr.) from this list. The list of course choices is located under the School of Science requirements "Undergraduate Programs" in this bulletin.
- List S course: Choose one course (3cr.) from this list. The list of course choices is located under the School of Science requirements "Undergraduate Programs" in this bulletin.
- One additional course from either List H or List S.
- List C course: Choose one course (3cr.) from this list. The list of course choices is located under the School of Science requirements "Undergraduate Programs" in this bulletin.

For the most current list of courses in the areas of Arts and Humanities, Social Sciences and Cultural Understanding, please refer to the IUPUI General Education Curriculum.

Area IIIC Life and Physical Sciences Competency

Chemistry

Two semesters of Principles of Chemistry with laboratory:

- CHEM-C105 / CHEM-C125 Principles of Chemistry I with lab *(CHEM-C105 ITCC)*
- CHEM-C106 / CHEM-C126 Principles of Chemistry II with lab *CHEM-C106 ITCC)*

Two semesters of organic chemistry lecture:

- CHEM-C341/CHEM-C343 Organic Chemistry Lecture/Lab I
- CHEM-C342 Organic Chemistry Lecture II

Physics One semester of basic physics

- PHYS 101, ITCC **or** PHYS 21800, IUPUI

Area IIID Analytical Reasoning Competency

Course work through two semesters of calculus:

- MATH 23100 / MATH 23200 **or**
- MATH 22100 / MATH 22200 **or**
- MATH 16500 / MATH 16600

NOTE: Students may need to complete MATH 136 (Algebra & Trigonometry I) and MATH 137 (Algebra and Trigonometry II) at ITCC

The starting point for mathematics courses should be worked out with a departmental advisor based on the math placement test and/or background of the student.

The computer programming requirement may be satisfied with CSCI-N200, CSCI-N201, CSCI-N207 or CSCI-N211. A statistics course is required: STAT 30100.

Area IV Biotechnology Requirements

Required courses

- BIOL-K101 Concepts of Biology I (5 cr.)
- BIOL-K384 Biological Chemistry (3 cr.) **or** CHEM-C384 Biological Chemistry (3 cr.) **or** BIOL-K484 Cellular Biochemistry (3 cr.)
- BIOL-K322, BIOL-K323, BIOL-K324, BIOL-K356, BIOL-K338
- BIOL-K357 or BIOL-K339

Specialized courses in biotechnology, including the internship, are to be taken at Ivy Tech Community College, Indianapolis. This program is available only to students who have an earned Associate Degree in Biotechnology from Ivy Tech Community College. See departmental advisor for additional information.

Elective courses in area of specialization

Electives chosen with advisor to total at least 40 credits

No grade below a C- will be accepted toward the degree program in any biology, biotechnology and chemistry course.

To receive credit for a laboratory for which there is an accompanying pre- or corequisite lecture, the lecture must be completed with a minimum grade of C-.

Department of Chemistry and Chemical Biology

IUPUI
Science Building, LD 326
402 N. Blackford Street
Indianapolis, IN 46202-3274
Phone: (317) 274-6872, fax: (317) 274-4701
https://science.iupui.edu/chemistry/

Department Chair: Partha Basu, Ph.D.

Department Advisors:

- Graduate Programs:
  - Eric Long, Ph.D.

Chemistry is the science that studies substances, both natural and synthetic, and their compositions, properties, transformations, and interactions with external forces.

The Department of Chemistry and Chemical Biology offers the Bachelor of Arts (B.A.) degree, the Bachelor of Science in Chemistry (B.S.) degree with a chemistry option, a biological chemistry option, and a medicinal chemistry option and the Master of Science (M.S.) degree. All degrees carry the general requirements of the School of Science, which are described elsewhere in this bulletin. An undergraduate minor in chemistry is also offered. The Bachelor of Science degree carries certification by the American Chemical Society (ACS) Committee on Professional Training. The Master of Science degree has

both a thesis and nonthesis option. An Industrial Co-op Program is also offered for the Master of Science degree. Qualified students may be authorized to pursue the Doctor of Philosophy (Ph.D.) degree in chemistry in the areas of analytical, biological, inorganic, organic, or physical chemistry. Contact the Department for details or visit the Web site chem.iupui.edu.

To enter the undergraduate curriculum in chemistry, a student should have completed a minimum of two years of algebra, one semester of trigonometry, one year each of chemistry and physics, and two years of a modern foreign language. The choice of a particular degree program in chemistry and the selection of courses for that degree must be made in consultation with a departmental advisor.

Courses for Nonmajors

Students in programs that require only one semester of chemistry should take CHEM-C100, CHEM-C101, or CHEM-C110, depending on their specific degree program. CHEM-C100 and CHEM-C110 are both nonmathematical introductions to chemistry, while CHEM-C101 requires one semester of high school algebra. Students in programs that require two semesters of chemistry take either CHEM-C101 / CHEM-C121 with CHEM-C110 / CHEM-C115 or the CHEM-C105 / CHEM-C125 with CHEM-C106 / CHEM-C126 sequence. (See specific program for degree major.) The CHEM-C105 / CHEM-C125 with CHEM-C106 / CHEM-C126 sequence is designed for students pursuing advanced work in scientific fields (e.g., biology, chemistry, geology, medicine, and physics). Students with an insufficient background in high school chemistry for CHEM-C105 should take CHEM-C101 as a preparatory course. Credit for CHEM-C101 cannot count toward the total credit hours needed for graduation if either of the following courses is taken: CHEM-C105 or CHEM-C106. Completion of CHEM-C101 does not qualify a student for admission to CHEM-C106.

Academic Advising in Chemistry

Academic success requires frequent and regular interaction between students and faculty in the classroom as well as outside it. In keeping with this departmental philosophy, chemistry majors are required to meet with their advisor at least once a year, preferably in the first half of the fall semester. Students who do not meet with their advisor by October 21 will not be permitted to register for the following spring semester until their advisor approves their registration.

Course Prerequisites

The Department enforces all prerequisites for chemistry courses as indicated in the course listing of this bulletin. For course equivalency of prerequisites, consult the instructor.

- Bachelor of Arts Preprofessional Chemistry Major
- Bachelor of Science in Chemistry, Professional Chemistry Major, A.C.S. Certified
- Graduate Programs (M.S. and Ph.D. Degrees)
- Minor

Bachelor of Arts Preprofessional Chemistry Major

For students who require a knowledge of chemistry as a basis for work in other fields such as business, dentistry, environmental science and policy, law, medicine, or other allied health fields. Recommended for pre-medical and pre-dentistry students.

Degree Requirements

First-Year Experience Course Beginning freshmen and transfer students with fewer than 19 credit hours are required to take SCI-I120 Windows on Science (1 cr.) or an equivalent first-year experience course.

Area I English Composition and Communication Competency See the School of Science requirements under “Undergraduate Programs” in this bulletin. The second semester of English composition may be satisfied only by ENG-W270, ENG-W230, ENG-W231, ENG-W233, ENG-W320, ENG-W350, TCM 22000, or TCM 32000.

Area II World Language Competency See the School of Science requirements under “Undergraduate Programs” in this bulletin.

Area IIIA Arts and Humanities, Social Sciences, and Cultural Understanding Competencies See the School of Science requirements under "Undergraduate Programs" in this bulletin.

For the most current list of courses in the areas of Arts and Humanities, Social Sciences and Cultural Understanding, please refer to the IUPUI General Education Curriculum.

Area IIIC Life and Physical Sciences Competency PHYS-P201 and PHYS-P202 (recommended PHYS 15200 and PHYS 25100). Also, at least two additional courses outside chemistry having a laboratory component, which may be chosen from, for example, biology, geology, or physics.

Area IIID Analytical Reasoning Competency MATH 22100 and MATH 22200 or MATH 23100 and MATH 23200 (recommended MATH 16500 and MATH 16600). One computer programming course is also required.

Note: Computer Science CSCI-N100 level courses and CIT 10600 do not count for any credit toward any degree in the School of Science. Also, CSCI-N241 and CSCI-N299 do not count in Area IIID, but may count as general electives.

Area IV Chemistry Concentration Requirements CHEM-C105, CHEM-C125, CHEM-C106, CHEM-C126, CHEM-C294, CHEM-C310, CHEM-C311, CHEM-C325, CHEM-C326, CHEM-C341, CHEM-C342, CHEM-C343, CHEM-C344, CHEM-C360 (recommended CHEM-C361), and CHEM-C495. Recommended CHEM-C384 or CHEM-C484. A total of 34 credit hours of chemistry courses are required. The Department requires a minimum grade of C in all chemistry courses (C- grades are unacceptable).

Bachelor of Arts Preprofessional Chemistry Major Sample Program (120 cr. required):

Freshman Year

First Semester

SCI-I120 Windows on Science	1
CHEM-C105 Principles of Chemistry I	3
CHEM-C125 Experimental Chemistry I	2
MATH 22100 Calculus for Technology I or MATH 23100 Calculus for the Life Sciences I	3
ENG-W131 Reading, Writing and Inquiry	3
World Language	4
Total	**16**
Second Semester	
CHEM-C106 Principles of Chemistry II	3
CHEM-C126 Experimental Chemistry II	2
MATH 22200 Calculus for Technology II or MATH 23200 Calculus for the Life Sciences II	3
World Language	4
2nd Written communication course	3
Total	**15**

Sophomore Year

Third Semester	
CHEM-C341 Organic Chemistry I	3
CHEM-C343 Organic Chemistry Laboratory I	2
Life and Physical Science with lab (approved elective)	5
COMM-R110 Fundamentals of Speech Communication	3
Arts and Humanities/Social Science (choose from list)	3
Total	**16**
Fourth Semester	
CHEM-C342 Organic Chemistry II	3
CHEM-C344 Organic Chemistry Laboratory II	2
CHEM-C294 Cornerstone in Chemistry	1
Life and Physical Science (approved elective)	5
Arts and Humanities/Social Sciences (choose from list)	3
Total	**14**

Junior Year

Fifth Semester	
CHEM-C310 Analytical Chemistry Lecture	3
CHEM-C310 Analytical Chemistry Lab	1
PHYS-P201 General Physics I	5
Arts & Humanities or Social Sciences (choose from list)	3
Elective	3
Total	**15**
Sixth Semester	
CHEM-C325 Intro to Instrumental Analysis	3
CHEM-C326 Introduction to Instrumental Analysis Lab	2
Computer Programming (approved course)	3
PHYS-P202 General Physics 2	5
Electives	3
Total	**16**

Senior Year

Seventh Semester	
Electives	15
Total	**15**
Eighth Semester	
CHEM-C360 Elementary Physical Chemistry	3
CHEM-C495 Capstone in Chemistry	1
Electives	9
Total	**13**

Bachelor of Science in Chemistry, Professional Chemistry Major, A.C.S. Certified

This degree is for students who plan to be professional chemists or who plan to pursue graduate studies in chemistry. It carries certification by the Committee on Professional Training of the American Chemical Society. Three options are available: a Chemistry option, a Biochemistry option and a Medicinal Chemistry option.

Degree Requirements (Chemistry Option)

First-Year Experience Course Beginning freshmen and transfer students with fewer than 19 credit hours are required to take SCI-I120 Windows on Science (1 cr.) or an equivalent first-year experience course.

Area I English Composition and Communication Competency See the School of Science requirements under “Undergraduate Programs” in this bulletin. The second semester of English composition may be satisfied only by ENG-W270, ENG-W150, ENG-W230, ENG-W231, ENG-W233, ENG-W320, ENG-W350, TCM 22000, or TCM 32000.

Area II World Language Competency No world language proficiency is required for a Bachelor of Science degree.

Area IIIA Arts and Humanities, Social Sciences, and Cultural Understanding Competencies See the School

of Science requirements under "Undergraduate Programs" in this bulletin.

For the most current list of courses in the areas of Arts and Humanities, Social Sciences and Cultural Understanding, please refer to the IUPUI General Education Curriculum.

Area IIIC Life and Physical Sciences Competency PHYS 15200, PHYS 25100, and at least two additional courses outside chemistry, which may be chosen from, for example, biology, geology, or physics.

Area IIID Analytical Reasoning Competency MATH 16500, MATH 16600, MATH 17100, and MATH 26100. One computer programming course is also required.

Note: Computer Science CSCI-N100 level courses and CIT 10600 do not count for any credit toward any degree in the School of Science. Also, CSCI-N241 and CSCI-N299 do not count in Area IIID, but may count as general electives.

Area IV Chemistry Concentration Requirements CHEM-C105, CHEM-C125, CHEM-C106, CHEM-C126, CHEM-C294, CHEM-C310, CHEM-C311, CHEM-C341, CHEM-C342, CHEM-C343, CHEM-C344, CHEM-C361, CHEM-C362, CHEM-C363, CHEM-C410, CHEM-C411, CHEM-C430, CHEM-C435, CHEM-C484 and CHEM-C495. A total of 47 credit hours of chemistry courses are required. The Department of Chemistry requires a minimum grade of C in all chemistry courses (C- grades are unacceptable).

In addition to the above requirements, a minimum of 6 additional credit hours of advanced chemical elective courses is required. Courses may be chosen from the following: CHEM-C409 (3 cr. min.), CHEM-C309, CHEM-C371, CHEM-C372, CHEM-C420, CHEM-C475, CHEM-C485, CHEM-C488, CHEM-C489, certain CHEM-C496 topics courses (permission required), any graduate-level chemistry course (permission required), FIS 40100, FIS 40400, GEOL-G406, or GEOL-G483.

Degree Requirements (Biochemistry Option)

First-Year Experience Course Beginning freshmen and transfer students with fewer than 19 credit hours are required to take SCI-I120 Windows on Science (1 cr.) or an equivalent first-year experience course.

Area I English Composition and Communication Competency See the School of Science requirements under “Undergraduate Programs” in this bulletin. The second semester of English composition may be satisfied only by ENG-W270, ENG-W150, ENG-W230, ENG-W231, ENG-W233, ENG-W290, TCM 22000, or TCM 32000.

Area II World Language Competency No world language proficiency is required for a Bachelor of Science degree.

Area IIIA Arts and Humanities, Social Sciences, and Cultural Understanding Competencies See the School of Science requirements under “Undergraduate Programs” in this bulletin.

Area IIIC Life and Physical and Sciences Competency PHYS 15200, PHYS 25100, BIOL-K101, and BIOL-K103. Beyond the introductory level, an additional 3 credit hours of biology should be chosen from one of the following: BIOL-K324 Cell Biology, BIOL-K356 Microbiology, or BIOL-K322 Genetics and Molecular Biology.

Area IIID Analytical Reasoning Competency MATH 16500, MATH 16600, MATH 17100, and MATH 26100. One computer programming course is also required.

Note: Computer Science CSCI-N100 level courses and CIT 10600 do not count for any credit toward any degree in the School of Science. Also, CSCI-N241 and CSCI-N299 do not count in Area IIID, but may count as general electives.

Area IV Chemistry Concentration Requirements CHEM-C105, CHEM-C125, CHEM-C106, CHEM-C126, CHEM-C294, CHEM-C310, CHEM-C311, CHEM-C341, CHEM-C342, CHEM-C343, CHEM-C344, CHEM-C361, CHEM-C362, CHEM-C363, CHEM-C410, CHEM-C411, CHEM-C430, CHEM-C435, CHEM-C484, CHEM-C485, CHEM-C486, and CHEM-C495. A total of 52 credit hours of chemistry courses are required. The Department requires a minimum grade of C in all chemistry courses (C- grades are unacceptable).

In addition to the above requirements, a minimum of 3 additional credit hours of advanced chemical elective courses is required. Courses may be chosen from the following: CHEM-C409 (3 cr. min.), CHEM-C309, CHEM-C371, CHEM-C372, CHEM-C420, CHEM-C475, CHEM-C488, CHEM-C489, certain CHEM-C496 topics courses (permission required), any graduate-level chemistry course (permission required), FIS 40100, FIS 40400, GEOL-G406, or GEOL-G483.

Degree Requirements (Medicinal Chemistry Option)

First-Year Experience Course Beginning freshmen and transfer students with fewer than 19 credit hours are required to take SCI-I120 Windows on Science (1 cr.) or an equivalent first-year experience course.

Area I English Composition and Communication Competency See the School of Science requirements under “Undergraduate Programs” in this bulletin. The second semester of English composition may be satisfied only by ENG-W270, ENG-W150, ENG-W230, ENG-W231, ENG-W233, ENG-W290, TCM 22000, or TCM 32000.

Area II World Language Competency No world language proficiency is required for a Bachelor of Science degree.

Area IIIA Arts and Humanities, Social Sciences, and Cultural Understanding Competencies See the School of Science requirements under “Undergraduate Programs” in this bulletin.

Area IIIC Life and Physical Sciences Competency PHYS 15200, PHYS 25100, BIOL-K101, and BIOL-K103. Beyond the introductory level, an additional 3 credit hours of biology should be chosen from one of the following: BIOL-K324 Cell Biology, BIOL-K356 Microbiology, or BIOL-K322 Genetics and Molecular Biology.

Area IIID Analytical Reasoning Competency MATH 16500, MATH 16600, MATH 17100, and MATH 26100. One computer programming course is also required.

Note: Computer Science CSCI-N100 level courses and CIT 10600 do not count for any credit toward any degree in the School of Science. Also, CSCI-N241 and CSCI-

N299 do not count in Area IIID, but may count as general electives.

Area IV Chemistry Concentration Requirements
CHEM-C105, CHEM-C125, CHEM-C106, CHEM-C126, CHEM-C294, CHEM-C310, CHEM-C311, CHEM-C341, CHEM-C342, CHEM-C343, CHEM-C344, CHEM-C361, CHEM-C362, CHEM-C363, CHEM-C410, CHEM-C411, CHEM-C430, CHEM-C435, CHEM-C484, CHEM-C486, CHEM-C488, CHEM-C489, and CHEM-C495. A total of 55 credit hours of chemistry courses are required. The Department requires a minimum grade of C in all chemistry courses (C- grades are unacceptable).

Bachelor of Science: Sample Program, Chemistry Option- Professional Chemistry Major- A.C.S. Certified (120 cr. required)

Freshman Year

First Semester	
CHEM-C105 Principles of Chemistry I	3
CHEM-C125 Experimental Chemistry I	2
MATH 16500 Analytic Geometry and Calculus I	4
Arts and Humanities/Social Sciences (choose from list)	3
ENG-W131 Reading, Writing and Inquiry	3
SCI-I120 Windows on Science	1
Total	**16**
Second Semester	
CHEM-C106 Principles of Chemistry II	3
CHEM-C126 Experimental Chemistry II	2
MATH 16600 Analytic Geometry and Calculus II	4
PHYS 15200 Mechanics	4
2nd Written Communication Course	3
Total	**16**

Sophomore Year

Third Semester	
CHEM-C341 Organic Chemistry I	3
CHEM-C343 Organic Chemistry Laboratory I	2
MATH 17100 Multidimensional Mathematics	3
Life and Physical Science (approved elective)	3
Arts & Humanities/Social Science (choose from list)	3
COMM-R110 Fundamentals of Speech Communication	3
Total	**17**
Fourth Semester	
CHEM-C342 Organic Chemistry II	3
CHEM-C344 Organic Chemistry Laboratory II	2
CHEM-C294 Cornerstone in Chemistry	1
PHYS 25100 Heat, Electricity and Optics	5
MATH 26100 Multivariate Calculus	4
Total	**15**

Junior Year

Fifth Semester	
CHEM-C362 Physical Chemistry of Molecules	4
CHEM-C310 Analytical Chemistry Lecture	3
CHEM-C311 Analytical Chemistry Lab	1
Arts & Humanities/Social Science (choose from list)	3
Cultural Understanding (choose from list)	3
Total	**14**
Sixth Semester	
CHEM-C361 Physical Chemistry of Bulk Matter	3
CHEM-C363 Experimental Physical Chemistry	2
CHEM-C484 Biomolecules and Catabolism	3
Computer Programming (approved course)	3
Elective	3
Total	**14**

Senior Year

Seventh Semester	
CHEM-C410 Principles of Chemical Instrumentation	3
CHEM-C411 Principles of Chemical Instrumentation Laboratory	2
Life and Physical Science (approved elective)	3
Advanced Chemical Elective	3
Electives	3
Total	**14**
Eighth Semester	
CHEM-C430 Inorganic Chemistry	3
CHEM-C435 Inorganic Chemistry Laboratory	1
CHEM-C495 Capstone in Chemistry	1
Advanced Chemical Elective	3

Electives	6
Total	**14**

Bachelor of Science: Sample Program Biochemistry Option-Professional Chemistry Major-A.C.S. Certified (120 cr. required)

Freshman Year

First Semester	
CHEM-C105 Principles of Chemistry I	3
CHEM-C125 Experimental Chemistry I	2
BIOL-K101 Concepts of Biology I	5
MATH 16500 Analytic Geometry and Calculus I	4
SCI-I120 Windows on Science	1
Total	**15**
Second Semester	
CHEM-C106 Principles of Chemistry II	3
CHEM-C126 Experimental Chemistry II	2
MATH 16600 Analytic Geometry and Calculus II	4
BIOL-K103 Concepts of Biology II	5
ENG-W131 Reading, Writing and Inquiry	3
Total	**17**

Sophomore Year

Third Semester	
CHEM-C341 Organic Chemistry I	3
CHEM-C343 Organic Chemistry Laboratory I	2
MATH 17100 Multidimensional Mathematics	3
PHYS 15200 Mechanics	4
2nd written communication course	3
Total	**15**
Fourth Semester	
CHEM-C342 Organic Chemistry II	3
CHEM-C344 Organic Chemistry Laboratory II	2
CHEM-C294 Cornerstone in Chemistry	1
PHYS 25100 Heat, Electricity and Optics	5
MATH 26100 Multivariate Calculus	4
Total	**15**

Junior Year

Fifth Semester	
CHEM-C362 Physical Chemistry of Molecules	4
CHEM-C310 Analytical Chemistry Lecture	3
CHEM-C311 Analytical Chemistry Lab	1
COMM-R 110 Fundamentals of Speech Communication	3
Arts and Humanities (choose from list)	3
Total	**14**
Sixth Semester	
CHEM-C361 Physical Chemistry of Bulk Matter	3
CHEM-C363 Experimental Physical Chemistry	2
CHEM-C484 Biomolecules and Catabolism	3
Arts and Humanities/Social Sciences (choose from list)	3
Arts and Humanities/Social Sciences (choose from list)	3
Total	**14**

Senior Year

Seventh Semester	
CHEM-C410 Principles of Chemical Instrumentation	3
CHEM-C411 Principles of Chemical Instrumentation Lab	2
CHEM-C485 Biosynthesis and Physiology	3
CHEM-C486 Biological Chemistry Lab	2
Computer Programming (approved course)	3
Biology (approved elective)	3
Total	**16**
Eighth Semester	
CHEM-C430 Inorganic Chemistry	3
CHEM-C435 Inorganic Chemistry Laboratory	1
Advanced Chemistry Elective	3
Cultural Understanding (choose from list)	3
Elective	3
CHEM-C495 Capstone in Chemistry	1
Total	**14**

Bachelor of Science: Sample Program Medicinal Chemistry Option-Professional Chemistry Major-A.C.S. Certified (120 cr. required)

Freshman Year

First Semester	
CHEM-C105 Principles of Chemistry I	3
CHEM-C125 Experimental Chemistry I	2
BIOL-K101 Concepts of Biology I	5
MATH 16500 Analytic Geometry and Calculus I	4
SCI-I120 Windows on Science	1
Total	**15**
Second Semester	
CHEM-C106 Principles of Chemistry II	3
CHEM-C126 Experimental Chemistry II	2
MATH 16600 Analytic Geometry and Calculus II	4
BIOL-K103 Concepts of Biology II	5
ENG-W131 Reading, Writing and Inquiry	3
Total	**17**

Sophomore Year

Third Semester	
CHEM-C341 Organic Chemistry I	3
CHEM-C343 Organic Chemistry Laboratory I	2
MATH 17100 Multidimensional Mathematics	3
PHYS 15200 Mechanics	4
2nd written communication course	3
Total	**15**
Fourth Semester	
CHEM-C342 Organic Chemistry II	3
CHEM-C344 Organic Chemistry Laboratory II	2
CHEM-C294 Cornerstone in Chemistry	1
PHYS 25100 Heat, Electricity and Optics	5
MATH 26100 Multivariate Calculus	4
Total	**15**

Junior Year

Fifth Semester	
CHEM-C310 Analytical Chemistry Lecture	3
CHEM-C311 Analytical Chemistry Lab	1
CHEM-C362 Physical Chemistry of Molecules	4
COMM-R110 Fundamentals of Speech Communication	3
Arts and Humanities/Social Sciences (choose from list)	3
Total	**14**
Sixth Semester	
CHEM-C361 Physical Chemistry of Bulk Matter	3
CHEM-C363 Experimental Physical Chemistry	2
CHEM-C484 Biomolecules and Catabolism	3
Arts and Humanities/Social Sciences (choose from list)	3
Arts and Humanities/Social Sciences (choose from list)	3
Total	**14**

Senior Year

Seventh Semester	
CHEM-C410 Principles of Chemical Instrumentation	3
CHEM-C411 Principles of Chemical Instrumentation Laboratory	2
CHEM-C486 Biological Chemistry Laboratory	2
CHEM-C488 Introduction to Medicinal and Agricultural Chemistry	3
Computer Programming (approved course)	3
Biology (approved elective)	3
Total	**16**
Eighth Semester	
CHEM-C430 Inorganic Chemistry	3
CHEM-C435 Inorganic Chemistry Laboratory	1
CHEM-C489 The Practice of Medicinal Chemistry	3
CHEM-C495 Capstone in Chemistry	1
Cultural Understanding (choose from list)	3
Elective Course	3
Total	**14**

The Department will not grant credit for a course when considerable duplication of course content may occur with another course taken. In general, credit will be allowed for

the higher-level course, but not for the lower-level course. The following listings are considered to be duplications (lower-level courses listed first):

- CHEM-C360 and CHEM-C361
- MATH 22100 / MATH 22200 or MATH 23100 / MATH 23200 and MATH 16500 / MATH 16600
- PHYS-P201 / PHYS-P202 or PHYS 21800 / PHYS 21900 and PHYS 15200 / PHYS 25100
- PHYS 10000 or PHYS 20000 and PHYS-P201, PHYS 21800, or PHYS 15200

For example, if a student has earned credit in MATH 16500 / MATH 16600, the student will receive no credit for MATH 22100 / MATH 22200, even if earned previously.

On occasion, a student who initially enrolled in the preprofessional B.A. in chemistry program decides to transfer to the B.S. in Chemistry program, having already taken one or more of the above-listed lower-level courses. The following policies will apply:

- If a student has a minimum grade of B (B- or lower is unacceptable) in CHEM-C360 and approval of the departmental chairperson, credit will be granted for CHEM-C361 and the student may proceed to CHEM-C362.
- If a student has earned credit for the MATH 22100 / MATH 22200 sequence, the student will be placed in MATH 16600. If the student passes MATH 16600, the MATH 16500 / MATH 16600 requirement will be considered fulfilled. Credit will be granted for MATH 22100 and MATH 16600 only (7 credit hours). If the student does not pass MATH 16600, the student must start with MATH 16500.
- If a student has earned credit for MATH 22100 only, the student must take the MATH 16500 / MATH 16600 sequence, and no credit will be allowed for MATH 22100.
- If a student has earned credit for the PHYS-P201 / PHYS-P202 or PHYS 21800 / PHYS 21900 sequence, the student will be placed in PHYS 25100. If the student passes PHYS 25100, the PHYS 15200 / PHYS 25100 requirement will be considered fulfilled. Credit will be granted for PHYS-P201 and PHYS 25100 only (10 credit hours). If the student does not pass PHYS 25100, the student must start with PHYS 15200.
- If a student has earned credit for PHYS-P201 or PHYS 21800 only, the student must take the PHYS 15200 / PHYS 25100 sequence, and no credit will be allowed for PHYS-P201 or PHYS 21800.

On occasion, a student who initially enrolled in the B.S. in Chemistry program decides to transfer to the pre-professional B.A. in Chemistry program, having already taken one or more of the above-listed higher-level courses. A higher-level course will always substitute for a lower-level course to satisfy the requirement.

Minor in Chemistry

The undergraduate minor in chemistry requires a minimum of 21 credit hours of chemistry courses. The following courses are required: CHEM-C105, CHEM-C125, CHEM-C106, CHEM-C126, CHEM-C341, CHEM-C342, CHEM-C343, and CHEM-C310, or CHEM-C360 or CHEM-C484. MATH 22200 or MATH 23200 and PHYS-P202 or PHYS 25100 are prerequisites for CHEM-C360. A grade of C or better must be earned in each chemistry course. (A grade of C minus does not count). For other requirements see the School of Science requirements under "Undergraduate Programs, Minors" elsewhere in the bulletin.

Graduate Programs (M.S. and Ph.D. Degrees)

Admission Requirements

The prospective student should have a bachelor's degree from an accredited institution, show promise of ability to engage in advanced work, and have adequate preparation, at least 35 credit hours of chemistry, broadly representative of the fields of the discipline, in a chemistry curriculum.

Incoming students with an undergraduate grade point average (GPA) of 3.0 or higher (on a 4.0 scale) will be considered for admission as regular graduate students. Those with a GPA below 3.0 could be considered for admission.

Application for Admission

Inquiries concerning the application process can be made directly to the Department by writing to Graduate Admissions; Department of Chemistry and Chemical Biology, IUPUI, 402 N. Blackford Street, Indianapolis, IN 46202-3272; phone (317) 274-6876; https://chemistry.iupui.edu. Applications for full-time study should be completed by January 15th for the following Fall semester to ensure complete consideration for fellowships and other financial support (see "Graduate Program Financial Aid" in this section). Applications for part-time graduate admission may be submitted at any time.

Non-degree seeking graduate students who wish to enroll in courses, though not necessarily in a degree program, should contact the IUPUI Graduate Office, University Library, UL 1170, 755 W. Michigan Street, Indianapolis, IN 46202; phone (317) 274-1577. Students should be aware that no more than 12 credit hours earned as a non-degree student may be counted toward a degree program. Please contact the graduate administrator in the Department of Chemistry and Chemical Biology for guidelines.

Transfer Credit

The Department will accept by transfer a maximum of 6 hours of graduate credit, in excess of undergraduate degree requirements, from approved institutions subject to approval by the graduate director in the Department of Chemistry and Chemical Biology.

Graduate Program Financial Aid

All full-time Ph.D. graduate students receive support stipends through teaching assistantships, research assistantships, departmental fellowships, university fellowships, or through the Industrial Co-op Program. Full-time students receive fee remissions; students with assistantships and fellowships are also eligible for health insurance. Consult the graduate advisor for current funding levels.

Master of Science Program

The M.S. program in chemistry, culminates in a Purdue University degree and requires 30 credit hours of study beyond the baccalaureate level. It is designed for students seeking careers as professional chemists. Graduates of the program often choose industrial positions, but others enter Ph.D. programs in chemistry or related areas. Graduates have been placed in positions throughout the United States and abroad.

General Degree Options and Requirements

Specific area requirements (core courses) apply for course work. Courses from three of the following areas must be taken: analytical, biological, inorganic, organic, and physical. Typically, students take three courses in their primary area and two courses outside of it to meet these requirements.

The M.S. degree can be earned through any of three different options: the thesis option, the Industrial Co-op Program, and the nonthesis option.

Thesis Option This traditional full-time program requires 20 hours of course work and 10 hours of thesis research. The research activity culminates in the completion and defense of a thesis. This option is available to full- or part-time students.

Nonthesis Option The nonthesis option requires 30 hours of course work alone. Because actual research experience is essential in an advanced chemistry program, this option is recommended for part-time students only. Students in this option are usually employed full time and are already engaged in research activity as part of their employment. However, nonthesis students may still enroll in a limited amount of research study that applies to the degree requirements (usually through CHEM 59900).

Ph.D. Program

The Ph.D. program is a full-time, thesis-based research program that culminates in a Purdue University degree. This program provides a substantially larger research component than that of the M.S. degree and requires original and significant research contributions by the student. As a result, the Ph.D. student is qualified for employment where the ability to design, develop, and complete a research program is expected.

To establish candidacy, students must pass five written ‘cumulative’ examination questions within their first four semesters and an oral examination before the end of their fifth semester of graduate study. The oral examination will include a discussion of the student’s research and defense of an original research proposal that is different from the student’s thesis research.

Course requirements include a core of three courses in the student’s major division plus three additional courses outside the major division. A number of additional courses may be recommended that cover material appropriate to the written part of the preliminary examination.

Department of Computer and Information Science

IUPUI
Engineering, Science and Technology Building, SL 280
723 W. Michigan Street
Indianapolis, IN 46202-5132
Phone: (317) 274-9727; fax: (317) 274-9742
https://science.iupui.edu/cs/

Department Chair Shiaofen Fang, Ph.D.

Department Advisors:

- Graduate Programs: contact Nicole Wittlief

The department offers Purdue University Bachelor of Science (B.S.) in Computer Science, Bachelor of Science (B.S.) in Computer Science - Biocomputing Track, Bachelor of Science (B.S.) in Artificial Intelligence - Data and Computational Science Concentration, Bachelor of Arts (B.A.) in Applied Computer Science, Graduate Certificates, and Master of Science (M.S.) degrees in Computer Science and Computational Data Science. It also offers a Certificate in Applied Computer Science and a Certificate in Fundamentals of Data Analytics. Students interested in research may arrange to pursue a Doctor of Philosophy (Ph.D.) degree through the Purdue University Graduate School. The programs of study emphasize the basic principles of computing and information processing, which include the creation, representation, display, storage, transformation, and transmission of information, as well as the software to accomplish these tasks. Because computers are used in all segments of society, the theory and practice of computer and information science are pervasive and the field is, therefore, interdisciplinary. It is also young and dynamic, as evidenced by the growth of the computer industry, so the curriculum itself evolves rapidly.

- Bachelor of Science
- Bachelor of Science, Biocomputing Concentration
- Bachelor of Science, Artificial Intelligence - Data and Computational Science Concentration
- Bachelor of Arts
- Certificate in Applied Computer Science
- Certificate in Fundamentals of Data Analytics
- Graduate programs
- Minor in Computer and Information Science and Minor in Applied Computer Science

Bachelor of Arts

The B.A. in Applied Computer Science offers a balance of theoretical and applied computing coursework to prepare a student for multiple pathways into the information technology workforce. The student’s additional coursework in the liberal arts and social sciences further enhances communication skills and understanding of issues in other sectors of the economy. The program requires 120 credit hours including core courses in computer science that are supplemented by applied electives and rounded out with courses in algebra and statistics, world language, communications, liberal arts and social sciences. This program allows students flexibility in pursuing a minor or undergraduate certificate in a program of their choice.

Degree Requirements

NOTE: These degree requirements are effective for students admitted beginning in the Fall of 2022.

See the School of Science requirements under "Undergraduate Programs" in this bulletin for the general and area degree requirements. The School of Science will not accept certain university courses for the computer science degree program. The Bachelor of Arts degree program in computer science requires a minimum of 120 credit hours.

First-Year Experience Course Beginning freshmen and transfer students with fewer than 19 credit hours are required to take CSCI 12000 Windows on Computer Science (1 cr.) or an equivalent first-year experience course.

Area I English Composition and Communication Competency (9 cr.) See the School of Science requirements under "Undergraduate Programs" in this bulletin for details.

- ENG-W131 Reading, Writing and Inquiry
- COMM-R110 Fundamentals of Speech Communication

The second semester of English composition must be satisfied with:

- TCM 32000 Written Communication in Science and Industry

Area II World Language Competency Students must demonstrate world language first-year proficiency in one of three ways:

- First year proficiency via test
- Successful completion of a world language courses 131 and 132.
- Successful completion of a 200-level or higher world language courses with a C or above

Area IIIA Arts and Humanities, Social Sciences, and Cultural Understanding Competencies (12 cr.) The information about the IIIA requirements in the School of Science "Undergraduate Programs" section of this bulletin lists courses that may be used to satisfy the requirements below. Students should consult a departmental advisor before registering for these courses.

- List H Arts and Humanities Competency: Choose one course from this list. (3 cr.). The list of course choices is located with the School of Science Area requirements under "Undergraduate Programs" in this bulletin.
- List S Social Sciences Competency: Choose one course from this list (3 cr.). The list of course choices is located with the School of Science Area requirements under "Undergraduate Programs" in this bulletin.
- One additional course from either List H or List S (3 cr.)
- List C Cultural Understanding Competency: Choose one course from this list (3 cr.). The list of course choices is located with the School of Science Area requirements under "Undergraduate Programs" in this bulletin.

For the most current list of courses in the areas of Arts and Humanities, Social Sciences and Cultural Understanding, please refer to the IUPUI General Education Curriculum.

Area IIIC Life and Physical Sciences Competency The Department of Computer and Information Science requires all computer science majors to take four science courses chosen from the areas of biology, chemistry, geology, and physics, or from certain courses in engineering. A single grade of D or D+ is acceptable in this Area. Otherwise, all courses must be completed with a C- or higher. Each course that counts as one of the physical science required courses must have a lecture component and be at least 3 credit hours. One course must be at least 4 credit hours with a lab component. Courses that may not be used to fulfill Area IIIC requirements include: BIOL-N100, BIOL-N120, BIOL-N200; CHEM-C100, CHEM-C102; PHYS 01000, PHYS 10000, PHYS 14000, PHYS 20000; AST-A130; GEOL-G 103, GEOL-G130, GEOL-G132; and all agriculture and geography courses. Consult a departmental academic advisor concerning the acceptability of other courses. The following engineering courses may be applied toward Area IIIC requirements: ECE 20100, ECE 20200, and ECE 27000. Laboratory courses without a lecture component may be taken for credit, but do not count toward the four-course requirement.

Area IIID Analytical Reasoning Competency Applied Computer Science majors are required a minimum of 9 credit hours of mathematical sciences. A single grade of D or D+ is acceptable in this Area. Otherwise, all courses must be completed with a C- or higher. The three course requirements are MATH 15300, MATH 15400, and STAT 30100.

Area IV Major Requirements Minimum requirements include 17 credit hours of core computer science courses, 12 credit hours of core applied computer science courses, and at least 27 additional hours of computer science and supporting course electives. Core CSCI courses are: CSCI 23000, CSCI 24000, CSCI 34000, CSCI 36200, and CSCI 49500. Applied computer science core courses are: CSCI-N211 or CIT 21400, CSCI-N241 or CIT21200, CSCI-N361 or INFO-I402, and INFO-I300. All major courses must be completed with a grade of C- or better. Students must maintain a GPA of 2.0 or above in major courses.

Computer and Information Science Electives Applied Computer Science majors take 9 major elective courses. Four courses must be from the list of approved applied computer science electives. No more than two applied courses can be chosen from the list of electives outside of computer science. Five courses must be from the list of traditional computer science electives.

CSCI-N-Series and applied electives—Choose no more than four total and no more than two outside of computer science

- CSCI-N300 Mobile Computing Fundamentals
- CSCI-N305 C Language Programming
- CSCI-N311 Advanced Database Programming, Oracle
- CSCI-N317 Computation for Scientific Applications
- CSCI-N321 System and Network Administration

- CSCI-N335 Advanced Programming, Visual Basic
- CSCI-N341 Client Side Web Programming
- CSCI-N342 Server Side Web Development
- CSCI-N343 Object-Oriented Programming for the Web
- CSCI-N345 Advanced Programming, Java
- CSCI-N351 Introduction to Multimedia Programming
- CSCI-N355 Introduction to Virtual Reality
- CSCI-N361 Fundamentals of Software Project Management
- CSCI-N410 Mobile Computing Application Development
- CSCI-N420 Mobile Computing Cross Platform Development
- CSCI-N430 Mobile Computing and Interactive Applications
- CSCI-N431 E-Commerce with ASP.NET
- CSCI-N435 Data Management Best Practices with ADO.NET
- CSCI-N443 XML Programming
- CSCI-N450 Mobile Computing with Web Services
- CSCI-N451 Web Game Development
- CSCI-N452 3D Game Programming (Pending)
- CSCI-N461 Software Engineering for Applied Computer Science
- CSCI-N499 Topics in Applied Computing (topic varies)
- INFO-I202 Social Informatics
- INFO-I270 Intro HCI Principles and Practices
- INFO-I275 Intro to HCI Theory
- INFO-I310 Multimedia Arts: History, Criticism & Technology
- INFO-I480 Experience Design & Evaluation of Ubiquitous Computing
- NEWM-N220 Intro to Media Application Development
- NEWM-N230 Intro to Game Design & Development
- NEWM-N241 Stop Motion Animation
- NEWM-N255 Intro to Digital Sound
- NEWM-N285 Interactive Design
- NEWM-N320 Intermediate Media Application Development
- NEWM-N330 Game Design, Development, and Production
- NEWM-N335 Character Modeling and Animation
- NEWM-N431 Game On
- NEWM-N450 Usability Practices for New Media Interfaces
- CIT 20200 Network Fundamentals
- CIT 31200 Advanced Web Design
- CIT 31300 Commercial Web Site Development
- CIT 32900 Java Server Programming
- CIT 34700 Advanced ASP.NET Programming
- CIT 35600 Network Operating System Administration
- CIT 40200 Design and Implementation of Local Area Networks
- CIT 40600 Advanced Network Security
- CIT 41200 XML-Based Web Applications
- CIT 42000 Digital Forensics
- CIT 43600 Advanced E-Commerce Development
- CIT 44000 Computer Network Design
- HER-L210 Visual Design for the Web
- HER-A261 Intro to Computer Imagery
- BUS-S302 Management Information Systems
- BUS-L203 Commercial Law I
- BUS-L303 Commercial Law II
- ECE 20400 Intro to Electrical & Electron Circuits
- ECE 27000 Intro to Digital System Design
- ECE 36200 Microprocessor Systems & Interfacing
- ECE 47100 Embedded Systems
- STAT 51400 Design of Experiments
- MATH 16500 Analytic Geometry & Calculus I
- MATH 16600 Analytic Geometry & Calculus II
- MATH 26100 Multivariate Calculus
- MATH 26600 Ordinary Differential Equations
- MATH 35300 Linear Algebra II with Applications

Please note that the courses above may require pre-requisites. Be sure to plan accordingly

CSCI 300, 400, and 500 level Electives—Choose five courses

- CSCI 30000 Systems Programming
- CSCI 35500 Introduction to Programming Languages
- CSCI 36300 Principles of Software Design
- CSCI 40200 Computer Architecture
- CSCI 40300 Operating Systems
- CSCI 41400 Numerical Methods
- CSCI 43200 Security in Computing
- CSCI 43300 Introduction to Internet of Things
- CSCI 43500 Multimedia Information Systems
- CSCI 43600 Principles of Computer Networking
- CSCI 43700 Introduction to 3D Game Graphics
- CSCI 43800 Advanced Game Development
- CSCI 44300 Database Systems
- CSCI 44800 Biometric Computing
- CSCI 45000 Principles of Software Engineering
- CSCI 45200 Object-Oriented Analysis and Design
- CSCI 46300 Analysis of Algorithms
- CSCI 47000 Automata and Formal Languages
- CSCI 47500 Scientific Computing I
- CSCI 47600 Scientific Computing II
- CSCI 47700 High Performance Computing
- CSCI 48100 Data Mining
- CSCI 48400 Theory of Computation
- CSCI 48500 Expert System Design
- CSCI 48700 Artificial Intelligence
- CSCI 48900 Data Science
- CSCI 49000 Variable Title
- CSCI 500-level electives per approval

Bachelor of Arts Sample Program (120 cr. required)

Freshman Year

First Semester	
CSCI 12000 First Year Seminar	1
CSCI 23000 Computing I	4
MATH 15300 Algebra & Trigonometry I	3

ENG W131 Reading, Writing and Inquiry	3
Arts & Humanities (choose from list)	3
Total	**14**
Second Semester	
CSCI 24000 Computing II	4
CSCI 34000 Discrete Computational Structures	3
MATH 15400 Algebra & Trigonometry II	3
CSCI-N211 Intro. to Databases	3
COMM-R110 Fundamentals of Speech Communication	3
Total	**16**

Sophomore Year

Third Semester	
CSCI 36200 Data Structures	3
CSCI-N241 Fundamentals of Web Development	3
STAT 30100 Elem. Statistical Methods I	3
Life and Physical Science (approved elective)	3
Arts & Humanities/Social Sciences (choose from list)	3
Total	**15**
Fourth Semester	
CSCI-N361 Fund. of Software Project Mgmt.	3
CSCI elective	3
CSCI elective	3
Life and Physical Science (approved elective)	3
Social Sciences (choose from list)	3
Total	**15**

Junior Year

Fifth Semester	
CSCI Elective	3
World Language (also fulfills Cultural Understanding requirement)	4
Life and Physical Science with lab (approved elective)	4
TCM 32000 Written Comm. in Science & Industry	3
Elective	3
Total	**17**
Sixth Semester	
CSCI Elective	3
CSCI Elective	3
Life and Physical Science (approved elective)	3
World Language	4
Elective	3
Total	**16**

Senior Year

Seventh Semester	
CSCI Elective	3
CSCI Elective	3
CSCI Elective	3
INFO-I300 Human Computer Interaction	3
Total	**12**
Eighth Semester	
CSCI 49500 Explorations in Applied Computing (Capstone)	3
CSCI Elective	3
Elective	6
Elective	3
Total	**15**

Bachelor of Science

Students completing the undergraduate degree in computer and information science will have acquired a fundamental understanding of computing, information processing, and information communication. The department's graduates serve in a variety of programming, software engineering, database administration, systems analysis, management, and research positions.

Degree Requirements

NOTE: These degree requirements are effective for students admitted beginning in the Fall of 2022.

See the School of Science requirements under "Undergraduate Programs" in this bulletin for the general and area degree requirements. Computer science majors are admitted only provisionally to the program until they have completed MATH 16500 and CSCI 23000 and 24000 with a grade point average of 2.7 or higher for the three courses. Please note that computer and information science courses below CSCI 23000 or CSCI-N305 with certain exceptions, mathematics courses below MATH 16500, and statistics courses below STAT 35000 are not credited toward the degree. Furthermore, the School of Science will not accept certain university courses for the computer science degree program. The Bachelor of Science degree program in computer science requires a minimum of 120 credit hours.

First-Year Experience Course Beginning freshmen and transfer students with fewer than 19 credit hours are required to take CSCI 12000 Windows on Computer Science (1 cr.) or an equivalent first-year experience course.

Area I English Composition and Communication Competency (9 cr.) See the School of Science requirements under "Undergraduate Programs" in this bulletin for details.

- ENG-W131 Reading, Writing and Inquiry
- COMM-R110 Fundamentals of Speech Communication

The second semester of English composition must be satisfied with:

- TCM 32000 Written Communication in Science and Industry

Area II World Language Competency No world language proficiency is required for a Bachelor of Science degree.

Area IIIA Arts and Humanities, Social Sciences, and Cultural Understanding Competencies (12 cr.) The information about the IIIA requirements in the School of Science "Undergraduate Programs" section of this bulletin lists courses that may be used to satisfy the requirements below. Students should consult a departmental advisor before registering for these courses.

- List H One course from Arts and Humanities List (3 cr.).
- List S One course from Social Sciences List (3 cr.)
- One additional course from either Arts/Humanities or Social Sciences List (3 cr.)
- List C One course from Cultural Understanding List (3 cr.).

For the most current list of courses in the areas of Arts and Humanities, Social Sciences and Cultural Understanding, please refer to the IUPUI General Education Curriculum.

Area IIIC Life and Physical Sciences Competency The Department of Computer and Information Science requires all computer science majors to take PHYS 15200 and three other physical science courses chosen from the areas of biology, chemistry, geology, and physics, or from certain courses in engineering. A single grade of D or D+ is acceptable in this Area. Otherwise, all courses must be completed with a C- or higher. Each course that counts as one of the physical science required courses must have a lecture component and be at least 3 credit hours. Courses that may not be used to fulfill Area IIIC requirements include: BIOL-N100, BIOL-N120, BIOL-N200; CHEM-C100, CHEM-C101, CHEM-C102; PHYS 01000, PHYS 10000, PHYS 14000, PHYS 20000, PHYS 21800, PHYS 21900, PHYS-P201, PHYS-P202; AST-A130; GEOL-G 103, GEOL-G130, GEOL-G132; and all agriculture and geography courses. Consult a departmental academic advisor concerning the acceptability of other courses. The following engineering courses may be applied toward Area IIIC requirements: ECE 20100, ECE 20200, and ECE 27000. Laboratory courses without a lecture component may be taken for credit, but do not count toward the four-course requirement.

Area IIID Analytical Reasoning Competency Computer Science majors are required a minimum of 17 credit hours of mathematical sciences. A single grade of D or D+ is acceptable in this Area. Otherwise, all courses must be completed with a C- or higher. Five course requirements are MATH 16500, MATH 16600, MATH 17100, MATH 35100 or MATH 51100, STAT 35000 or STAT 41600 or STAT 51100.

Area IV Major Requirements Minimum requirements include 26 credit hours of core computer science courses and at least 33 additional hours of computer science and supporting course electives. Core courses are: CSCI 23000, CSCI 24000, CSCI 34000, CSCI 36200, CSCI 40200, CSCI 40300, CSCI 48400, and CSCI 49500. Students who do not maintain a minimum GPA of 2.50 in MATH 17100, and in CSCI 23000, CSCI 24000, CSCI 34000, and CSCI 36200 will not be permitted to continue as departmental majors. All major courses must be completed with a grade of C- or better. Students must maintain a GPA of 2.0 or above in major courses.

Computer and Information Science Electives

Students are encouraged to focus their required electives in such areas as databases and data mining, software engineering, game and graphics, networking, and security. Students choose a minimum of 11 courses from among the list of computer science and supporting course electives. No more than 3 courses can be chosen from the select list of N-series courses; a minimum of 6 courses must be CSCI 40000-level or above, and no more than 2 courses can be chosen from an approved list of supporting electives outside of computer science.

CSCI-N-Series — Choose no more than three

- CSCI-N300 Mobile Computing Fundamentals
- CSCI-N305 C Language Programming
- CSCI-N311 Advanced Database Programming, Oracle
- CSCI-N317 Computation for Scientific Applications
- CSCI-N321 System and Network Administration
- CSCI-N335 Advanced Programming, Visual Basic
- CSCI-N341 Client Side Web Programming
- CSCI-N342 Server Side Web Development
- CSCI-N343 Object-Oriented Programming for the Web
- CSCI-N345 Advanced Programming, Java
- CSCI-N351 Introduction to Multimedia Programming
- CSCI-N355 Introduction to Virtual Reality
- CSCI-N361 Fundamentals of Software Project Management
- CSCI-N410 Mobile Computing Application Development
- CSCI-N420 Mobile Computing Cross Platform Development
- CSCI-N430 Mobile Computing and Interactive Applications
- CSCI-N431 E-Commerce with ASP.NET
- CSCI-N435 Data Management Best Practices with ADO.NET
- CSCI-N443 XLM Programming
- CSCI-N450 Mobile Computing with Web Services
- CSCI-N451 Web Game Development (Pending)
- CSCI-N452 3D Game Programming
- CSCI-N461 Software Engineering for Applied Computer Science
- CSCI-N499 Topics in Applied Computing (topic varies)

Computer Science Supporting Electives

Choose no more than 2 courses from the supporting elective list. Note that this list of courses is not all-inclusive. Other courses outside of computer science can be considered and can be counted with prior approval of the computer science undergraduate committee.

- NEWM-N220 Intro to Media Application Development

- NEWM-N230 Introduction to Game Design & Development
- NEWM-N255 Intro to Digital Sound
- NEWM-N285 Interactive Design
- NEWM-N320 Intermediate Media Application Development
- NEWM-N330 Game Design, Development, and Production
- NEWM-N335 Character Modeling and Animation
- CIT 40200 Design and Implementation of Local Area Networks
- CIT 40600 Advanced Network Security
- CIT 42000 Digital Forensics
- CIT 44000 Computer Network Design
- HER-L210 Visual Design for the Web
- HER-A261 Intro to Computer Imagery
- INFO-I300 Human Computer Interaction
- INFO-I310 Multimedia Arts: History, Criticism, and Technology
- INFO-I320 Distributed Systems and Collaborative Comp
- BUS-S302 Management Information Systems
- BUS-L203 Commercial Law I
- BUS-L303 Commercial Law II
- ECE 20400 Introduction Electrical and Electron Circuits
- ECE 27000 Introduction to Digital System Design
- ECE 36200 Microprocessor Systems and Interfacing
- ECE 47100 Embedded Systems
- MATH 26100 Multivariate Calculus
- MATH 26600 Ordinary Differential Equations
- MATH 35300 Linear Algebra II with Applications
- STAT 51400 Design of Experiments

CSCI 300-Level Electives

- CSCI 30000 Systems Programming
- CSCI 35500 Introduction to Programming Languages
- CSCI 36300 Principles of Software Design

CSCI 400 and 500 level Electives—Choose at least six courses

- CSCI 41400 Numerical Methods
- CSCI 43200 Security in Computing
- CSCI 43300 Introduction to Internet of Things
- CSCI 43500 Multimedia Information Systems
- CSCI 43600 Principles of Computer Networking
- CSCI 43700 Introduction to 3D Game Graphics
- CSCI 43800 Advanced Game Development
- CSCI 44300 Database Systems
- CSCI 44800 Biometric Computing
- CSCI 45000 Principles of Software Engineering
- CSCI 45200 Object-Oriented Analysis and Design
- CSCI 46300 Analysis of Algorithms
- CSCI 47000 Automata and Formal Languages
- CSCI 47500 Scientific Computing I
- CSCI 47600 Scientific Computing II
- CSCI 47700 High Performance Computing
- CSCI 48100 Data Mining
- CSCI 48500 Expert System Design
- CSCI 48700 Artificial Intelligence
- CSCI 48900 Data Science
- CSCI 49000 Variable Title
- CSCI 500-level Electives per Approval
-

Bachelor of Science Sample Program (120 cr. required)

Freshman Year

First Semester	
CSCI 12000 Windows on Computer Science	1
CSCI 23000 Computing I	4
ENG W131 Reading, Writing and Inquiry	3
MATH 16500 Analytic Geometry and Calculus I	4
Arts & Humanities (choose from list)	3
Total	**15**
Second Semester	
CSCI 24000 Computing II	4
CSCI 34000 Discrete Computational Structures	3
MATH 16600 Analytic Geometry and Calculus II	4
COMM-R110 Fundamentals of Speech Communication	3
Social Sciences (choose from list)	3
Total	**17**

Sophomore Year

Third Semester	
CSCI 36200 Data Structures	3
CSCI Elective	3
MATH 17100 Multidimensional Mathematics	3
Life and Physical Science (approved elective)	3
Arts & Humanities/Social Sciences (choose from list)	3
Total	**15**
Fourth Semester	
CSCI 40200 Architecture of Computers	3
CSCI elective	3
MATH 35100 Elementary Linear Algebra	3
Life and Physical Science (approved elective)	3
Cultural Understanding (choose from list)	3
Total	**15**

Junior Year

Fifth Semester	

CSCI 40300 Intro. to Operating Systems	3
CSCI 400-level elective	3
CSCI elective	3
Statistics (approved elective)	3
TCM 32000 Written Comm. in Science & Industry	3
Total	**15**
Sixth Semester	
CSCI 400-level elective	3
CSCI 400-level elective	3
CSCI elective	3
PHYS 15200 Mechanics	4
General elective	3
Total	**16**

Senior Year

Seventh Semester	
CSCI 48400 Theory of Computation	3
CSCI 400-level elective	3
CSCI 400-level elective	3
CSCI elective	3
General elective	3
Total	**15**
Eighth Semester	
CSCI 49500 Explorations in Applied Computing (Capstone)	3
CSCI 400-level elective	3
Science elective	3
General elective	3
Total	**12**

Bachelor of Science, Biocomputing Concentration

Students completing the undergraduate degree in computer and information science will have acquired a fundamental understanding of computing, information processing, and information communication. The Biocomputing concentration prepares graduates for medical school admission application requirements. The option also combines the study of computer science with coursework in the life sciences. The department's graduates serve in a variety of programming, software engineering, database administration, systems analysis, management, and research positions.

Degree Requirements

NOTE: These degree requirements are effective for students admitted beginning in the Fall of 2022.

See the School of Science requirements under "Undergraduate Programs" in this bulletin for the general and area degree requirements. Computer science majors are admitted only provisionally to the program until they have completed MATH 16500 and CSCI 23000 and 24000 with a grade point average of 2.7 or higher for the three courses. Please note that computer and information science courses below CSCI 23000 or CSCI-N305 with certain exceptions, mathematics courses below MATH 16500, and statistics courses below STAT 35000 are not credited toward the degree. Furthermore, the School of Science will not accept certain university courses for the computer science degree program. The Bachelor of Science degree program in computer science, Biocomputing concentration requires a minimum of 120 credit hours.

First-Year Experience Course Beginning freshmen and transfer students with fewer than 19 credit hours are required to take CSCI 12000 Windows on Computer Science (1 cr.) or an equivalent first-year experience course.

Area I English Composition and Communication Competency (9 cr.) See the School of Science requirements under "Undergraduate Programs" in this bulletin for details.

- ENG-W131 Reading, Writing and Inquiry
- COMM-R110 Fundamentals of Speech Communication

The second semester of English composition must be satisfied with:

- TCM 32000 Written Communication in Science and Industry

Area II World Language Competency No world language proficiency is required for a Bachelor of Science degree.

Area IIIA Arts and Humanities, Social Sciences, and Cultural Understanding Competencies (12 cr.) The information about the IIIA requirements in the School of Science "Undergraduate Programs" section of this bulletin lists courses that may be used to satisfy the requirements below. Students should consult a departmental advisor before registering for these courses.

- List H One course from Arts & Humanities List (3 cr.).
- List S Social Science - PSY-B110 (3 cr.)
- One additional course - SOC-R100 (3 cr.)
- List C One course from Cultural Understanding List (3 cr.).

For the most current list of courses in the areas of Arts and Humanities, Social Sciences and Cultural Understanding, please refer to the IUPUI General Education Curriculum.

Area IIIC Life and Physical Sciences Competency

Life and physical science courses required for the BS in computer science, Biocomputing concentration are:

- BIOL-K101 Concepts of Biology I
- BIOL-K103 Concepts of Biology II
- CHEM-C105 Principles of Chemistry I
- CHEM-C125 Experimental Chemistry I
- CHEM-C106 Principles of Chemistry II
- CHEM-C126 Experimental Chemistry II
- CHEM-C341 Organic Chemistry I
- CHEM-C343 Organic Chemistry I Lab
- CHEM-C342 Organic Chemistry II
- CHEM-C344 Organic Chemistry II Lab

- PHYS-P201 General Physics I
- PHYS-P202 General Physics II
- BIOL-K384 or CHEM-C384 Biochemistry

Area IIID Analytical Reasoning Competency BS in Computer Science, Biocomputing concentration majors are required to complete a minimum of 14 credit hours of mathematical sciences. A single grade of D or D+ is acceptable in this Area. Otherwise, all courses must be completed with a C- or higher. Four course requirements are MATH 16500, MATH 16600, MATH 17100, STAT 35000 or STAT 41600 or STAT 51100.

Area IV Major Requirements Minimum requirements include 23 credit hours of core computer science courses and at least 18 additional hours of computer science course electives. Core courses are: CSCI 23000, CSCI 24000, CSCI 34000, CSCI 36200, CSCI 40200, CSCI 40300, and CSCI 49500. Students who do not maintain a minimum GPA of 2.50 in MATH 17100, and in CSCI 23000, CSCI 24000, CSCI 34000, and CSCI 36200 will not be permitted to continue as departmental majors. All major courses must be completed with a grade of C- or better. Students must maintain a GPA of 2.0 or above in all major courses.

Computer and Information Science Electives

Students choose a minimum of 6 courses from among the list of computer science course electives. No more than 3 courses can be chosen from the select list of N-series and 300-level courses.

CSCI-N-Series and 300-Level - Choose no more than three:

- CSCI 30000 Systems Programming
- CSCI 35500 Introduction to Programming Languages
- CSCI 36300 Principles of Software Design
- CSCI-N300 Mobile Computing Fundamentals
- CSCI-N305 C Language Programming
- CSCI-N311 Advanced Database Programming, Oracle
- CSCI-N317 Computation for Scientific Applications
- CSCI-N321 System and Network Administration
- CSCI-N335 Advanced Programming, Visual Basic
- CSCI-N341 Client Side Web Programming
- CSCI-N342 Server Side Web Development
- CSCI-N343 Object-Oriented Programming for the Web
- CSCI-N345 Advanced Programming, Java
- CSCI-N351 Introduction to Multimedia Programming
- CSCI-N355 Introduction to Virtual Reality
- CSCI-N361 Fundamentals of Software Project Management
- CSCI-N410 Mobile Computing Application Development
- CSCI-N420 Mobile Computing Cross Platform Development
- CSCI-N430 Mobile Computing and Interactive Applications
- CSCI-N431 E-Commerce with ASP.NET
- CSCI-N435 Data Management Best Practices with ADO.NET
- CSCI-N443 XLM Programming
- CSCI-N450 Mobile Computing with Web Services
- CSCI-N451 Web Game Development
- CSCI-N452 3D Game Programming
- CSCI-N461 Software Engineering for Applied Computer Science
- CSCI-N499 Topics in Applied Computing (topic varies)

CSCI 400 and 500 level Electives—Choose at least three courses

- CSCI 41400 Numerical Methods
- CSCI 43200 Security in Computing
- CSCI 43300 Introduction to Internet of Things
- CSCI 43500 Multimedia Information Systems
- CSCI 43600 Principles of Computer Networking
- CSCI 43700 Introduction to 3D Game Graphics
- CSCI 43800 Advanced Game Development
- CSCI 44300 Database Systems
- CSCI 44800 Biometric Computing
- CSCI 45000 Principles of Software Engineering
- CSCI 45200 Object-Oriented Analysis and Design
- CSCI 46300 Analysis of Algorithms
- CSCI 47000 Automata and Formal Languages
- CSCI 47500 Scientific Computing I
- CSCI 47600 Scientific Computing II
- CSCI 47700 High Performance Computing
- CSCI 48100 Data Mining
- CSCI 48500 Expert System Design
- CSCI 48700 Artificial Intelligence
- CSCI 48900 Data Science
- CSCI 49000 Variable Title
- CSCI 500-level Electives per Approval

Bachelor of Science, Biocomputing Concentration Sample Program (120 cr. required)

Freshman Year

First Semester	
CSCI 12000 Windows on Computer Science	1
CSCI 23000 Computing I	4
MATH 16500 Analytic Geometry and Calculus I	4
BIOL-K101 Concepts in Biology I	5
Total	**14**
Second Semester	
CSCI 24000 Computing II	4
MATH 16600 Analytic Geometry and Calculus II	4
ENG-W131 Reading, Writing and Inquiry	3
BIOL-K103 Concepts of Biology II	5
Total	**16**

Sophomore Year

Third Semester	

CSCI 34000 Discrete Computational Structures	3
MATH 17100 Multidimensional Mathematics	3
CHEM-C105 Principles of Chemistry I	3
CHEM-C125 Experimental Chemistry I	2
COMM-R110 Fundamentals of Speech Communication	3
PSY-B110 Introduction to Psychology	3
Total	**17**
Fourth Semester	
CSCI 36200 Data Structures	3
Statistics (approved elective)	3
CHEM-C106 Principles of Chemistry II	3
CHEM-C126 Experimental Chemistry II	2
SOC-R100 Introduction to Sociology	3
Total	**14**

Junior Year

Fifth Semester	
CSCI 40200 Architecture of Computers	3
CSCI elective	3
CHEM-C341 Organic Chemistry I	3
CHEM-C343 Organic Chemistry I Lab	2
Arts and Humanities (choose from list)	3
Cultural Understanding (choose from list)	3
Total	**17**
Sixth Semester	
CSCI 40300 Introduction to Operating Systems	3
TCM 32000 Written Comm. in Science/Industry	3
CSCI elective	3
CHEM-C342 Organic Chemistry II	3
CHEM-C344 Organic Chemistry II Lab	2
Total	**14**

Senior Year

Seventh Semester	
CSCI elective	3
CSCI elective	3
PHYS-P 201 General Physics I	5
BIOL-K384 or CHEM-C384 Biochemistry	3
Total	**14**
Eighth Semester	
CSCI 49500 Explorations in Applied Computing (Capstone)	3
CSCI elective	3
CSCI elective	3
PHYS-P202 General Physics II	5
Total	**14**

Bachelor of Science Artificial Intelligence

The B.S. in AI degree program will provide a solid foundational, as well as comprehensive, education on AI and related technologies. Students graduating from this program will be able to develop intelligent agents that are part of autonomous systems mimicking human behavior capable of performing tasks autonomously, and intelligently. Students completing the undergraduate degree in artificial intelligence will have studied artificial intelligence theory, methodologies, and applications throughout the program. Students will be able to apply this knowledge to artificial intelligence technologies, such as robotics, autonomous systems, intelligent control and smart systems and devices.

Degree Requirements

NOTE: These degree requirements are effective for students admitted beginning in the Fall of 2022.

See the School of Science requirements under "Undergraduate Programs" in this bulletin for the general and area degree requirements. Please note that computer and information science courses below CSCI 23000 or CSCI-N305 with certain exceptions, mathematics courses below MATH 16500, and statistics courses below STAT 35000 are not credited toward the degree. Furthermore, School of Science will not accept certain university courses for the computer science degree program. The Bachelor of Science degree program in artificial intelligence requires a minimum of 120 credit hours.

First-Year Experience Course Beginning freshmen and transfer students with fewer than 19 credit hours are required to take CSCI 12000 Windows on Computer Science (1 cr.) or an equivalent first-year experience course.

Area I English Composition and Communication Competency (9 cr.) See the School of Science requirements under "Undergraduate Programs" in this bulletin for details.

- ENG-W131 Reading, Writing and Inquiry
- COMM-R110 Fundamentals of Speech Communication

The second semester of English composition must be satisfied with:

- TCM 32000 Written Communication in Science and Industry

Area II World Language Competency No world language proficiency is required for a Bachelor of Science degree.

Area IIIA Arts and Humanities, Social Sciences, and Cultural Understanding Competencies (12 cr.) The information about the IIIA requirements in the School of Science "Undergraduate Programs" section of this bulletin lists courses that may be used to satisfy the requirements below. Students should consult a departmental advisor before registering for these courses.

- List H Arts and Humanities Competency: One course from Arts and Humanities list (3 cr.)
- List S Social Sciences Competency: One course from Social Science list - PSY-B110 Intro to Psychology (3 cr.)
- One additional course from either Arts/Humanities or Social Science list (3 cr.)
- List C Cultural Understanding Competency: One course from Cultural Understanding list (3 cr.)

For the most current list of courses in the areas of Arts and Humanities, Social Sciences and Cultural Understanding, please refer to the IUPUI General Education Curriculum.

Area IIIC Life and Physical Sciences Competency The Department of Computer and Information Science requires four life and physical science lecture courses; one of those courses must also have a lab component. A single grade of D or D+ is acceptable in this Area. Otherwise, all courses must be completed with a C- or higher. Each course that counts as one of the physical science required courses must have a lecture component and be at least 3 credit hours. Courses that may not be used to fulfill Area IIIC requirements include: BIOL-N100, BIOL-N120, BIOL-N200; CHEM-C100, CHEM-C101, CHEM-C102; PHYS 01000, PHYS 10000, PHYS 14000, PHYS 20000, AST-A130; GEOL-G 103, GEOL-G130, GEOL-G132; and all agriculture and geography courses. Consult a departmental academic advisor concerning the acceptability of other courses. The following engineering courses may be applied toward Area IIIC requirements: ECE 20100, ECE 20200, and ECE 27000. Laboratory courses without a lecture component may be taken for credit, but do not count toward the four-course requirement.

Area IIID Analytical Reasoning Competency Artificial Intelligence majors are required to complete a minimum of 21 credit hours of mathematical science courses. A single grade of D or D+ is acceptable in this Area. Otherwise, all courses must be completed with a C- or higher. Six course requirements are MATH 16500, MATH 16600, MATH 17100, MATH 26100, MATH 35100 and STAT 41600.

Area IV Major Requirements Minimum requirements include 47 credit hours of computer science courses. Core courses are: CSCI 23000, CSCI 24000, CSCI 34000, CSCI 36200, CSCI 48100, CSCI 41400, CSCI-N 317, CSCI 44300, CSCI 48700, CSCI 46300 or ECE 49500 Algorithms, CSCI 49500 Robotics, CSCI 49500 and CSCI 49000 Deep Learning, Computer Vision and Natural Language Processing courses. All major courses must be completed with a grade of C- or better. Students must maintain a GPA of 2.0 or above in major courses.

Focus Area Electives:

- CSCI 43500 Multimedia Information Systems
- CSCI 44800 Biometric Computing
- CSCI 45000 Principles of Software Engineering
- CSCI 48900 Data Science
- CSCI 58000 Algorithm Design, Analysis, and Implementation

Bachelor of Science Sample Program (120 cr. required)

Freshman Year

First Semester	
CSCI 12000 Windows on Computer Science	1
CSCI 23000 Computing I	4
MATH 16500 Analytical Geometry and Calculus I	4
ENG W131 Reading, Writing and Inquiry	3
AIS 10000 Introduction to AI	3
Total	**15**
Second Semester	
CSCI 34000 Discrete Computational Structures	3
MATH 16600 Analytical Geometry and Calculus II	4
MATH 17100 Multidimensional Math	3
PSY-B110 Intro to Psychology (Social Sciences)	3
COMM-R110 Fundamentals of Speech Communication	3
Total	**16**

Sophomore Year

Third Semester	
MATH 26100 Multivariate Calculus	4
AIS 20000 Introductory Data Science	3
MATH 35100 Linear Algebra	3
Life/Physical Science Elective	3
CSCI 24000 Computing II	4
Total	**17**
Fourth Semester	
CSCI-N317 Computation for Scientific Applications	3
STAT 41600 Probability	3
CSCI 36200 Data Structures	3
PSY-B201 Foundations of Neuroscience (life/physical science)	3
CSCI 48100 Data Mining	3

Total	**15**

Junior Year

Fifth Semester	
CSCI 41400/MATH 41400 Numerical Methods	3
AIS 30000 Collaborative Human-AI Systems	3
CSCI 44300 Database Systems	3
Life/Physical Science Elective	3
CSCI 49000 topic - Deep Learning	3
Total	**15**
Sixth Semester	
CSCI 48700 Artificial Intelligence	3
AI Core- CSCI 46300 or ECE 49500 Algorithms	3
Cultural Understanding elective	3
Life/Physical Science Elective + lab requirement	4
Focus Area Elective	3
Total	**16**

Senior Year

Seventh Semester	
TCM 32000 Written Communication in Science and Industry	3
AI-IUPUI Recent Trends in AI	3
AI-IUPUI 4XX AI Ethics	1
AI Core ECE 49500 Robotics	3
Arts & Humanities Elective	3
Total	**13**
Eighth Semester	
CSCI 49000 topic - Computer Vision	3
CSCI 49500 Computer Science Capstone	3
CSCI 49000 topic - Natural Language Processing	3
Focus Area Elective 2	1
General Education Arts/ Humanities or Social Sciences	3
Total	**13**

Certificate in Applied Computer Science

The certificate program introduces computer science principles, develops practical skills in market-driven software applications, and prepares students to be successful with emerging technologies. The program is designed to supplement and enhance a primary degree program. It serves current IUPUI students and returning adults who are interested in gaining knowledge and skills in computing applications.

Those who earn the certificate will have demonstrated that they have the core competencies necessary for entry-level positions in information technology. They will have the ability to solve complex problems, design and implement algorithms, apply computer science theory to practical problems, adapt to technological change and to develop software solutions.

Admission Requirements

- A cumulative GPA of at least 2.0 and enrollment in or successful completion (no grade below C–) of MATH-M118 Finite Mathematics or higher or PHIL-P162 Logic or PHIL-P265 Introduction to Symbolic Logic

Students must declare their intent to earn this certificate before completing the core requirements (9 credit hours) described below. No more than 9 credit hours earned before admission to the program will be accepted toward the certificate requirements.

Program Requirements

Students are required to successfully complete 18 credit hours (six courses) to earn the certificate. Three courses are core requirements and three courses are advanced electives. Core requirements must be completed before enrolling in the advanced electives. No individual grade below a C– is acceptable. At least 9 credit hours in the certificate program must be taken in the Department of Computer and Information Science. A GPA of at least 2.0 is required for the complete certificate program.

Required Core CSCI Courses (9 credit hours):

- CSCI-N241 Fundamentals of Web Development
- CSCI-N301 Fundamental Computer Science Concepts or CSCI-N 200 Principles of Computer Science or CSCI 23000 Computing I
- CSCI-N361 Fundamentals of Software Project Management

Advanced Electives (9 credit hours):

In addition to the three core courses, students must successfully complete three other approved courses that complete one Tier 1 and two Tier 2 electives.

Tier 1 Electives

- CSCI-N207 Data Analysis Using Spreadsheets
- CSCI-N211 Introduction to Databases
- CSCI-N341 Client Side Web Programming

Tier 2 Electives

- CSCI-N300 Mobile Computing Fundamentals
- CSCI-N311 Advanced Database Programming, Oracle
- CSCI-N317 Computation for Scientific Applications
- CSCI-N342 Server Side Web Development
- CSCI-N410 Mobile Application Development
- CSCI-N431 E-Commerce with ASP.net
- CSCI 36200 Data Structures
- CSCI 48100 Data Mining
- INFO-I300 Human-Computer Interaction

Students should contact the Computer and Information Science Academic Advisor for information about Tier 1 and Tier 2 courses. While the certificate can be completed entirely online, not all electives are offered online or offered every semester.

To enroll in this certificate program, students must be formally admitted by the Office of Undergraduate Admissions on the IUPUI campus. For currently enrolled (admitted) IUPUI students, an online application is available at https://science.iupui.edu/admissions/apply/internal-application.html.

Certificate in Fundamentals of Data Analytics

The certificate in fundamentals of data analytics equips students with the skill set necessary to perform meaningful data analysis in any domain. The curriculum includes theoretical knowledge as well as hands-on training in various major data applications, such as R, MatLab, SPSS, Excel, Access, MySQL, Oracle and more. Students will learn to marshal computational data to solve a variety of real world problems. The certificate is appropriate for students and working professionals in a wide range of areas, including STEM fields, Liberal Arts, Philanthropy, Business and more.

Admission Requirements

- Candidates for this certificate are required to be formally admitted by the IUPUI Office of Admissions. Current IUPUI students must have a 2.0 IU Cumulative GPA or better for admission.

Program Requirements

Students are required to successfully complete 15 credit hours (five courses) to earn the certificate. No individual grade below a C is acceptable. At least 12 credit hours in the certificate program must be taken at IUPUI. An IU Cumulative GPA of at least 2.0 is required to complete the certificate program

Required Courses (15 credit hours):

- CSCI-N207 Data Analysis Using Spreadsheets
- CSCI-N211 Introduction to Databases
- CSCI-N311 Advanced Database Programming
- CSCI-N317 Computation for Scientific Applications
- STAT 30100 Elementary Statistical Methods (pre-requisite of MATH 11000 or MATH 11100 or equivalent)

Minor in Computer and Information Science

The undergraduate minor in computer and information science requires at least 20 credit hours in computer science courses, including CSCI 23000, 24000, 34000, 36200, and two CSCI elective courses. Students who have requested and received approval for the waiver of CSCI 23000 must replace that course with another CSCI minor course elective; for such students the minimum total computer science credit hour requirement will be relaxed to 19 credits. Course prerequisites must be fulfilled prior to enrollment in CSCI courses.

Approved list of computer and information science minor electives:

- CSCI 24000 Computing II
- CSCI 30000 Systems Programming
- CSCI 35500 Introduction to Programming Languages
- CSCI 36300 Software Design
- CSCI 40200 Computer Architecture
- CSCI 40300 Operating Systems
- CSCI 41400/MATH 41400 Numerical Methods
- CSCI 43200 Security in Computing
- CSCI 43300 Internet of Things
- CSCI 43500 Multimedia Information Systems
- CSCI 43600 Principles of Computer Networking
- CSCI 43700 Introduction to Game Graphics
- CSCI 43800 Advanced Game Development
- CSCI 44300 Database Systems
- CSCI 44800 Biometric Computing
- CSCI 45000 Principles of Software Engineering
- CSCI 48100 Data Mining
- CSCI 48400 Theory of Computation
- CSCI 48700 Artificial Intelligence
- CSCI 48900 Data Science
- CSCI 49000 Variable Title
- CSCI-N300 Mobile Computing Fundamentals
- CSCI-N311 Advanced Database Programming, Oracle
- CSCI-N317 Comp. for Scientific Applications
- CSCI-N341 Client-Side Web programming
- CSCI-N342 Server-Side Web Development
- CSCI-N361 Software Project Management
- CSCI-N410 Mobile Computing Application Dev.
- CSCI-N431 E-Commerce with ASP.NET

A minimum GPA of 2.50 must be maintained in these courses. At least 9 credit hours of the minor must be taken at IUPUI.

Students who wish to pursue a minor in computer and information science may declare the minor intent by completing this online form. Students should consult an advisor in the department before their final semester regarding minor completion.

Minor in Applied Computer Science

The Minor in Applied Computer Science is available to currently enrolled IUPUI undergraduate students pursuing bachelor's degrees outside computer science. The applied minor requires at least 19 credit hours in computer science courses, including CSCI-N201, CSCI-N207 or CSCI-N211, CSCI-N241, CSCI 23000, and two three-credit electives from the approved list.

Approved list of applied computer science minor electives:

- CSCI 24000 Computing II
- CSCI 30000 Systems Programming
- CSCI 35500 Introduction to Programming Languages
- CSCI 36300 Software Design
- CSCI-N300 Mobile Computing Fundamentals
- CSCI-N311 Advanced Database Programming, Oracle
- CSCI-N317 Comp. for Scientific Applications
- CSCI-N341 Client-Side Web Programming
- CSCI-N342 Server-Side Web Development
- CSCI-N361 Software Project Management

- CSCI-N410 Mobile Computing Application Dev.
- CSCI-N431 E-Commerce with ASP.NET
- CSCI-N499 Topics in Applied Computing

A minimum 2.0 GPA must be maintained in these courses, and no grade below C- is allowed. At least 12 credit hours of the minor must be taken in residence at IUPUI. Students who wish to pursue a minor in Applied Computer Science may declare the minor intent by completing this online form. Students should consult an advisor in the department before their final semester regarding minor completion.

Graduate Programs

Master of Science

This program leads to a Master of Science degree from Purdue University.

Programs of Study

The Department offers three programs within its M.S. program: the Research program, the Applied Program, and the Course Only option.

Research Program

The objective of the Research Program is to help students develop a general knowledge of computer science, depth in a specific area, and an ability to do independent research. The student learns research techniques by working in close cooperation with a faculty member while doing the thesis research. in addition to the two core courses and 6 to 9 credit hours of CSCI 69800 M.S. Thesis work, the student completes a sufficient number of electives from the department's graduate level courses to satisfy the requirement of 30 credit hours total.

Applied Program

The objective of the Applied Program is to develop skills and knowledge of the computer science fundamentals and an ability to apply these to practical problems. In addition to the two core courses, it requires at least two courses in a specialization, 3 to 6 credits of work in the M.S. Project course, CSCI 69500, and a sufficient number of electives from the department's graduate courses to complete the requirement of 30 credit hours. The course work is designed to provide breadth of knowledge to the professional as well as specialized knowledge in the areas that the project will require. The project normally involves at least two semesters of intensive work on an application of the course material to a problem of practical importance. This might be a project from the student's work environment, internship, or a faculty member's work. Its objective is generally more immediately practical than the thesis in the Research Program. The student carries out the project under the supervision of a faculty member.

The Applied Program offers a menu of courses from which the individual selects one or more specializations to prepare for the proposed project. To define a specialization, the graduate advisor and student identify in the plan of study two or more courses that provide depth in a cohesive theme.

Course Only Option

The Course Only option is meant for students who desire practical knowledge and skills in a range of specializations in computer science. It offers a menu of courses from which the individual selects one or more specializations to define a concentration area. The program provides both depth and breadth of knowledge in the discipline and is ideal for students who are not planning careers exclusively in research.

Application for Admission

Submit applications for admission to the graduate program directly to the Department of Computer and Information Science by April 1 for the following Fall semester and September 15 for the following Spring semester. To be considered for the University Fellowship award for the following Fall semester, all application materials must be received by January 15.

Students interested in advanced study or students who are required to complete preparatory courses and are waiting on application processing may take courses as graduate non-degree students. No more than 12 graduate credit hours earned as a nondegree student may be counted toward a graduate degree program.

See the department's Web site (https://science.iupui.edu/cs/) for additional information on requirements and application deadlines.

General Admission Requirements

Applicants to the graduate program must have a four-year bachelor's degree or equivalent. Interested students with 3-year bachelor's degrees should contact the department for information.

The applicant's record should demonstrate strong individual accomplishments, include recommendations from independent references and exhibit outstanding achievement as indicated by the grade point average for each degree over his or her entire academic record. An applicant is expected to have a GPA of at least a 3.0 on a scale of 4.0.

The Graduate Record Exam (GRE) General Test is not required for applicants to the Computer Science MS or Computational Data Science MS programs, though applicants are still strongly encouraged to submit scores. All applicants to the Computer Science Ph.D. program are required to submit GRE scores, however there is no specific minimum score requirement that must be met.

All applicants should have a background in the following core areas of computer science:

- software development experience in a high-level language
- data structures and algorithms
- systems (operating systems, compilers, and programming languages)
- theory (discrete math and theory of computation)
- hardware (computer architecture)

In addition, applicants should have a strong background in mathematics, including calculus, linear algebra, and numerical computations.

All applicants whose native language is not English must submit sufficient proof of English proficiency via either TOEFL or IELTS test. For TOEFL, applicants must have an overall score of at least 80 on the Internet Based Test (iBT) with section minimums of 19 Reading, 14 Listening,

and 18 Speaking & Writing. TOEFL scores must be from a single test occurrence; "MyBest" scores are not accepted. For IELTS (Academic test only), applicants must have an overall band score of 6.5, with section minimums of 6.5 Reading, 6.0 Listening & Speaking and 5.5 Writing.

International applicants who have received a degree in the U.S. are exempted from the TOEFL/IELTS requirement only if the degree was awarded within the last 3 years.

Degree Requirements

To receive the Master of Science degree, the applicant must be admitted as a graduate student *without provisions* and complete 30 semester credit hours of study in CSCI courses numbered 500 or above. Of the 30 required hours, students must select 1 course each from 4 different "foundational" categories for a total of 12 credit hours. There are 6 categories from which to select the 4, as listed below:

1. Networking and Security -- CSCI 53300, CSCI 53600, CSCI 55500
2. Databases and Intelligent Systems -- CSCI 54100, CSCI 54900, CSCI 57300, CSCI 57800
3. Visualization and Graphics -- CSCI 55000, CSCI 55200, CSCI 55700
4. Software Engineering -- CSCI 50600, CSCI 50700, CSCI 50900
5. Theory -- CSCI 52000, CSCI 56500, CSCI 58000
6. Systems -- CSCI 50200, CSCI 50300, CSCI 50400, CSCI 53200, CSCI 53700

Each student is required to submit to the graduate committee for approval an initial plan of study during the first year in the program. This is prepared in consultation with the faculty advisor. Before the semester of expected graduation, the student's formal plan of study must be submitted to, and accepted by, Purdue University's Graduate School. Each student must register in CAND 99100 and at least 1 credit hour of a fee-bearing course during the final semester before graduation.

Credit for Courses from Outside the Department

Credit for graduate courses taken at other institutions may be transferred with the approval of the graduate committee and the Graduate School if the courses have not been used for other degree requirements. Transfer credits are normally limited to 6 credit hours and are restricted to courses in which the grade is B or higher. Non-departmental courses are limited to 3 credits (1 course) for course-only students, selected from a pre-approved list. Up to 3 additional credits (for a total of 6) may be allowed for MS Thesis or MS Project students for courses related to research area; prior approval of the Advisory and Graduate Committees are required for registration.

Assessment

The student's graduate examination committee will examine the student's project or thesis and general proficiency in computer science. Grades of A and B are expected; up to 6 credit hours of C or C+ may be included, provided an overall GPA of 3.0 (B) is maintained. Other grades are unacceptable.

Master of Science in Computational Data Science

This degree program is offered through the Departments of Computer & Information Science and Mathematical Sciences of the IUPUI School of Science. The objective of the program is to prepare students to enter the workforce in the rapidly advancing field of data science, an interdisciplinary domain that cuts across computer science and statistics, by providing a solid, comprehensive background in the related topics of theory and their applications.

This program will provide the skills necessary that will enable students to be flexible and competitive in today's job market by gaining deep understanding of theory, implementation (e.g., algorithms and appropriate computing languages), as well as the inherent "nature" of different data modalities, such as classification and prediction challenges on specific data (e.g., sparse and/or incomplete data).

Curriculum Requirements

The curriculum requires 30 credits in total that can be completed in three semesters. There are 9 credits for core courses in Computer Science, 6 credits for Statistics core courses, 12 credits for elective courses from Computer Science and/or Statistics, and 3 credits for the capstone course. Students must choose two electives from Computer Science and two electives from Statistics.

Successful completion of the program requires a minimum plan of study GPA of 3.0, and the minimum grade acceptable in any course is C. Students can count a maximum of 2 grades of C or C+ combined, as long as the 3.0 minimum GPA is maintained.

Core Courses:
CSCI 59000 Introduction to Data Science
CSCI 57300 Data Mining
CSCI 57800 Statistical Machine Learning
STAT 51200 Applied Regression Analysis
STAT 52900 Applied Decision Theory and Bayesian Analysis

Capstone Courses:
CSCI 69500 MS Capstone Project
STAT 59800 Topics in Statistical Methods
Elective courses:
CSCI 52000 Computational Methods in Analysis
CSCI 54100 Database Systems
CSCI 55200 Advanced Graphics & Visualization
CSCI 58000 Algorithm Design, Analysis & Implementation
CSCI 59000 Large-Scale Machine Learning
CSCI 59000 High Performance Computing
STAT 51400 Design of Experiments
STAT 52000 Time Series and Applications
STAT 52300 Categorical Data Analysis
STAT 52400 Applied Multivariate Analysis
STAT 52501 Generalized Linear Models
STAT 53600 Introduction to Survival Analysis
The course sequence is crucial for successful completion of this program. Students should consult with the departmental advisor for questions regarding course sequencing.

General Admission Requirements for MS in Computational Data Science

Prerequisite coursework and/or degrees:

4-year Bachelor's degree in Computer Science, Engineering, Mathematics, Statistics or related fields. 4-year Bachelor's degree in any other area of study will be considered on a case-by-case basis, based on the coursework and corresponding grades in the applicant's transcripts, as well as on the overall potential of successfully completing this program.

GPA: Entering students are expected to have a minimum cumlative grade point average (GPA) equivalent to at least 3.00 on a 4.00 scale

GRE: GRE scores are not required for applicants to the Computational Data Science MS program, however all applicants are still strongly encouraged to submit scores.

All applicants whose native language is not English must submit sufficient proof of English proficiency via either TOEFL or IELTS test. For TOEFL, applicants must have an overall score of at least 80 on the Internet Based Test (iBT) with section minimums of 19 Reading, 14 Listening, and 18 Speaking & Writing. TOEFL scores must be from a single test occurrence; "MyBest" scores are not accepted. For IELTS (Academic test only), applicants must have an overall band score of 6.5, with section minimums of 6.5 Reading, 6.0 Listening & Speaking and 5.5 Writing.

International applicants who have received a degree in the U.S. are exempted from the TOEFL/IELTS requirement only if the degree was awarded within the last 3 years.

Doctor of Philosophy

Students interested in research in certain areas and who qualify may be admitted to pursue a Ph.D. degree. Information on the general nature of the program appears in the “Graduate Programs” section of the School of Science part of this bulletin. Consult the department’s Web page (https://science.iupui.edu/cs/) for more specific information on how this might be arranged.

Research Orientation Requirement

Students in their first year must take a 1-credit Pass/Fail seminar course (CSCI-C591) and, as part of this course, they must also complete the "Physical Science Responsible Conduct of Research" course online and provide the certificate of completion.

Core Course Requirement

Students must satisfy this requirement by the end of their fourth semester by passing one theory core course and one systems core course and one course in an area of specialization with an average GPA of at least 3.5. A core course that does not meet the grade and GPA requirements can be taken, at most, a second time. Taking another course (in the same core area or in the same specialization area, or taking a course in another specialization area) would count as the second attempt. The second attempt at satisfying the core course qualifications will be considered a probationary period for the student to remedy the shortcoming. Students must declare the area of specialization ahead of time with the approval of their advisory committee. The students who have not satisfied their core course requirements by the end of their fourth semester according to the conditions described above cannot proceed further in their PhD studies. They will need to contact their advisor and their advisory committee. The students will receive a letter of probation during their second attempt at completing a core course. The students will be informed that they can be dismissed if they fail to be removed from probation.

The core courses and areas of specialization are defined as follows:

- Theory core courses: CSCI 58000 (Algorithms) and CSCI 56500 (Programming Languages)
- Systems core courses: CSCI 50300 (Operating Systems), CSCI 50400 (Computer Architecture)
- Area Specialization courses:
  - Visualization, Image Processing and Machine Vision: CSCI 55000, CSCI 55200, CSCI 55700, CSCI 55800
  - Data Communication and Networking: CSCI 53300, CSCI 53600
  - Distributed Computing: CSCI 53200, CSCI 53700
  - AI, Machine Learning, and Data Analysis: CSCI 54900, CSCI 57300, CSCI 57800
  - Databases: CSCI 54100
  - Software Engineering: CSCI 50600, CSCI 50700, CSCI 50900
  - Security: CSCI 55500, CSCI 57500

Students who are admitted into the program with deficiencies in CS background (because their degrees are in another discipline) must prove that the deficiencies are eliminated by the end of their qualifying process. The areas (as described in the admissions requirements) are Data Structures, Computer Architecture, and Operating Systems.

Plan of Study

- Advisory committee: Advisor + 2 or more other faculty. The students must form their advisory committee by the end of their first year.
- Overall course requirement: at least nine graduate level courses (including the two core and one specialization courses) with GPA>= 3.3. Other courses need to be 500 or 600 level courses.
  - A student receiving a grade lower than a B- in a course on the plan of study will have to repeat or replace the course. If a course is repeated, only the most recent grade, even if lower, is used to compute the current GPA.
- Policy for transferring courses from MS degree:
  - The MS courses taken in the department as part of the MS degree within the department count towards Ph.D. course requirements.
  - For students with graduate courses from another institution, the faculty will consider approving the transfer of up to 30 credits of graduate level courses from other institutions upon petition by the student. The faculty will require a copy of the syllabus for each course considered for transfer and decisions will be made on a case-by-case basis. Final approval of the course transfers will be made by the IUPUI Graduate Office. The courses on the plan of study cannot have been used to satisfy

requirements for an undergraduate degree nor can they cause the student's doctoral plan of study to include courses from more than one master's program.

Preliminary Exam

- Students must pass a preliminary examination that tests competence in the student's research area and readiness for research on a specific problem. The content of the examination is at the discretion of the examining committee. Typically, the examination includes a proposal of thesis research, the student's preliminary research results, an oral presentation by the student on his/her thesis proposal, and any other relevant material if requested by the examining committee. The form and content of the examination will be determined by the examination committee and will be communicated to the student by the committee chair, which normally is the student's advisor.
- The examining committee consists of the student's Advisory Committee, and of an additional member, who is not on the advisory committee, who is determined by the Graduate Committee Chair.
- The examination must be taken at least two semesters before the final examination of the thesis. It is advised, however, that the student take the preliminary exam by the end of the third semester following the one in which the student completes the qualifying process.

Thesis and Final Exam/Defense

- The thesis must present new results worthy of publication.
- The student must defend the thesis publicly and to the satisfaction of the Examining Committee.
- The Examining Committee consists of the Advisory Committee and one additional faculty member representing an area outside that of the thesis and who is assigned by the Graduate Committee Chair.
- The students can only defend their thesis after at least two semesters following the completion of the preliminary exam. The thesis defense should be completed by the end of the fourth semester following the one in which the student passes the preliminary examination. The Graduate Committee may grant extensions.

Annual Reviews

Each doctoral student's academic and research progress is evaluated annually by their advisory committee. Students receive written feedback and guidance to support their progress.

Computer and Information Science Ph.D. Minor

The objective of this minor is to provide an opportunity for current Indiana University doctoral students in other disciplines at IUPUI to learn and use computer science techniques and tools to solve problems in their academic fields.

Eligibility

If you are enrolled in any Indiana University doctoral program at IUPUI, you may apply for this Ph.D. minor. You are required to have a background in computer science of at least CSCI 36200 - Data Structures, or an equivalent course. Please contact our graduate advisor for permission to register for courses.

Requirements

The minor will require coursework totaling 12 graduate credit hours at the 500 level or above. These must include one 3-credit hour core course, and three elective computer science courses. Additional courses at the 500 level or above may be substituted for elective courses, with advance approval.

Core courses

- CSCI 50300 - Operating Systems
- CSCI 56500 - Programming Languages
- CSCI 58000 - Algorithm Design, Analysis, and Implementation

Elective courses

- CSCI 50600 - Management of the Software Development Process
- CSCI 54100 - Database Systems
- CSCI 54900 - Intelligent Systems
- CSCI 55000 - Computer Graphics
- CSCI 55200 - Advanced Graphics & Visualization
- CSCI 55500 - Cryptography
- CSCI 57300 - Data Mining

Minimum overall GPA

Successful completion of the minor requires at least a B (3.0) average over all courses counting toward the minor. The minimum grade that will be accepted in any single course is C. If you receive a C- or below, you must repeat the course.

Maximum number of transferable credits

If you have earned credits for one or more of the equivalent courses from another institution, you may request to apply up to a maximum of three credits toward the minor.

Maximum time for completion

All requirements for the minor must be completed within four calendar years.

Allowable credit hours prior to admission

Up to six equivalent credit hours taken prior to admission into the minor program may be applied toward the minor. Up to three of these may be from another institution.

For inquiries about the Ph.D. minor, please contact our graduate advisor or email csgrad@iupui.edu.

Department of Earth Sciences

IUPUI
Engineering, Science, and Technology Building, SL 118
723 W. Michigan Street
Indianapolis, IN 46202-5132
(317) 274-7484; fax (317) 274-7966
https:science.iupui.edu.earthsciences/

Interim Department Chair: Andrew Barth, Ph.D.

Department Advisors:

- Graduate Programs: Broxton Bird, Ph.D.

Geology is the study of the planet Earth: the materials of which it is made, the processes that act upon these materials, and the history of the planet and life forms since its origin. Geology considers the physical forces acting on the earth, the chemistry of its constituent materials, and the biology of its past inhabitants. Geology also includes the study of the interrelationships in the modern environment of humans and geological phenomena and focuses on such important concerns as how our global climate is changing and how that change will affect human activities.

The Department of Earth Sciences offers the Bachelor of Arts (B.A.) degree in Geology and Bachelor of Science (B.S.) degrees in Geology and in Environmental Science from Indiana University. These programs prepare students for graduate studies and for a variety of careers with emphasis on investigation of the environment by federal and state agencies, industries, and consulting companies, or earth and space science education. The programs allow flexibility to accommodate the needs and interests of all students. Selection of a particular program should be made in consultation with a departmental advisor.

Minors in Geochemistry, Geology and Environmental Science are available to supplement other campus, school, and department major programs. Minors allow for in-depth study of concepts to complement another degree program, or to pursue interests.

The Department of Earth Sciences offers graduate study leading to the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees granted by Indiana University. The M.S. program in Geology offers both thesis and non-thesis options. The Ph.D. program in Applied Earth Sciences is an interdisciplinary research training program involving students and faculty from the IUPUI Schools of Science, Liberal Arts, and Medicine.

Faculty and students of the Department of Earth Sciences are actively engaged in basic and applied research. Specific research areas include biogeochemistry, biomineralization, glacial geology, geochemistry, geomicrobiology, history of geology, hydrology, mineralogy, paleoceanography, paleoclimatology, paleontology, petrology, remote sensing and planetary geology, sedimentology and soil biogeochemistry.

- Bachelor of Arts
- Bachelor of Science
- Graduate Programs
- Minors

Bachelor of Arts in Geology

(Granted by Indiana University)

Degree Requirements

First-Year Experience Course Beginning freshmen and transfer students with less than 19 credit hours are required to take SCI-I120 Windows on Science (1 cr.) or an equivalent first-year experience course.

Area I English Composition and Communication Competency See the School of Science requirements under “Undergraduate Programs” in this bulletin. The second semester of English composition may be satisfied by ENG-W270, ENG-W231, ENG-W230 or ENG-W350. GEOL-G205 may satisfy the second writing requirement in Area I, but the 3 credit hours cannot then also be counted as part of the geology credit hours required in Area IV.

Area II World Language Competency First-year proficiency in a modern world language is required for the Bachelor of Arts degree program. See the School of Science requirements under “Undergraduate Programs” in this bulletin.

Area IIIA Arts and Humanities, Social Sciences, and Cultural Understanding Competencies See the School of Science requirements under “Undergraduate Programs” in this bulletin. For the most current list of courses in the areas of Arts and Humanities, Social Sciences and Cultural Understanding, please refer to the IUPUI General Education Curriculum.

Area IIIC Life and Physical Sciences Competency See the School of Science requirements under “Undergraduate Programs” in this bulletin, but all four courses must include laboratories; two of the four courses must include CHEM-C105 / CHEM-C125 and CHEM-C106 / CHEM-C126 and at least one of the four courses must be in biological sciences. No grade below C- will be accepted in any of these courses.

Area IIID Analytical Reasoning Competency MATH 15300 / MATH 15400 or MATH 15900 and CSCI-N207 or another CSCI course approved by the Department of Earth Sciences. No grade below C- will be accepted in any of these courses.

Note: Computer Science CSCI-N100 level courses and CIT 10600 do not count for credit toward any degree in the School of Science. Also, CSCI-N241 and CSCI-N299 do not count in Area IIID, but may count as an elective.

Area IV Geology Concentration Requirements GEOL-G110, GEOL-G120, GEOL-G205 (or 300-level or 400-level GEOL-G course if GEOL-G205 is used as a second composition course), GEOL-G335, GEOL-G221, GEOL-G222, GEOL-G334, three 300-level or higher geology courses, and a capstone course (GEOL-G420, GEOL-G460, or GEOL-G495). Thirty-nine (39) credit hours in GEOL-G course work required. Geology majors cannot earn credit for both GEOL-G221/GEOL-G222 and GEOL-G306. Other 100-level courses and 1 - 2 credit courses do not count toward the geology concentration, but may be applied as electives toward the university-required total of 120 credit hours. No grade below C- will be accepted in any of these courses.

Other Requirements

See the School of Science requirements under Undergraduate Programs, Baccalaureate Degree, General Requirements in this bulletin. Three credit hours of GEOL-G420, GEOL-G460, or GEOL-G495 may be used to satisfy the School of Science capstone requirement, with approval by the Department of Earth Sciences.

Bachelor of Arts Sample Program (120 cr. required)

Freshman Year

First Semester	
SCI-I120 Windows on Science	1

GEOL-G110 Physical Geology	3
GEOL-G120 Physical Geology Laboratory	1
CHEM-C105 Principles of Chemistry I	3
CHEM-C125 Experimental Chemistry I	2
ENG-W131 Reading, Writing and Inquiry	3
MATH 15300 Algebra and Trigonometry I	3
Total	**16**
Second Semester	
CHEM-C106 Principles of Chemistry II	3
CHEM-C126 Experimental Chemistry II	2
MATH 15400 Algebra and Trigonometry II	3
COMM-R110 Fundamentals of Speech Communication	3
CSCI-N207 or other approved computer course	3
Elective (GEOL-G130 course suggested)	1
Total	**15**

Sophomore Year

Third Semester	
Second Composition Course (GEOL-G205 recommended)	3
GEOL-G221 Introductory Mineralogy	5
Approved Biology course with laboratory	5
Arts and Humanities (choose from list)	3
Total	**16**
Fourth Semester	
GEOL-G335 Evolution of the Earth and Life	4
GEOL-G222 Petrology	5
Approved Science course with laboratory	5
Elective (GEOL-G130 recommended)	1
Total	**15**

Junior Year

Fifth Semester	
GEOL-G300/GEOL-G400 elective	3
GEOL-G334 Principles of Sedimentation and Stratigraphy	5
Social Sciences Course (choose from list)	3
World Language Course	4
Total	**15**
Sixth Semester	
GEOL-G300/GEOL-G400 elective	3
Arts & Humanities or Social Sciences (choose from list)	3
World Language Course	4
Electives	5
Total	**15**

Senior Year

Seventh Semester	
GEOL-G300/GEOL-G400 electives	3
World Language Course	4
Elective	3
Elective	3
Elective	3
Total	**16**
Eighth Semester	
GEOL-G300/GEOL-G400 elective	3
Geology Capstone Course	3
Elective	3
Elective	3
Total	**12**

Bachelor of Science in Geology

(Granted by Indiana University)

Degree Requirements

First-Year Experience Course Beginning freshmen and transfer students with less than 19 credit hours are required to take SCI-I120 Windows on Science (1 cr.) or an equivalent first-year experience course.

Area I English Composition and Communication Competency See the School of Science requirements under “Undergraduate Programs” in this bulletin. The second semester of English composition may be satisfied by ENG-W270, ENG-W231, ENG-W230 or ENG-W350. GEOL-G205 may satisfy the second writing course requirement in Area I, but the 3 credit hours cannot then also be counted as part of the geology credit hours required in Area IV and another GEOL-G course must be taken.

Area II World Language Competency No world language proficiency is required for a Bachelor of Science degree.

Area IIIA Arts and Humanities, Social Sciences, and Cultural Understanding Competencies See the School of Science requirements under “Undergraduate Programs” in this bulletin.

For the most current list of courses in the areas of Arts and Humanities, Social Sciences and Cultural Understanding, please refer to the IUPUI General Education Curriculum.

Area IIIC Life and Physical Sciences Competency CHEM-C105 / CHEM-C125, CHEM-C106 / CHEM-C126; PHYS-P201 / PHYS-P202; BIOL-K341 / BIOL-K342; and two Life and Physical Science courses or certain geography courses (see advisor), outside the Department of Earth Sciences at the 300 or 400-level approved by the Department of Earth Sciences. No grade below C- will be accepted in any of these courses.

Area IIID Analytical Reasoning Competency MATH 22100 / MATH 22200; CSCI-N207 or another CSCI course approved by the Department of Earth Sciences; and STAT 30100 or another statistics course approved by the Department of Earth Sciences. No grade below C- will be accepted in any of these courses.

Note: Computer Science CSCI-N100 level courses and CIT 10600 do not count for credit toward any degree in the School of Science. Also, CSCI-N241 and CSCI-N299 do not count in Area IIID, but may count as an elective.

Area IV Geology Concentration Requirements GEOL-G110, GEOL-G120, GEOL-G205 (or GEOL-G 300 level or GEOL-G400 level course if GEOL-G205 is used as a second composition course), GEOL-G335, GEOL-G221, GEOL-G222, GEOL-G334, GEOL-G323, 12 credits of 300-level or 400-level geology courses, and GEOL-G420 or another field camp of at least 3 credit hours approved by the Department of Earth Sciences. Forty-six (46) credit hours in GEOL-G course work required. Geology majors cannot earn credit for both GEOL-G221/GEOL-G222 and GEOL-G306. Other 100-level courses, and 1 - 2 credit courses do not count toward the geology concentration requirement, but may be applied as electives toward the university-required total of 120 credit hours. No grade below C- will be accepted in any of these courses.

Other Requirements See the School of Science requirements under Undergraduate Programs, Baccalaureate Degree, General Requirements in this bulletin. GEOL-G420 satisfies the School of Science capstone requirement.

Bachelor of Science Sample Program (120 cr. required)

Freshman Year	
First Semester	
SCI-I120 Windows on Science	1
GEOL-G110 Physical Geology/GEOL-G120 Laboratory	4
ENG-W131 Reading,Writing & Inquiry I	3
CHEM-C105 Principles of Chemistry I	3
CHEM-C125 Experimental Chemistry I	2
Arts & Humanities Course (choose from list)	3
Total	**16**
Second Semester	
COMM-R110 Fundamentals of Speech Communication	3
CHEM-C106 Principles of Chemistry II	3
CHEM-C126 Experimental Chemistry II	2
MATH 22100 Calculus for Technology I	3
CSCI-N207 or other approved computer course	3
Total	**14**

Sophomore Year	
Third Semester	
Second Composition Course (GEOL-G205 recommended)	3
GEOL-G221 Introductory Mineralogy	5
MATH 22200 Calculus for Technology II	3
Social Sciences Course (choose from list)	3
Total	**14**
Fourth Semester	
PHYS-P201 General Physics I	5
GEOL-G222 Introductory Petrology	5
GEOL-G335 Evolution of Earth and Life	4
STAT 30100 Elementary Statistical Methods	3
Total	**17**

Junior Year	
Fifth Semester	
PHYS-P202 General Physics II	5
GEOL-G323 Structural Geology	5
GEOL-G334 Sedimentology and Stratigraphy	5
Total	**15**
Sixth Semester	
BIOL-K341 Ecology and Evolution Lecture/BIOL-K342 Laboratory	5
GEOL-G300/GEOL-G400 elective	3
300-400 level Science or Geography course	3
Elective	3
Total	**14**

Senior Year	
Seventh Semester	

GEOL-G300/GEOL-G400 elective	3
GEOL-G300/GEOL-G400 elective	3
Arts & Humanities or Social Sciences (choose from list)	3
Cultural Understanding Course (choose from list)	3
Elective	3
Total	**15**
Eighth Semester	
GEOL-G300/GEOL-G400 elective	3
GEOL-G300/GEOL-G400 elective	3
300-400 level Science or Geography course	3
Elective	3
GEOL-G420 Regional Geology Field Trip (Summer)	3
Total	**15**

Minors

(Granted by Indiana University)

Minor in Geology

The undergraduate minor in geology requires 18 credit hours, with an overall grade point average of 2.0 (C) and with no grade less than a C-, distributed as follows:

- Students must complete the following four courses that total 12 credit hours: GEOL-G110 (3 cr.), GEOL-G120 (1 cr.), GEOL-G335 (4 cr.), and GEOL-G221 (4 cr.) or GEOL-G306 (4 cr.).
- Students must complete an additional 6 credit hours minimum, including two of the following courses: GEOL-G222 (4 cr.), GEOL-G304 (3 cr.), GEOL-G334 (4 cr.), GEOL-G406 (3 cr.), GEOL-G415 (3 cr.), GEOL-G430 (4 cr.), GEOL-G451 (3 cr.), or another 400-level geology course with departmental approval.

At least 9 credit hours of the minor must be taken at IUPUI. In addition, recommended courses include one year of college chemistry and at least one course in college algebra.

Minor in Geochemistry

The undergraduate minor in geochemistry requires five courses that total 15 credit hours, with an overall grade point average of 2.00 (C) and with no grade less than a C, distributed as follows:

At least three courses (9 credit hours) are geology courses chosen from the following: GEOL-G406, GEOL-G483, GEOL-G486, and GEOL-G488.

A maximum of two courses/course sequences may be chosen from the following: CHEM-C310/CHEM-C311, CHEM-C341, CHEM-C360, CHEM-C361, CHEM-C410/CHEM-C411, BIOL-K411.

At least 9 credit hours of the minor must be taken at IUPUI. Prerequisites to the minor courses are not included but are required in order to complete the minor. This information can be found in the School of Science bulletin. Additional recommended courses include one year of college chemistry and at one course in college algebra.

Minor in Environmental Science

A minor in Environmental Science requires satisfactory completion of 16-17 credit hours distributed as follows, with a minimum grade of C- in each course. At least 9 credits must be completed at IUPUI (this does not include transfer credit, AP, or CLEP credit).

- GEOL-G107 (3 cr.)
- GEOL-G117 (1 cr.)
- GEOL-G115 or GEOL-G132 (3 cr.)
- GEOL-G306 (4 cr.)
- Choose one (3 cr.) SPEA-V222, SPEA-V311, GEOG-G303, PBHL-A435, SPEA-E476
- Choose one (2-3 cr.): GEOL-G436, GEOL-G477, GEOL-G467, GEOL-G415, or GEOL-G420 British Virgin Islands Experiential Field Study

At least 9 credit hours of the minor must be taken at IUPUI. In addition, recommended courses include one year of college chemistry and at least one course in college algebra.

Graduate Programs

Master of Science in Geology

The Department of Earth Sciences graduate program leads to a Master of Science degree from Indiana University. The program is administered by a departmental graduate advisory committee, composed of the graduate advisor and two or more members of the graduate faculty.

Admission Requirements

Prospective students should have a bachelor's degree in geology, including a summer field course, and a minimum of a B (3.0) grade point average. One year of chemistry and mathematics through college algebra and trigonometry are required. Individuals with a bachelor's degree in another area of science are also encouraged to apply; the departmental graduate advisory committee will prescribe a plan of study to remove deficiencies. The Graduate Record Examination (GRE) General Test is not required but scores may be submitted. Each student must submit three letters of recommendation.

Financial Aid

Admitted students may be appointed as research assistants or as teaching assistants in introductory geology courses. Several such assistantships are available each year. Assistantships include remission of tuition and fees.

Degree Requirements

Both thesis and non-thesis MSc degree options are available. *The thesis option* requires 30 credit hours of total course work. Of the 30 credit hours, 21 to 24 are comprised of non-research course work and 6 to 9 are comprised of G810 Research credits. 1 credit of colloquium is required. At least 6, but no more than 9 credits of G810 Research credits shall be counted toward the 30 total credit hours for the MSc thesis option, although more may be taken. Of the non-research course

work, 15 to 21 credit hours shall be completed within the department. At least 3 credit hours, and up to 6, of non-research course work approved at the graduate level must be taken outside of the department from allied disciplines with the approval of the graduate advisor. Up to 6 credit hours of 400-level courses approved for graduate credit may be counted toward the 15 to 24 credit hours of non-research course work with the approval of the graduate advisor. Up to 6 credit hours of G700 credits may be counted toward the non-research course work requirements. *The non-thesis option* requires a total of 36 credit hours, none of which are to be taken as G810 Research. Of the 36 credit hours, 24 to 33 are to be completed within the department. 3 to 6 of the in-department course work credit hours must be completed as G700 Geologic Problems. At least 3, and up to 12, credit hours of non-research courses approved at the graduate level must be taken outside of the department from allied disciplines with the approval of the graduate advisor. The departmental graduate committee must approve elective credits outside the Department of Earth Sciences for both the thesis and non-thesis options.

MSc Degree Option	In Department Credit Hours	Outside of Department Credit Hours	G810 Research Credit Hours	G700 Geologic Problems Credit Hours	Total Credit Hours
Thesis	15-21	3-6	6-9	0-6	30
Non-Thesis	24-33	3-12	0	3-6	36

Admitted students will be assigned a three-person advisory committee at the beginning of the first year of graduate study. The committee will prescribe a study program based on the interests of the student and the principal graduate advisor. Students must complete all degree requirements within five years of beginning the study program. Students must maintain a B (3.0) average or higher, and no grade below C is acceptable.

Bachelor of Science/Master of Science in Geology

Program Structure and Admission

The B.S./M.S. program blends the undergraduate BS program with the MS program in Geology, leading to a joint award of B.S. and M.S. degrees upon completion of the M.S. thesis. The departmental graduate advisory committee administers the B.S./M.S. program in cooperation with the undergraduate advisor.

Prospective students should have advanced standing in the undergraduate program. Students will apply to the Earth Sciences graduate program in early spring of the junior year under consultation of the undergraduate advisor. Students should submit three letters of recommendation. Application requires a minimum GPA of 3.0 and will be considered by the departmental graduate committee.

Upon acceptance into the program, the student will prepare an M.S. research and course plan in consultation with a B.S./M.S. academic advisor, or will elect to complete a non-thesis (coursework) M.S. degree. Research reading and data collection begins in the summer prior to the senior year of undergraduate study, and will be completed in the following summer. The fifth year of study is devoted to graduate course work and completion of the M.S. thesis research, or M.S. non-thesis coursework.

Degree Requirements

The proposed curriculum includes the core undergraduate courses that are currently required for the B.S. in Geology, and all the graduate courses that are currently required for the M.S. in Geology. The total credit hours for this integrated degree program will be 138 credit hours for a thesis M.S., and 147 credit hours for a non-thesis M.S. For reference, the B.S. Geology degree requires 120 hours, and the M.S. Geology degree requires 30 hours for a thesis M.S., and 36 hours for a non-thesis M.S. The integrated program utilizes overlap credits, reducing the number of required credit hours by 12 hours for students pursuing a thesis M.S., and by 9 hours for students pursuing a non-thesis (coursework) M.S.

- For thesis M.S.: GEOL-G700 Geologic Problems (3 cr.), is taken in the Summer after the senior year, to develop a research project for the M.S. degree.
- For non-thesis M.S.: GEOL-G690 Advanced Geology Seminar (3 cr.), is taken with a faculty member in the Earth Sciences department to explore a research focus.
- Two 400-level or higher GEOL-G courses (6 cr.) satisfy both the B.S. Geology major course requirements, and 6 credits of the M.S. Geology graduate coursework requirements.
- For a thesis M.S., two 500-level or higher GEOL-G courses (6 cr.) satisfy both the B.S. Geology major concentration requirements, and M.S. Geology graduate coursework requirements.
- For a non-thesis M.S., one 500-level or higher GEOL-G course (3 cr.) satisfies both the B.S. Geology major concentration requirements, and M.S. Geology graduate coursework requirements.

Doctor of Philosophy in Applied Earth Sciences

The Ph.D. program prepares students for academic positions or research and leadership positions in local, state, national, or private environmental organizations. The goal of the program is to prepare future researchers and leaders who assess complex environmental systems and assist in providing sound options and solutions for optimizing human-environment interactions.

Admission Requirements

Prospective students should have a B.S. or M.S. degree in the physical, biological, or health sciences, and a cumulative GPA of 3.0 or higher is expected. The Graduate Record Examination (GRE) General Test is required. Individuals for whom English is a second language must demonstrate proficiency in English. Scores from the TOEFL exam should be submitted with the application for admission. Each student must submit three letters of recommendation.

Degree Requirements

Upon admittance to the program, students are assigned a preliminary advisory committee from among program

faculty. Students identify an appropriate sub-discipline after their first year, and the preliminary advisory committee is reconstituted into a research committee (5 members) to suit the research goals of the student. The research committee includes at least three faculty members from the department of Earth Sciences and the minor advisor (who must be outside the department of Earth Sciences). In order to maintain proper balance in the expertise represented in the research committee, the graduate advisor can petition the Graduate Affairs committee to replace one Earth Sciences faculty with an external member. If not an IU-affiliated faculty, that external member must be approved by the University Graduate School. The research advisory committee ensures successful progress in later coursework, coordinates oral qualifying exams, and advises students in their progress to degree completion as appropriate. Students will complete four or five core graduate courses in applied earth science topical areas, based on their prior academic background. After completing the core courses, students identify a specialization area and enroll in at least 18 credit hours of additional courses in support of that specialization, with consultation of the research advisory committee. Because of the interdisciplinary nature of the program and the diverse academic background of admitted students, all students are required to take the common core class, "Applied Earth Sciences: The Human Dimension". The advisory committee may recommend one more fundamental earth sciences course to address deficiencies. All Ph.D. students must also complete a minor which is composed of 12 to 15 credit hours of coursework in a related area. The minor is chosen in consultation with the research committee. Students must complete all degree requirements within six years of beginning the study program, and must maintain a B (3.0) average.

Environmental Science Program

IUPUI
Engineering, Science, and Technology Building, SL 118
723 W. Michigan Street
Indianapolis, IN 46202-5132
Phone: (317) 274-7484; fax: (317) 274-7966
https://science.iupui.edu/earthsciences/academics/degrees-and-programs/_degrees/environmental-science-bses-iupui-envscibs.html

- **Director:** Gabriel Filippelli, Ph.D.

Bachelor of Science in Environmental Science

The Bachelor of Science of Environmental Science (BSES) degree is awarded by Indiana University. This program prepares students for graduate studies and for a variety of careers with emphasis on investigation of the environment by federal and state agencies, industry, and consulting firms. The program allows flexibility to accommodate the needs and interests of all students.

Faculty and students in the Departments of Earth Sciences (Science), Geography (Liberal Arts), and the Fairbanks School of Public Health are actively engaged in basic and applied research. Specific research areas include geochemistry, hydrology, paleoclimatology, biogeochemical cycles, soils, wetland restoration, water resource analysis, environmental remote sensing, land cover dynamics, urban ecosystems, human health and the environment, environmental and water resources planning, environmental health policy, food science, and indoor air quality.

The Bachelor of Science in Environmental Science degree program offers three concentrations. The Earth and Water Resources concentration provides students with a quantitative background in soils, hydrogeology, and biogeochemistry and an understanding of biological interactions, processes affecting soil and water resources, and advanced analytical techniques related to environmental quality assessments. The Environmental Remote Sensing and Spatial Analysis concentration builds theoretical background and advanced knowledge in spatial analytical techniques using remote sensing (satellite and airborne sensors), geographic information systems (GIS), and global positioning system (GPS) technologies.The Environmental Management concentration prepares students who wish to focus on the management of pollution in the air, land, and water. Students who complete this concentration have the theoretical foundation and applied skills needed to characterize hazards, track the fate and transport of pollutants, identify health and environmental effects of pollutants, and plan and manage programs to control environmental hazards. The Environmental Remote Sensing and Spatial Analysis concentration builds theoretical background and advanced knowledge in spatial analytical techniques using remote sensing (satellite and airborne sensors), geographic information system (GIS), and global positioning system (GPS) technologies. Selection of a particular concentration should be made in consultation with the academic and concentration advisors.

- Bachelor of Science in Environmental Science

Bachelor of Science in Environmental Science

(Granted by Indiana University)

Degree Requirements

First-Year Experience Course Beginning freshmen and transfer students with fewer than 19 credit hours are required to take SCI-I120 Windows in Science (1 cr.) or an equivalent first-year experience course. BS Environmental Science students are encouraged to take the Themed Learning Community (TLC) SCI-BE499 Sustainabilty - Thriving Communities, Thriving Planet, which includes SCI-I120, GEOL-G107, and SPEA-V222.

Area I English Composition and Communication Competency (9 cr.) See the School of Science requirements under “Undergraduate Programs” in this bulletin. The second semester of English composition may be satisfied by ENG-W230, TCM 22000 or TCM 32000. GEOL-G205 may be used to fulfill the second writing course requirement, but the 3 credit hours cannot then also be counted as part of the core and concentration credit hours required in Area IV.

Area II World Language No world language proficiency is required for a Bachelor of Science degree.

Area IIIA Arts and Humanities, Social Sciences, and Cultural Understanding Competencies (12 cr.) See the

School of Science requirements under “Undergraduate Programs” in this bulletin. If a student chooses to take the SCI-BE499, Sustainability TLC, SPEA-V222 will count as one Social Science course.

For the most current list of courses in the areas of Arts and Humanities, Social Sciences and Cultural Understanding, please refer to the IUPUI General Education Curriculum.

Area IIIC Life and Physical Sciences Competency (26 cr.) BIOL-K341 / BIOL-K342, CHEM-C105 / CHEM-C106, CHEM-C341 / CHEM-C343, and PHYS-P201 / PHYS-P202. No grade below C- will be accepted in any of these courses.

Area IIID Analytical Reasoning Competency (12 cr.) MATH 22100 / MATH 22200, or MATH 23100 / MATH 23200 or MATH 16500 / MATH 16600, CSCI-N207 or another CSCI course approved by the Department of Earth Sciences; and STAT 30100, SPEA-K300, or a course in statistics approved by the Department of Earth Sciences. No grade below C- will be accepted in any of these courses.

Note: Computer Science CSCI-N100 level courses and CIT 10600 do not count for credit toward any degree in the School of Science. Also, CSCI-N241 and CSCI-N299 do not count in Area IIID, but may count as an elective.

Area IV Major Core and Concentration Requirements
Thirty-two (32) credit hours of environmental science core courses including:

- GEOL-G107 / GEOL-G117 Environmental Geology Lecture and Laboratory
- GEOL-G205 Reporting Skills in Geoscience (or 300+ GEOL, PBHL, SPEA, or GEOG with approval if G205 is used as the second composition course.
- GEOG-G208 Environment & Society or PBHL-A115 Environment and Human Health
- PBHL-P237 Environmental Ethics
- GEOG-G303 Weather and Climate
- GEOL-G306 Earth Materials
- GEOL-G436 Earth Observation from Space
- GEOL-G477 Climate Change and Society
- GEOG-G315 Environmental Conservation or SPEA-V311 Natural Resources and Environmental Policy
- HIST-A410 American Environmental History

No grade below C- will be accepted in any of these courses.

Concentration Requirements Seventeen to Eighteen (17 - 18) credit hours of courses within one of three Environmental Science concentrations. Students select one of the Environmental Science Concentrations – Earth and Water Resources, Environmental Remote Sensing and Spatial Analysis, or Environmental Management.

A. Earth and Water Resources Seventeen (17) credit hours, including:

- GEOL-G334 Sedimentology and Stratigraphy
- GEOL-G430 Principles of Hydrology
- GEOL-G406 Introduction to Geochemistry

One (1) concentration elective course, chosen from the following:

- GEOL-G486 Soil Biogeochemistry
- GEOL-G483 Isotope Geochemistry
- BIOL-K411 Global Change Biology
- GEOL-G415 Geomorphology
- Other applicable topic courses in GEOL-G as approved by advisor

One (1) capstone course, chosen from the following

- GEOL-G488 Global Cycles
- GEOL-G467 GeoHealth: When our Health Collides with our Environment
- GEOL-G460 Internship
- GEOL-G495 Senior Thesis

No grade below C- will be accepted in any courses in the Earth and Water Resources concentration.

B. Environmental Remote Sensing and Spatial Analysis Eighteen (18) credit hours, including:

- GEOG-G336 Environmental Remote Sensing
- GEOL-G338 Introduction to GIS
- GEOG-G337 Computer Cartography and Graphics or GEOL-G415 Geomorphology
- Two (2) courses chosen from:
  - GEOG-G436 Advanced Remote Sensing
  - GEOG-G438 Advanced Geographic Information Science
  - GEOL-G487 Remote Sensing of Global Change
  - GEOG-G311 Research Methods in Geography
- One capstone course, chosen from the following
  - GEOG-G439 GIS and Environmental Analysis
  - GEOL-G460 Internship
  - GEOL-G495 Senior Thesis

No grade below C- will be accepted in any courses in the Environmental Remote Sensing and Spatial Analysis concentration.

C. Environmental Management Seventeen (17) credit hours, including:

- PBHL-A316 Environmental Health Science
- SPEA-E476 Environmental Law and Regulation
- One (1) course in Spatial Analysis, chosen from the following:
  - GEOG-G338 Introduction to GIS
  - GEOG-G438 Advanced GIS
  - GEOG-G439 GIS and Environmental Analysis
  - PBHL-A441 Public Health Applications of GIS
- Two (2) concentration elective courses, chosen from the following:
  - GEOG-G315 Environmental Conservation
  - PBHL-A415 Explosions, Collapses, and Toxic Spills
  - PBHL-A430 eWaste, Toxic Materials and Conflict Minerals
  - PBHL-A435 Energy, Climate Change, Resilience and Health
  - PBHL-A445 Global Health and Sustainable Development

- SPEA-V310 Environmental Justice
- SPEA-V311 Natural Resources and Environmental Policy

- One (1) capstone course, chosen from the following:
  - GEOL-G460 Internship
  - GEOL-G467 GeoHealth: When our Health Collides with our Environment
  - GEOL-G488 Global Cycles
  - GEOL-G495 Senior Thesis

No grade below C- will be accepted in any courses in the Environmental Management concentration.

D. Other Requirements See the School of Science requirements under "Undergraduate Programs, Baccalaureate Degree, General Requirements" in this bulletin.

Environmental Science Plans of Study

There is no single semester-by-semester plan of study for the B.S.E.S. degree because of the flexibility encouraged within the program and the three concentration options. However, a possible plan for courses is given below. Variations from this sample plan of study should be made in consultation with the academic and concentration advisors.

Bachelor of Science Environmental Science Sample Programs (120 hours required)

Sample Plan of Study

- **Freshman Year**

First Semester	
SCI-BE499 Sustainability TLC (GEOL-G107, SPEA-V222, SCI-I120)	7
GEOL-G117 Laboratory: Earth and Our Environment	1
CHEM-C105 Principles of Chemistry I	3
ENG-W131 Reading, Writing and Inquiry	3
1 credit elective	1
Total	**15**
Second Semester	
CHEM-C106 Principles of Chemistry II	3
GEOG-G208 Environment & Society or PBHL-A115 Environment & Human Health	3
Calculus I	3
COMM-R110 Fundamentals of Speech Communication	3
Cultural Understanding Course	3
Total	**15**

Sophomore Year

Third Semester	
GEOL-G205 Reporting Skills in Geoscience (as 2nd composition course)	3
PBHL-P237 Environmental Ethics	3
Calculus 2	3
CSCI-N207 Data Analysis Using Spreadsheets	3
GEOG-G303 Weather and Climate	3
Total	**15**
Fourth Semester	
GEOL-G306 Earth Materials	4
PHYS-P201 Physics 1	5
Social Science or Arts and Humanities Course	3
Arts and Humanities Course	3
Total	**15**

Junior Year - EARTH AND WATER RESOURCES CONCENTRATION

Fifth Semester	
GEOL-G334 Sedimentology and Stratigraphy	5
BIOL-K341 Principles of Ecology and Evolution Lecture	3
BIOL-K342 Principles of Ecology and Evolution Lab	2
PHYS-P202 Physics 2	5
1 credit elective	1
Total	**16**
Sixth Semester	
GEOL-G477 Climate and Society	3
CHEM-C341 Organic Chemistry I Lecture	3
CHEM-C343 Organic Chemistry I Lab	2
SPEA-V311 or GEOG-G315	3
Upper Level GEOL, GEOG, SPEA, or PBHL elective (replace GEOL-G205 as 2nd composition)	3

Total	**14**

Senior Year - EARTH AND WATER RESOURCES CONCENTRATION

Seventh Semester	
STAT 30100 or SPEA-K300	3
GEOL-G430 Hydrology	3
GEOL-G436 Earth Observation from Space	3
GEOL-G406 Geochemistry	3
Elective	3
Total	**15**
Eighth Semester	
Concentration Elective	3
Concentration Capstone	3
HIST-A410 American Environmental History	3
Electives	6
Total	**15**

Junior Year - REMOTE SENSING CONCENTRATION

Fifth Semester	
BIOL-K341 Principles of Ecology & Evolution Lecture	3
BIOL-K342 Principles of Ecology & Evolution Lab	2
PHYS-P202 Physics 2	5
GEOG-G338 Introduction to GIS	3
GEOG-G336 Introduction to Remote Sensing	3
Total	**16**
Sixth Semester	
CHEM-C341 Organic Chemistry I Lecture	3
CHEM-C343 Organic Chemistry I Lab	2
GEOL-G477 Climate and Society	3
SPEA-V311 or GEOG-G315	3
GEOG-G337 or GEOL-G415	3
Total	**14**

Senior Year - REMOTE SENSING CONCENTRATION

Seventh Semester	
STAT 30100 or SPEA-K300	3
Concentration Elective	3
GEOL-G436 Earth Observation from Space	3
Electives	6
Total	**15**
Eighth Semester	
Concentration Elective	3
Concentration Capstone	3
HIST-A410 American Environmental History	3
Upper Level GEOL, GEOG, SPEA, or PBHL elective (replace GEOL-G205 as 2nd composition)	3
Elective	3
Total	**15**

Junior Year - ENVIRONMENTAL MANAGEMENT CONCENTRATION

Fifth Semester	
BIOL-K341 Principles of Ecology and Evolution Lecture	3
BIOL-K342 Principles of Ecology and Evolution Lab	2
PHYS-P202 Physics 2	5
SPEA-E476 Environmental Law and Regulation	3
PBHL-A316 Environmental Health Science	3
Total	**16**
Sixth Semester	
CHEM-C341 Organic Chemistry I Lecture	3
CHEM-C343 Organic Chemistry I Lab	2
GEOL-G477 Climate and Society	3
SPEA-V311 or GEOG-G315	3
Concentration Elective	3
Total	**14**

Senior Year - ENVIRONMENTAL MANAGEMENT CONCENTRATION

Seventh Semester	
SPEA-K300 or STAT 30100	3
Concentration Elective (Spatial Analysis)	3

GEOL-G436 Earth Observation from Space	3
Elective	3
Elective	3
Total	**15**
Eighth Semester	
Concentration Elective	3
Concentration Capstone	3
HIST-A410 American Environmental History	3
Upper Level GEOL, GEOG, SPEA, or PBHL elective (replace GEOL-G205 as 2nd composition)	3
Elective	3
Total	**15**

Forensic and Investigative Sciences Program

IUPUI
Science Building, LD 326
402 N. Blackford Street
Indianapolis, IN 46202-3274
Phone: (317) 274-6882 (undergraduate); (317) 274-8969 (graduate); fax: (317) 274-4701
https://science.iupui.edu/forensic/

- **Director:** Christine J. Picard, Ph.D.
- **Program Advisor:** School of Science Advising Group

Forensic science is the application of the methods of science to matters involving the public. In many cases this means the application of science in solving crimes. Forensic science is multidisciplinary; it involves chemistry, biology, physics, math, biochemistry, engineering, computer science, psychology, medicine, law, criminal justice, etc. Forensic scientists analyze evidence and testify in court. They may be called upon to attend some crime scenes, train police investigators and attorneys, and conduct research.

In the fall of 2004, IUPUI began the first forensic science degree program in Indiana. This FEPAC accredited program was developed by faculty from the School of Law, the School of Science, and the School of Public and Environmental Affairs (SPEA). Completion of this program leads to the Bachelor of Science in Forensic and Investigative Sciences. All students take a core of science classes and university-required courses. Then each student chooses one concentration:

- Forensic Biology
- Forensic Chemistry

The baccalaureate program also includes courses in law and forensic science, laboratory courses in forensic chemistry and biology, as well as opportunities to complete an internship or a research project with a member of the faculty. Graduates of the program will be able to seek employment in crime labs, scientific industries, environmental agencies, and federal or local law enforcement. Students are also well qualified to apply for graduate or medical school.

Admission to the Major

There are specific credit, GPA, and course requirements for admission to the FIS program. These depend upon your status. For more information about the undergraduate program, please contact: Please contact forsci@iupui.edu or 317-274-6882. For information about the graduate program please contact: fisgrad@iupui.edu or 317-274-8969.

- Bachelor of Science
- Minor in Forensic and Investigative Sciences
- Graduate Program

Bachelor of Science

This degree is for students who plan to work in the criminal justice system as scientists in crime laboratories or other law enforcement environments. This degree also allows students to be well prepared for medical school, graduate school, law school, teaching or research laboratories.

Degree Requirements

See the School of Science requirements under “Undergraduate Programs” in this bulletin for additional restrictions.

First-Year Experience Course Beginning freshmen and transfer students with fewer than 19 credit hours are required to take SCI-I120 Windows on Science (1 cr.) or an equivalent first-year experience course.

Area I English Composition and Communication Competency (9 cr.)

Written Communication (6 cr.)

A minimum grade of C must be obtained in both composition courses.

- ENG-W131 Reading, Writing and Inquiry
- The second semester of English composition may be satisfied only by ENG-W270, ENG-W231, ENG-W230, or TCM 32000.

Oral Communication (3 cr.)

A minimum grade of C must be obtained.

- COMM-R110 Fundamentals of Speech Communication

Area II World Language Competency

No world language proficiency is required for a Bachelor of Science degree.

Area IIIA Arts and Humanities, Social Sciences, and Cultural Understanding Competencies (12 cr.)

- Arts and Humanities course: Choose one course (3 cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.
- Social Sciences course: Choose one course (3 cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.

- One additional course (3 cr.) from Humanities or Social Sciences list.
- Cultural Understanding course: Choose one course (3 cr.) from this list. The list of course choices is located under the School of Science requirements "Undergraduate Programs" in this bulletin.

For the most current list of courses in the areas of Arts and Humanities, Social Sciences and Cultural Understanding, please refer to the IUPUI General Education Curriculum.

Area IIIC Life and Physical Sciences Competency (20 cr.)

- *Physics* Two semesters of basic physics: PHYS-P201 General Physics I (5 cr.) and PHYS-P202 General Physics II (5 cr.)
  - *PHYS 15200 and PHYS 25100 are acceptable substitutes.*
- *Chemistry* Two semesters of introductory college chemistry with a laboratory: CHEM-C105 Principles of Chemistry I (3 cr.) / CHEM-C125 Experimental Chemistry I (2 cr.) and CHEM-C106 Principles of Chemistry II (3 cr.) / CHEM-C126 Experimental Chemistry II (2 cr.)

Area IIID Analytical Reasoning Competency (9 cr.)

- *Mathematics* MATH 23100 Calculus for the Life Sciences I (3 cr.) and MATH 23200 Calculus for the Life Sciences II (3 cr.)
  - *MATH 16500 and 16600 or MATH 22100 and 22200 are acceptable substitutes.*
  - *Students pursuing a BS in Chemistry must take MATH 16500 and 16600.*
- *Computer Programming* Choose one course from the following: CSCI-N200, CSCI-N201, CSCI-N207 recommended), CSCI-N211, or CSCI-N301 (all are 3 cr.)

Note: Computer Science CSCI-N100 level courses and CIT 10600 do not count for credit toward any degree in the School of Science. Also, CSCI-N241 and CSCI-N299 do not count in Area IIID but may count as a general elective.

Area IV Forensic and Investigative Sciences Major Concentration (17 cr.)

A) Required forensic science courses in addition to those required for the concentration (16 cr.) All FIS courses applicable to the major must have a minimum grade of C.

- FIS 20500 Concepts of Forensic Science I (Fall and SS1) (3 cr.)
- FIS 20600 Concepts of Forensic Science II (Spring and SSII) (3 cr.)
- FIS 30100 Forensic Microscopy (1 cr.)
- FIS 30101 Forensic Microscopy Lab (2 cr.)
- FIS 30500 Professional Issues in Forensic Science (3 cr.)
- FIS 41500 Forensic Science and the Law (3 cr.)
- FIS 48000 Forensic Science Professional Capstone I (Spring) (1 cr.)
- FIS 49000 Capstone Experience (Fall) (1 cr.)

B) Required biology courses (10 cr.) A minimum grade of C- is required in all of these courses.

- BIOL-K101 Concepts of Biology I (5 cr.)
- BIOL-K103 Concepts of Biology II (5 cr.)

C) Required chemistry courses beyond introductory chemistry (10 cr.) A minimum grade of C- is required in all of these courses.

- CHEM-C341 Organic Chemistry Lectures I (3 cr.)
- CHEM-C343 Organic Chemistry Laboratory I (2 cr.)
- CHEM-C342 Organic Chemistry Lectures II (3 cr.)
- CHEM-C344 Organic Chemistry Laboratory II (2 cr.)

D) Required statistics course (3 cr.) A minimum grade of C- is required in this course.

- STAT 30100 Elementary Statistical Methods (3 cr.)

E) Concentrations

- **Forensic Biology Concentration (24 cr.)**

FIS courses applicable to the major must have a minimum grade of C. A minimum grade of C- is required in all the Biology course.

- - BIOL-K322 Genetics and Molecular Biology (3 cr.)
  - BIOL-K323 Genetics and Molecular Biology Laboratory (Fall) (2 cr.)
  - BIOL-K324 Cell Biology (3 cr.)
  - BIOL-K325 Cell Biology Laboratory (Spring) (2 cr.)
  - BIOL-K384 Biological Chemistry (3 cr.)
  - FIS 40200 Forensic Biology (Fall) (3 cr.)
  - FIS 40201 Forensic Biology Laboratory (Fall) (1 cr.)
  - FIS 40300 Forensic Genetics (Spring) (3 cr.)
  - FIS 43000 Population Genetics (Spring) (3 cr.)
  - FIS 49001 Forensic Biology Practical Capstone III (Spring) (1 cr.)

F) Advanced Specialization Courses: Refer to the list below (9 cr. minimum)

- **Forensic Biology Concentration Advanced Specialization Course List**
  - ANTH-B426 Human Osteology (3 cr.)
  - ANTH-B468 Bioarchaeology (3 cr.)
  - ANTH-B474 Forensic Anthropology, Archaeology & Taphonomy (3 cr.)
  - BIOL-K331 Developmental Biology (3 cr.)
  - BIOL-K333 Developmental Biology Laboratory (2 cr.)
  - BIOL-K338 Intro Immunology (3 cr.)
  - BIOL-K339 Immunology Laboratory (2 cr.)
  - BIOL-K341 Principles of Ecology & Evolution (Fall & even numbered Springs) (3 cr.)
  - BIOL-K342 Principles of Ecology & Evolution Laboratory (Fall) (2 cr.)
  - BIOL-K356 Microbiology (3 cr.)
  - BIOL-K357 Microbiology Laboratory (2 cr.)
  - BIOL-N217 Human Physiology (5 cr.)
  - BIOL-N261 Human Anatomy (5 cr.)
  - CHEM-C310 Analytical Chemistry (3 cr.)

- CHEM-C311 Analytical Chemistry Laboratory (1 cr.)
- CHEM-C360 Elementary Physical Chemistry (3 cr.)
- CHEM-C325 Introductory Instrumental Analysis (Spring) (5 cr.)
- CHEM-C430 Inorganic Chemistry (3 cr.)
- CHEM-C435 Inorganic Chemistry Laboratory (1 cr.)
- CHEM-C485 Biosynthesis and Physiology (3 cr.)
- CHEM-C486 Biological Chemistry Laboratory (2 cr.)
- FIS 40100 Forensic Chemistry I (Fall) (3 cr.)
- FIS 40101 Forensic Chemistry Laboratory I (Fall) (1 cr.)
- FIS 40400 Forensic Chemistry II (Spring) (3 cr.)
- FIS 40900 Forensic Science Research (1 - 4 cr.)
- FIS 49002 Forensic Chemistry Practical Capstone III (Spring) (1 cr.)
- FIS 49500 Forensic Science Internship (0 - 5 cr.)
- FIS 49600 Special Topics in Forensic Science (credits vary - repeatable with different topics)
- SPEA-J260 Topics in Criminal Justice (1 cr.) (ONLY topics: Death Investigation, Investigating Post Blast Crime Scene, Serial Murder, and Indiana Homicide)

- **Forensic Chemistry Concentration (19 cr.)**

FIS courses applicable to the major must have a minimum grade of C. A minimum grade of C- is required for all Chemistry courses.

- - CHEM-C310 Analytical Chemistry (3 cr.)
  - CHEM-C311 Analytical Chemistry Laboratory (1 cr.)
  - CHEM-C360 Elementary Physical Chemistry (Spring) (3 cr.)
    - CHEM-C362 is an acceptable substitute for students pursuing a BS in Chemistry.
  - CHEM-C325 Introduction to Instrumental Analysis (Spring) (5 cr.)
    - CHEM-C410 and 411 are acceptable substitutes for students pursuing a BS in Chemistry.
  - FIS 40100 Forensic Chemistry I (Fall) (3 cr.)
  - FIS 40101 Forensic Chemistry I Lab (Fall) (1 cr.)
  - FIS 40400 Forensic Chemistry II (Spring) (3 cr.)
  - FIS 49002 Forensic Chemistry Practical Capstone III (Spring) (1 cr.)

G) Advanced Specialization Courses; refer to the list below (12 cr. minimum)

- **Forensic Chemistry Concentration Advanced Specialization Course List**
  - ANTH-B426 Human Osteology (3 cr.)
  - ANTH-A474 Forensic Anthropology, Archaeology & Taphonomy (3 cr.)
  - ANTH-A468 Bio-Archaeology (3 cr.)
  - BIOL-K322 Genetics and Molecular Biology (3 cr.)
  - BIOL-K323 Genetics and Molecular Biology Laboratory (Fall) (2 cr.)
  - BIOL-K324 Cell Biology (3 cr.)
  - BIOL-K325 Cell Biology Laboratory (Spring) (2 cr.)
  - BIOL-K331 Developmental Biology (3 cr.)
  - BIOL-K333 Developmental Biology Laboratory (1 cr.)
  - BIOL-K338 Intro Immunology (3 cr.)
  - BIOL-K339 Immunology Laboratory (2 cr.)
  - BIOL-K341 Principles of Ecology & Evolution (Fall and even numbered Springs) (3 cr.)
  - BIOL-K342 Principles of Ecology & Evolution Laboratory (Fall) (2 cr.)
  - BIOL-K356 Microbiology (3 cr.)
  - BIOL-K357 Microbiology Laboratory (2 cr.)
  - BIOL-K384 Biological Chemistry (3 cr.)
  - BIOL-K484 Cellular Biochemistry (3 cr.)
  - BIOL-N217 Human Physiology (5 cr.)
  - BIOL-N261 Human Anatomy (5 cr.)
  - CHEM-C430 Inorganic Chemistry (3 cr.)
  - CHEM-C435 Inorganic Chemistry Laboratory (2 cr.)
  - CHEM-C384 Biochemistry (3 cr.)
  - CHEM-C485 Biosynthesis and Physiology (3 cr.)
  - CHEM-C486 Biological Chemistry Laboratory (2 cr.)
  - FIS 40200 Forensic Biology I (Fall) (3 cr.)
  - FIS 40201 Forensic Biology I Laboratory (Fall) (1 cr.)
  - FIS 40300 Forensic Biology II (Spring) (3 cr.)
  - FIS 40900 Forensic Science Research (1 - 4 cr.)
  - FIS 43000 Population Genetics (Spring) (3 cr.)
  - FIS 49001 Forensic Biology Practical Capstone III (Spring) (1 cr.)
  - FIS 49500 Forensic Science Internship (0 - 5 cr.)
  - FIS 49600 Special Topics in Forensic Science (credits vary - repeatable with different topics)
  - SPEA-J260 Topics in Criminal Justice (1 cr.) (approved topics are: Death Investigation, Investigating Post Blast Crime Science, Serial Murder, and Indiana Homicide)

Area V Electives This degree requires no electives not defined by degree requirements.

Additional Policies

1) Overlapping Courses

The Forensic and Investigative Sciences Program will not grant credit for a course when considerable duplication of course content occurs with another course that has been taken for credit. In general, credit will be allowed for the higher-level or Honors courses, but not for the lower-

level courses. The following listings are considered to be duplications (lower-level courses listed first):

- CHEM-C101 and CHEM-C105
- MATH 22100 / MATH 22200 and MATH 23100 / MATH 23200 and MATH 16500 / MATH 16600
- PHYS-P201 / PHYS-P202 and PHYS 15200 and PHYS 25100

For example, if a student has earned credit for MATH 16500 / MATH 16600, the student will receive no credit for MATH 22100 / MATH 22200, even if earned previously.

As a result of completing a Bachelor of Science in Forensic and Investigative Sciences and depending on the concentration selected, a student may earn enough credit hours to satisfy the requirements for a minor in chemistry or biology in addition to the major in FIS. Please consult with the academic advisor for the FIS program and the appropriate academic unit that awards the minor.

Bachelor of Science: Forensic and Investigative Sciences Forensic Biology Concentration Sample Plan of Study (124 cr.)

Freshman Year

First Semester	
BIOL-K101 Concepts of Biology I	5
CHEM-C105 Principles of Chemistry I	3
CHEM-C125 Experimental Chemistry I	2
MATH 23100 Calculus for the Life Sciences I	3
FIS 20500 Concepts of Forensic Science I	3
SCI-I120 Windows on Science	1
Total	**17**
Second Semester	
BIOL-K103 Concepts of Biology II	5
CHEM-C106 Principles of Chemistry II	3
CHEM-C126 Experimental Chemistry II	2
MATH 23200 Calculus for the Life Sciences II	3
FIS 20600 Concepts of Forensic Science II	3
Total	**16**

Sophomore Year

Third Semester	
ENG-W131 Reading, Writing and Inquiry	3
BIOL-K322 Genetics and Molecular Biology	3
BIOL-K323 Genetics and Molecular Biology Lab (Fall only)	2
CHEM-C341 Organic Chemistry I	3
CHEM-C343 Organic Chemistry Laboratory I	2
Cultural Understanding (choose from list)	3
Total	**16**
Fourth Semester	
COMM-R110 Fundamentals of Speech Communication	3
CHEM-C342 Organic Chemistry II	3
CHEM-C344 Organic Chemistry Laboratory II	2
BIOL-K324 Cell Biology	3
BIOL-K325 Cell Biology Laboratory (Spring only)	2
FIS 30500 Professional Issues Forensic Science	3
Total	**16**

Junior Year

Fifth Semester	
BIOL-K384 Biological Chemistry	3
PHYS-P201 General Physics I	5
2nd Written Communication Course	3
FIS 41500 Forensic Science and the Law	3
Total	**14**
Sixth Semester	
FIS 30100/30101 Forensic Microscopy and Lab	3
Advanced Science Elective	3
PHYS-P202 General Physics II	5
FIS 48000 Forensic Science Professional Capstone I (Spring only)	1
STAT 30100 Elementary Statistical Methods 1	3
Total	**15**

Senior Year

Seventh Semester	
FIS 40200 Forensic Biology I (Fall only)	3
FIS 40201 Forensic Biology I Laboratory (Fall only)	1
FIS 49000 Forensic Science Capstone (Fall only)	1
Computer Programming (CSCI-N207 recommended)	3
Advanced Science Elective	3
Arts and Humanities/Social Sciences (choose from list)	3

Total	**14**
Eighth Semester	
FIS 40300 Forensic Genetics (Spring only)	3
FIS 49001 Forensic Biology Practical Capstone III (Laboratory Spring only)	1
Arts and Humanities/Social Sciences (choose from list)	6
FIS 43000 Population Genetics (Spring only)	3
Advanced Science Elective	3
Total	**16**

Bachelor of Science: Forensic and Investigative Sciences Forensic Chemistry Option Sample Plan of Study (123 cr.)

Freshman Year

First Semester	
BIOL-K101 Concepts of Biology I	5
CHEM-C105 Principles of Chemistry I	3
CHEM-C125 Experimental Chemistry I	2
MATH 23100 Calculus for the Life Sciences	3
FIS 20500 Concepts of Forensic Science I	3
SCI-I120 Windows on Science	1
Total	**17**
Second Semester	
BIOL-K103 Concepts of Biology II	5
CHEM-C106 Principles of Chemistry II	3
CHEM-C126 Experimental Chemistry II	2
MATH 23200 Calculus for the Life Sciences II	3
FIS 20600 Concepts of Forensic Science II	3
Total	**16**

Sophomore Year

Third Semester	
CHEM-C341 Organic Chemistry I	3
CHEM-C343 Organic Chemistry Laboratory I	2
PHYS-P201 General Physics I	5
ENG-W131 Reading, Writing and Inquiry	3
Cultural Understanding (choose from list)	3
Total	**16**
Fourth Semester	
CHEM-C342 Organic Chemistry II	3
CHEM-C344 Organic Chemistry Laboratory II	2
PHYS-P202 General Physics II	5
FIS 30500 Professional Issues in Forensic Science	3
COMM-R110 Fundamentals of Speech Communication	3
Total	**16**

Junior Year

Fifth Semester	
Computer Programming (CSCI-N207 recommended)	3
CHEM-C310 Analytical Chemistry Lecture	3
CHEM-C311 Analytical Chemistry Lab	1
FIS 30100/30101 Forensic Microscopy and Lab	3
Advanced Science Elective	3
2nd written communication course	3
Total	**16**
Sixth Semester	
CHEM-C325 Intro to Instrumental Analysis (Spring only)	5
STAT 30100 Elementary Statistical Methods	3
Arts and Humanities/Social Science (choose from list)	3
FIS 48000 Forensic Science Professional Capstone (Spring only)	1
Advanced Science Elective	3
Total	**15**

Senior Year

Seventh Semester	
FIS 40100 Forensic Chemistry I (Fall only)	3
FIS 40101 Forensic Chemistry I Lab (Fall only)	1
FIS 41500 Forensic Science and the Law	3
FIS 49000 Forensic Science Capstone II	1
Advanced Science Elective	3
Arts and Humanities/Social Sciences (choose from list)	3
Total	**14**
Eighth Semester	
FIS 40400 Forensic Chemistry II (Spring only)	3

FIS 49002 Forensic Chemistry Practical Capstone III (Laboratory Spring only)	1
Advanced Science Electives	3
CHEM-C360 Introductory Physical Chemistry (Spring only)	3
Arts and Humanities/Social Sciences (choose from list	3
Total	**13**

Minor in Forensic and Investigative Sciences

The minor in Forensic and Investigative Sciences can be used in relevant majors where the student's primary interest is in the major but who wishes to learn the basic concepts of forensic science and how to apply them to other fields of knowledge. Prerequisites to any of the minor courses are not included but are required in order to complete the minor. All FIS classes require a grade of C or higher. All SPEA classes require a grade of C- or higher. Students must have a 2.0 GPA average for all courses used for the minor.

- FIS 10100 Investigating Forensic Science Lecture (1 cr.)
- FIS 10101 Investigating Forensic Science Lab (2 cr.)
- FIS 20500 Concepts of Forensic Science I (3 cr.)
- FIS 20600 Concepts of Forensic Science II (3 cr.)*
- FIS 30500 Professional Issues in Forensic Science (3 cr.)**
- FIS 41500 Forensic Science and the Law (3 cr.)***

*P: FIS 20500 and CHEM-C101 OR 105 OR FIS 10101
**P: FIS 20500 and 20600
***P: FIS 20500 and 20600

Choose 3 credit hours from the following courses:

- FIS 30100 Microscopy Lecture (1 cr.) (P: FIS 20500, 20600)
- FIS 43000 Population Genetics (3 cr.) (P: BIOL-K322, 323, and STAT 30100)
- FIS 49600 Special Topics in Forensic Science (credits vary - repeatable) (3 cr., prerequisites vary)
- SPEA-J303 Evidence (3 cr.) (P: SPEA-J101)
- SPEA-J320 Criminal Investigation (3 cr.) (P: SPEA-J101)

Graduate Program

Master of Science in Forensic Science

Description

The M.S. Program in Forensic Science, which awards a Purdue University degree, requires 30 credit hours of study beyond the baccalaureate level. It is designed for students seeking careers as professional forensic scientists who desire employment in the criminal justice field or a related area. There are two ways to complete the MS, the thesis MS or the non-thesis, accelerated MS. The MS Thesis Program is FEPAC-accredited.

General Degree Options and Requirements

Students must apply in one of the following concentrations; forensic chemistry or forensic biology. All students take a core of required courses which include a professional issues course, law courses and a microscopy course. Each concentration and track (thesis or non-thesis) contains specific required courses taken by students in that concentration and track.

This thesis program requires 17 credit hours of course work and 13 credit hours of thesis completion and defense and is available to full time students. A non-thesis option is available and this program includes 30 credit hours of classes approved by the department. This may include up to six credits of internship and research.

Admission

The **admission requirements** are as follows:

- A Bachelor's degree from an accredited institution in the physical or life sciences such as chemistry, biology, forensic science, pharmacology/toxicology, or a related science
- A minimum GPA of 3.0 for all undergraduate work

The program will serve full- and part-time students who meet the above requirements as well as students who are presently employed full time in a forensic science laboratory or other analytical laboratory.

How to Apply for the Full-Time Thesis MS

Application to the program can be done completely online. The online application is called the "Indiana University Graduate Centralized Application System (CAS)."LINK.

You will be directed to create an account to begin your application. The application can be filled out in stages and saved along the way so you can return to it later. The CAS system has provisions for uploading your personal statement and listing contact names for two letters of recommendation.

These people will automatically be emailed and asked to input their letters of recommendation.

Please arrange for your previous academic institutions to send official, sealed transcripts to FIS Graduate Admissions, 402 N. Blackford St., LD 326, Indianapolis, IN 46202. International applicants will need to provide transcripts in both native language and English, as well as a certificate of diploma.

The Forensic and Investigative Sciences Program accepts applications once a year for beginning matriculation in the fall semester. The deadline for applying to the thesis program is **January 15** of the year you wish to start. Applications must be complete by **January 15** or they will not be considered. Applicants must submit the following:

1. The completed application which will also require:

- Two letters of recommendation. These would normally be from professors who can evaluate your ability to successfully complete graduate work in forensic science.
- A personal statement that discusses your educational and work background, interest and

experience (if any) in forensic science, and research interests if you are full time. Supplemental questions requests information about which degree (thesis or non-thesis) and track (forensic biology or chemistry) is applied for along with requiring a list of relevant coursework.

2. Official final transcripts from all higher education institutions that you attended.

Applicants are not normally considered on a rolling basis. They are generally considered en masse after the January 15 deadline. You will be notified within a few weeks after the decision is made.

How to Apply for the Non-Thesis MS

Application to the program can be done completely online. The online application is called the "Indiana University Graduate Centralized Application System (CAS)" LINK.

You will be directed to create an account to begin your application. The application can be filled out in stages and saved along the way so you can return to it later. The CAS system has provisions for uploading your personal statement, supplemental questions for, and listing contact names for two letters of recommendation. These people will automatically be emailed and asked to input their letters of recommendation.

The Forensic and Investigative Sciences Program review of applications will begin in late February and will continue on a rolling basis until the **March 15** deadline. Applications will also be considered for the Spring term if there is availability (completed by December 1).

Applicants must submit the following:

1. The completed application which will also require:

- Two letters of recommendation. These would normally be from professors who can evaluate your ability to successfully complete graduate work in forensic science.
- A personal statement that discusses your educational and work background, interest and experience (if any) in forensic science, and research interests if you are full time. Supplemental questions requests information about which degree (thesis or non-thesis) and track (forensic biology or chemistry) is applied for along with requiring a list of relevant coursework.

2. Official final transcripts from all higher education institutions that you attended.

You will be notified within a few weeks after the decision is made.

The Curriculum

The thesis and non-thesis M.S. program consists of 30 semester credit hours. It is anticipated that the thesis program can be completed within two years by full time students. The non-thesis program can be completed in one academic year plus two summer courses. The credit hours are to be distributed as follows:

All students (thesis and non-thesis) take the following courses (course substitutions only with Graduate Advisor approval):

1. FIS 50100/50101 (3) - Forensic Microscopy and Lab
2. FIS 50500 (3) - Profession and Ethical Issues in Forensic Science
3. FIS 51500 (3) - Legal Issues in Forensic Science
4. FIS 69500 (1) - Forensic Science Seminar

Students in the forensic chemistry concentration (thesis and non-thesis) must take the following courses:

1. FIS 51100 (3) - Forensic Chemistry
2. FIS 51101 (1) - Forensic Chemistry I Lab
3. FIS 51200 (3) - Forensic Chemistry II
4. FIS 51201 (1) - Forensic Chemistry II Lab

Students in the forensic biology concentration (thesis and non-thesis) must take the following courses:

1. FIS 52100 (3) - Forensic Biology I
2. FIS 52101 (2) - Forensic Biology I Lab
3. FIS 53000 (3) - Population Genetics

Thesis students must take the following courses:

1. FIS 69800 (13) - Thesis Research
2. Electives (1 - 4) - approved by department

Non-thesis students must take the following courses:

1. FIS 59700 (2) - Laboratory Project Design
2. FIS 50800 (2) - Forensic Science Laboratory Management
3. LAW-D774 (2) - Law and Forensic Science
4. Electives (6) - approved by department. This may include up to 6 credits of internship. A student may also take courses in other concentrations as part of theses credits.

The Thesis

The faculty of the Forensic and Investigative Sciences Program strongly believe that research should be a major component of a Master of Science degree. For thesis students, 13 of the 30 credit hours of the program are devoted to the thesis. Students are encouraged to identify a thesis topic with the help of the FIS faculty as soon as possible in the program. It is normally expected that the research and write up of the thesis will take at least one year of the program. A master's thesis project may be begun in conjunction with an internship at a crime laboratory and then finished at IUPUI. It may be possible for a student to remain at the internship host for longer than a semester and complete the research. Thesis research done in conjunction with a crime lab must be approved by the student's thesis director at IUPUI.

Financial Aid

Contrary to the situation with Ph.D. programs, there is limited financial support for master's programs. Nonetheless, we are committed to developing as many financial resources for our students as possible. Decisions concerning fellowships and assistantships will normally be at least partly based on merit. Other factors will also be considered. Some funds are usually available from the unit, School of Science, IUPUI and external grants. These will vary from year to year. The "Online Admissions Application" contains a box that should be

checked if you would like to be considered for financial aid.

Graduate Student Handbook

The Graduate Student Handbook contains additional information pertaining to the M.S. program.

Interdisciplinary Studies of Bachelor of Science Degree Program

School of Science, IUPUI
Science Building, LD 222
402 N. Blackford Street
Indianapolis, IN 46202-3276
Phone: (317) 274-0625; Fax: (317) 274-0628

- **Director** Jane R. Williams, Ph.D.
- **Program Advisor** Diana S. Sims-Harris
- **Program Advisor** Joseph L. Thompson

The purpose of the Bachelor of Science (B.S.) in Interdisciplinary Studies Program is to provide an opportunity for IUPUI students to construct individual majors that are science-based, interdisciplinary, and not represented by existing major programs. Instead of a prescribed area of study as with standard majors, the interdisciplinary studies (IDS) major will accommodate a variety of plans of study, with courses drawn from many subject areas in the sciences and beyond. The Interdisciplinary Studies degree program provides an academic structure that encourages creative and motivated undergraduates to design unique science-based interdisciplinary majors. In collaboration with an academic advisor and faculty mentors, students will create plans of study that demonstrate coherence, rigor, rationale, and vision. The B.S. in Interdisciplinary Studies requires a capstone project or internship experience, including a strong writing component. Particular plans of study may take advantage of the IUPUI Honors College, the IUPUI Center for Research and Learning, the Consortium for Urban Education to include relevant courses taught at five other Indianapolis colleges and universities, or may include specialized service learning experiences in consultation with the IUPUI Center for Service and Learning.

Though not meant to be a definitive list, examples of interdisciplinary majors with an emphasis in the sciences include:

- Art Restoration and Preservation
- Art Therapy
- Chemical Science and Technology
- Music Therapy
- Physics of Music
- Religion and Science
- Science and Gender
- Science, Technology, and Society
- Scientific Writing
- Urban Ecology

View the following information to learn more about Interdisciplinary Studies.

- Admissions and Curriculum
- Bachelor of Science

Admissions

All students admitted to the Interdisciplinary Studies (IDS) Program must have a minimum GPA of 2.50 and meet existing admission requirements of the School of Science. Students interested in the IDS program should contact the program advisor to discuss the interdisciplinary theme under consideration. The program advisor works with interested students in a pre-IDS period to identify faculty with expertise relevant to the IDS theme. In consultation with those faculty members and the program advisor, the student prepares a program proposal consisting of coursework from two or more disciplines, at least one of which is in the School of Science. The student also prepares a statement explaining the justification for the IDS theme chosen, how it relates to the student's future professional interests and what learning outcomes will be met through the proposed IDS program. The student is accepted for admission to the Interdisciplinary Studies Program when the faculty advisors and the Undergraduate Education Committee of the School of Science approve the student's proposal.

Before admission to the Interdisciplinary Studies Program, students must have completed a minimum of 15 credit hours of course work, but no more than 60 credit hours. The course work must include ENG-W131, a science course with lab, and an appropriate mathematics course. All science and mathematics courses on record must have minimum grades of C. Courses included in a specific IDS major may have prerequisites specified by the departments that offer them.

Curriculum

The curriculum for each interdisciplinary studies student will vary so as to meet the particular academic objective of the student. The interdisciplinary studies major areas of study will consist of a coherent set of courses that define a clearly recognizable focus of study for which faculty can provide oversight and ensure intellectual integrity and rigor. A faculty committee will approve all interdisciplinary study major areas, and each student in the program will work closely with a faculty mentor.

The interdisciplinary major will comprise 40-45 credit hours of regular courses from at least two disciplines and culminate with a 3- to 6-hour senior capstone project or internship.

- A minimum of 120 credit hours in the IDS program will be distributed as follows
  - General education (45-50 credits)
  - Interdisciplinary major with courses from at least two disciplines (40-45 credits)
  - Electives (25-35 credits)

Bachelor of Science Degree Requirements

For details on school specific policies, see the School of Science requirements under ‘‘Undergraduate Programs” in this bulletin. Please note that at least 32 credit hours of course work must be at the 300 level or higher.

First-Year Experience Course Beginning freshmen and transfer students with fewer than 19 credit hours are

required to take SCI-I120 Windows on Science (1 cr.), or an equivalent first-year experience course.

Area I English Composition and Communication Competency (9 cr.)

English Composition (6 cr.)
- ENG-W131 Elementary Composition I
- Second Composition Course that has ENG-W131 as a prerequisite, e.g. ENG-W270, ENG-W231, ENG-W320, ENG-W350, TCM 22000, or TCM 32000

Speech Communication (3 cr.)
- COMM-R110 Fundamentals of Speech Communication

Area II World Language Competency

No world language proficiency is required for the Bachelor of Science degree. However, if knowledge of a world language is pertinent to the interdisciplinary major, a student may choose to pursue one.

Area IIIA Arts and Humanities, Social Sciences, and Cultural Understanding Competencies (12 cr.)

The information about the IIIA requirements in the School of Science part of this bulletin lists courses that may be used to satisfy the requirements below. Students should consult the program advisor before registering for these courses.

- List H course: Choose one course (3 cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.
- List S course: Choose one course (3 cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.
- One additional course from either List H or List S
- List C course: Choose one course (3 cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.

For the most current list of courses in the areas of Arts and Humanities, Social Sciences and Cultural Understanding, please refer to the IUPUI General Education Curriculum.

Area IIIC Life and Physical Sciences Competency

See the School of Science requirements under “Undergraduate Programs” in this bulletin. Four courses outside the major from the life and physical sciences, one of which must include a corresponding laboratory. Laboratory courses without a lecture component may be taken for credit, but do not count toward the four-course requirement. No grade below C- will be accepted in any of these courses. Consult the program advisor concerning the acceptability of courses.

Area IIID Analytical Reasoning Competency (9 cr.)

- Two courses beyond algebra and trigonometry. (6 cr.)
- One computer programming course. (3 cr.)

No grade below C- will be accepted in any of these courses.

Note: Computer Science CSCI-N100 level courses and CIT 10600 do not count for credit toward any degree in the School of Science. Also, CSCI-N241 and CSCI-N299 do not count in Area IIID but may count as a general elective.

Area IV Interdisciplinary Major Concentration (40-45 cr.)

Minimum requirements include 40 credit hours of core interdisciplinary major courses.

All courses applicable to the major must have a minimum grade of C.

Curriculum

The curriculum for each interdisciplinary studies student will vary so as to meet the particular academic objective of the student. The interdisciplinary studies major areas of study will consist of a coherent set of courses that define a clearly recognizable focus of study for which faculty can provide oversight and ensure intellectual integrity and rigor. A faculty committee will approve all interdisciplinary study major areas, and each student in the program will work closely with a program advisor and faculty mentors.

The interdisciplinary major area will be comprised of 40-45 credit hours of regular courses from at least two disciplines and culminate with a senior capstone project or internship.

Department of Mathematical Sciences

IUPUI
Science Building, LD 270
402 N. Blackford Street
Indianapolis, IN 46202-3216
Phone: (317) 274-6918; fax: (317) 274-3460
https://science.iupui.edu/math/

Department Chair: Jeffrey X. Watt, Ph.D.

Department Associate Chair: R. Patrick Morton, Ph.D.

Department Advisors:
- Graduate Director: Evgeny Mukhin, Ph.D.
- Undergraduate Advisor: Virginia Ranly

Mathematical sciences include the areas of pure and applied mathematics, mathematics education, actuarial science, and statistics. Mathematics involves the study of problems in areas such as algebra, geometry, analysis, and logic and of problems arising in the real world. Mathematics, actuarial science and statistics are used in the physical sciences, engineering, the social, life, and management sciences. Mathematics education involves the training of prospective secondary teachers.
- Major Requirements and Plans of Study
- Degree Programs
- Graduate
- Minor

Degree Programs

The department offers the Purdue University Bachelor of Science degree in mathematics with options in pure mathematics, applied mathematics, actuarial science, and secondary school teaching.

Graduate degrees offered include the Purdue University Master of Science, with concentrations in Pure Mathematics, Applied Mathematics, Mathematics Education, Applied Statistics, and the Purdue University Doctor of Philosophy in mathematics, by arrangement with Purdue University, West Lafayette, with all requirements completed on the IUPUI campus. In addition, together with the Division of Biostatistics in the Indiana University School of Medicine, the department administers and offers an Indiana University Doctor of Philosophy in Biostatistics, with all requirements completed on the IUPUI campus.

Bachelor of Science

Students are encouraged to declare a mathematics major in their freshman year, so they can receive proper academic advising. A grade point average of 2.50 with no grades below C in mathematics courses through MATH 35100 is a minimum indication of success in this major.

Degree Requirements

The baccalaureate degree general requirements, the area requirements are listed earlier in this bulletin (see the School of Science requirements under “Undergraduate Programs”). For a Bachelor of Science degree in mathematics, the following additional requirements and restrictions apply:

First-Year Experience Course

Beginning freshmen and transfer students with fewer than 19 credit hours are required to take SCI-I120 Windows on Science (1 cr.) or an equivalent first-year experience course.

Area I English Composition and Communication Competency

No additional requirements beyond School-level requirements, located under the School of Science requirements “Undergraduate Programs” in this bulletin. The second semester of English composition may be satisfied by ENG-W270, ENG-W231, ENG-W350, TCM 32000 or ENG-W230.

Area II World Language Competency

All degree options require first year proficency (8 credit hours) in a modern world language. American sign language is acceptable.

Area IIIA Arts and Humanities, Social Sciences, and Cultural Understanding Competencies (12 cr.)

List H course: Choose one course (3 cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.

List S course: Choose one course (3 cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.

One additional course from either List H or List S.

List C course: Choose one course (3 cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.

For the most current list of courses in the areas of Arts and Humanities, Social Sciences and Cultural Understanding, please refer to the IUPUI General Education Curriculum.

Area IIIC Life and Physical Sciences Competency

Refer to specific mathematics option major requirements for any additional Area IIIC course requirement.

Note: Certain courses, such as CHEM-C101, CHEM-C102, CHEM-C110; PHYS 10000, PHYS 20000, PHYS 21800, and PHYS 21900, may not be used to fulfill the science requirement, Area IIIC, of the School of Science.

If in doubt about a particular course, the student should consult a mathematics department advisor.

Area IIID Analytical Reasoning Competency

See Area IV Major Requirements for required mathematics courses. Mathematics courses below MATH 16500 and those mathematics courses in which the student has received grades below C- do not count toward the degree. MATH-M118 will count as general elective.

The Area IIID computer programming requirement must be in a higher-level programming course (not BASIC). A grade of C (2.0) or better is required.

Note: Computer Science CSCI-N241 and CSCI-N299 do not count in Area IIID, but may count as a general elective.

Area IV Mathematical Sciences Major Requirements

Mathematics courses in which a student has received grades below C (2.0) do not count in Area IV. The Area IV requirements for the secondary area of concentration and the major for the four degree options—pure mathematics, applied mathematics, actuarial science, and secondary teaching—are described in the following sections. There is no single semester-by-semester plan of study for any of the options because flexibility is encouraged within the various programs. However, a sample program that shows one possible sequence of courses is given for each option. Variations from the sample program should be made in consultation with the student’s advisor. Because of the complexity of the requirements and because certain courses are not offered every semester, it is important that each student consult his or her assigned advisor as soon as possible in order to proceed through a proper plan of study for the chosen degree program. A minimum grade point average of 2.50 is required in all mathematics courses that count toward the major.

Area IV Secondary Area of Concentration Requirements

For each student to acquire some depth of study in a subject outside of the major area, the Department of Mathematical Sciences requires students to have a secondary area of concentration or minor outside of the department. The secondary area of concentration consists of at least 18 credit hours and includes at least three courses beyond the introductory level or a recognized minor from another department. It is subject to the approval of the student’s advisor. Although a second area of concentration is usually in one department, it may be from two or more if the advisor approves.

Courses may be used for the double purpose of fulfilling the general requirements and for fulfilling the secondary area of concentration requirements of the Department of Mathematical Sciences. For students in the Pure Mathematics Option or the Applied Mathematics Option,

a secondary area in one of the physical sciences or in a subject that makes substantial use of mathematics, such as computer science, engineering, or economics, is desirable. Students in the Secondary School Teaching Option satisfy the requirements for a secondary area by the courses they take to meet the professional education requirement. Students in the Actuarial Science Option satisfy the requirements for a secondary area by the required economics and business courses they take.

The requirement of 18 credit hours in a secondary area of concentration does not, by itself, constitute an official minor that would be acknowledged on the student's transcript. A minor must be offered through the department or school in which the minor is taken. Students in the Actuarial Science Option satisfy the requirements for a minor in economics by the economics courses they are required to take (Students must apply to the Economics Department to be awarded an official minor.).

Degree Requirements

Major Requirements

Pure Mathematics Option

With this option, students will be well prepared for graduate work in pure mathematics. However, students with undergraduate degrees in pure mathematics have also been successful with graduate studies in business administration, computer science, economics, educational research, engineering, law, medicine, operations research, physics, psychology, and statistics. Persons with advanced degrees in pure mathematics find careers primarily in college teaching, but careers in business, industry, or government service are also possible.

Courses taken to satisfy the Area IIIC requirements must include PHYS 15200 (or a more advanced physics course).

The Area IV major requirements are as follows:

1. Core curriculum: MATH 16500, MATH 16600, MATH 17100, MATH 26100, MATH 26600, and MATH 35100
2. MATH 45300 Beginning Abstract Algebra
3. MATH 30000 Logic & Foundations of Algebra
4. MATH 32101 Elementary Topology
5. MATH 44400 Foundations of Analysis I
6. The 45 credit hours required above must include at least 9 credit hours in the required advanced electives listed below plus 1 more 3-credit 300, 400 or 500 level course. *500 level courses require departmental approval
7. Minimum of two credit hours of MATH 49200 Capstone Experience

- MATH 46200 Elementary Differential Geometry OR MATH 57100 Elementary Topology
- MATH 42500 Elements of Complex Analysis OR MATH 445 Foundations of Analysis II
- MATH 45400 Galois Theory OR MATH 45600 Theory of Numbers

Pure Mathematics Option Sample Program (120 credits required)

Freshman Year

First Semester	
MATH 16500 Analytic Geometry and Calculus I	4
MATH 17100 Multidimensional Mathematics	3
SCI-I120 Windows on Science	1
ENG-W131 Reading, Writing and Inquiry	3
World Language	4
Total	**15**
Second Semester	
MATH 16600 Analytic Geometry and Calculus II	4
CSCI 23000 Computing I	4
COMM-R110 Fundamentals of Speech Communication	3
Life and Physical Science (approved elective)	3
World Language	4
Total	**18**

Sophomore Year

Third Semester	
MATH 26100 Multivariate Calculus	4
PHYS 15200 Mechanics	4
2nd Written Communication Course	3
MATH 30000 Logic & Foundations of Algebra	3
Secondary Area elective	3
Total	**17**
Fourth Semester	
MATH 26600 Ordinary Differential Equations	3
MATH 35100 Elementary Linear Algebra	3
Life and Physical Science (approved elective)	3
Social Sciences (choose from list)	3
Secondary Area elective	3
Total	**15**

Junior Year

Fifth Semester	
MATH 44400 Foundations of Analysis I	3
Advanced Elective	3
Arts and Humanities/Social Sciences (choose from list)	3

Secondary Area electives	6
Total	**15**
Sixth Semester	
MATH 32101 Elementary Topology	3
Advanced Elective	3
Life and Physical Sciences (approved elective)	3
Secondary Area electives	6
Total	**15**

Senior Year

Seventh Semester	
MATH 45300 Beginning Abstract Algebra	3
Arts & Humanities/Social Science (choose from list)	3
General electives	7
Total	**13**
Eighth Semester	
Advanced Elective	3
Advanced Elective	3
General elective	3
MATH 49200 Capstone Experience	3
Total	**12**

Applied Mathematics Option

Graduates with training in applied mathematics are employed in business, industry, and government. They would probably work as part of a team and would often need to communicate mathematical ideas to persons trained in other subjects. In many instances, they would need to formulate problems for solution on a computer and interpret the answers. Thus, besides a fundamental knowledge of mathematics, a knowledge of what computers can do is essential. This option is also good preparation for graduate study in applied mathematics, computer science, statistics, and engineering.

Courses taken to satisfy the Area IIIC requirements must include PHYS 15200 and PHYS 25100 (or more advanced physics courses).

The Area IV major requirements are as follows:

1. Core curriculum: MATH 16500, MATH 16600, MATH 17100, MATH 26100, MATH 26600, MATH 30000, and MATH 35100
2. MATH 41400 Numerical Methods
3. Mathematical modeling: MATH 42600 Introduction to Applied Mathematics and MATH 42100 Linear Programming and Optimization Techniques or MATH 42300 Discrete Modeling
4. MATH 44400 Foundations of Analysis I
5. Twelve (12) additional credit hours selected from MATH 27600 and mathematics courses at the 300 level or above and statistics courses numbered 35000 or higher. Courses in computer science or courses in other departments of the School of Science that have appropriate mathematical content may be selected with the approval of the advisor. Normally, no more than 6 credit hours outside of mathematics and statistics will be approved.
6. The 45 credit hours of courses required above must include at least 6 credit hours in each of two of the course sequences listed below. Students planning on attending graduate school in mathematics, economics, engineering, or physics are advised to take MATH 44400 and 44500. MATH 30000 is a recommended advanced elective to be taken as a prerequisite for MATH 44400.
7. Minimum of two credit hours of MATH 49200 Capstone Experience

Course Sequences

Two course sequences (each course 3 credit hours) are required. There must be at least one * sequence. No overlaps are allowed.

- *Differential Equations: MATH 52000 and MATH 52200
- *Biomathematics: Biomathematics course and STAT 35000 or higher
- Foundations of Analysis: MATH 44400 and MATH 44500
- Complex Analysis and Differential Equations: MATH 42500 and MATH 52000
- Abstract Algebra: MATH 45300 and MATH 45400
- Algebra and Number Theory: MATH 45600 and MATH 45300
- Linear Algebra: MATH 35100 and MATH 35300
- Differential Geometry: MATH 46200 and MATH 56200
- *Probability and Statistics: Two statistical-type courses at the STAT 35000 level or higher, with advisor's approval
- *Numerical Analysis: MATH 41400 and CSCI 51500
- *Scientific computing: CSCI 47500 and 47600[2]
- *Theoretical computer science: CSCI 34000 and 48400[2]

[2]Students are generally allowed to select only one of these two course sequences.

Applied Mathematics Option Sample Program (120 credits required)

Freshman Year

First Semester	
MATH 16500 Analytic Geometry and Calculus I	4
MATH 17100 Multidimensional Mathematics	3
SCI-I120 Windows on Science	1
ENG-W131 Reading, Writing and Inquiry	3
World Language	4
Total	**15**
Second Semester	
MATH 16600 Analytic Geometry and Calculus II	4

CSCI 23000 Computing I	4
COMM-R110 Fundamentals of Speech Communication	3
Life and Physical Science (approved elective)	3
World Language	4
Total	**18**

Sophomore Year

Third Semester	
MATH 26100 Multivariate Calculus	4
MATH 30000 Logic & Foundations/Algebra	3
PHYS 15200 Mechanics	4
2nd Written Communication Course	3
Secondary area elective	3
Total	**17**
Fourth Semester	
MATH 26600 Ordinary Differential Equations	3
MATH 35100 Elementary Linear Algebra	3
PHYS 25100 Heat, Electricity, and Optics	5
Secondary area elective	3
Total	**14**

Junior Year

Fifth Semester	
MATH 44400 Foundations of Analysis I	3
MATH/STAT sequence or elective	3
Arts and Humanities (choose from list)	3
Secondary area electives	6
Total	**15**
Sixth Semester	
MATH 42600 Introduction to Applied Mathematics and Modeling	3
MATH/STAT sequence or elective	3
Life and Physical Sciences (approved elective)	3
Secondary area electives	6
Total	**15**

Senior Year

Seventh Semester	
MATH 41400 Numerical Methods	3
MATH 42100 Linear Programming and Opt. Tech. or MATH 42300 Discreet Modeling	3
Social Sciences (choose from list)	3
General Elective	3
Total	**12**
Eighth Semester	
MATH 49200 Capstone Experience	2
MATH/STAT sequence or electives	6
Arts and Humanities/Social Sciences (choose from list)	3
General Elective	3
Total	**14**

Actuarial Science Option

The Actuarial Science Option for mathematics majors will provide students with the strong background in mathematics, statistics, and economics necessary to analyze financial risks. This concentration aims to prepare students for the first three actuarial examinations administered by the professional actuarial organizations. The secondary area of concentration for students in this option is fulfilled by required courses in business and economics.

Actuarial science deals with the analysis of financial consequences of risk. Actuaries are highly trained professionals, well versed in mathematical, statistical, and economic techniques that enable them to evaluate financial risk of uncertain future events, especially those pertaining to health care, insurance, and pension plans. Actuaries answer risk-related questions by developing, implementing, and interpreting sophisticated mathematical models.

Courses taken to satisfy Area IIIC requirements must include PHYS 15200 (or a more advanced physics course).

The Area IV major requirements are as follows:

1. Core Curriculum: MATH 16500, MATH 16600, MATH 17100, MATH 26100, MATH 26600, and MATH 35100
2. ECON-S201, ECON-E202 or ECON-S202, ECON-E305, ECON-E321, ECON-E322
3. BUS-A200, BUS-F300, BUS-F305
4. MATH 37300 Mathematical Finance
5. Mathematical Modeling: MATH 42600 Introduction to Applied Mathematics and Modeling or MATH 42100 Linear Programming and Optimization Techniques or MATH 42300 Discrete Modeling
6. STAT 41600 Probability and STAT 41700 Statistical Theory
7. Actuarial Models: STAT 47200 and STAT 47300
8. Two credit hour or three credit hour STAT elective at the 300 level or above (not STAT 30100, 30200, or 31100) Suggested course: STAT 51200 and STAT 37100 (Prep for Actuarial Exam 1)
9. Three credit hour MATH or STAT course selected from MATH 27600 and mathematics and statistics courses at the 300 level or above (not STAT 30100,

30200, or 31100). Suggested course: STAT 35000 Introduction to Statistics

10. Two or three credit hours of MATH 49200 Capstone Experience

Actuarial Science Option Sample Program (120 credits required)

Freshman Year

First Semester	
MATH 16500 Analytic Geometry and Calculus I	4
MATH 17100 Multidimensional Mathematics	3
SCI-I120 Windows on Science	1
ENG-W131 Reading, Writing and Inquiry	3
World Language	4
Total	**15**
Second Semester	
MATH 16600 Analytic Geometry and Calculus II	4
Arts and Humanities (choose from list)	3
COMM-R110 Fundamentals of Speech Communication	3
Life and Physical Science (approved elective)	3
World Language	4
Total	**17**

Sophomore Year

Third Semester	
MATH 26100 Multivariate Calculus	4
STAT 35000 Introduction to Statistics	3
MATH 37300 Financial Mathematics	3
ECON-S201 Introduction to Microeconomics: Honors	3
BUS-A200 Foundations of Accounting	3
Total	**16**
Fourth Semester	
MATH 35100 Elementary Linear Algebra	3
MATH 26600 Ordinary Differential Equations	3
PHYS 15200 Mechanics	4
ECON-E202 Intro to Macro Economics	3
2nd Written Communication Course	3
Total	**16**

Junior Year

Fifth Semester	
STAT 41600 Probability	3
ECON-E305 Money and Banking	3
BUS-F300 Introduction to Finance	3
CSCI 23000 Computing I	4
Social Sciences (choose from list)	3
Total	**16**
Sixth Semester	
STAT 37100 Prep for Exam P/1	2
STAT 41700 Statistical Theory	3
Arts and Humanities/Social Sciences (choose from list)	3
BUS-F305 Intermediate Finance	3
Life and Physical Science (approved elective)	3
Total	**14**

Senior Year

Seventh Semester	
STAT 47200 Actuarial Models I	3
ECON-E322 Intermed. Macroeconomic Theory	3
MATH 42100 Linear Prog. and Optim. Tech. or MATH 423 Discrete Modeling	3
STAT 51200 Regression Analysis	3
Elective or MATH 39000 (Topics)	1
Total	**13**
Eighth Semester	
STAT 47300 Actuarial Models II	3
MATH 49200 Capstone Experience	3
Life and Physical Science (approved elective)	3
ECON-E321 Theory of Prices & Markets	3
General elective	1
Total	**13**

Applied Statistics Option

The Applied Statistics Option for mathematics majors will provide students with the strong background in mathematics and statistics necessary to analyze risks. The secondary area of concentration may be selected by the student or fulfilled by required courses in business and economics.

The Area IV major requirements are as follows:

1. Core Curriculum: MATH 16500, MATH 16600, MATH 17100, MATH 26100, MATH 26600, MATH 35100.
2. Math Major Concentration: STAT 41600, STAT 41700, STAT 42100, STAT 51200
3. Advanced Electives: STAT 35000 or MATH 51100, MATH 41400, MATH 42100, MATH or STAT elective course.
4. Secondary area of concentration selected by student.
5. Two or three credit hours of MATH 49200 Capstone Experience

Freshman Year

First Semester	
MATH 16500 Analytic Geometry and Calculus I	4
MATH 17100 Multidimensional Mathematics	3
SCI-I120 Windows on Science	1
ENG-W131 Reading, Writing and Inquiry	3
World Language	4
Total	**15**
Second Semester	
MATH 16600 Analytic Geometry and Calculus II	4
CSCI 23000 Computing I	4
COMM-R110 Fundamentals of Speech Communication	3
Life and Physical Science (approved elective)	3
World Language	4
Total	**18**

Sophomore Year

Third Semester	
MATH 26100 Multivariate Calculus	4
STAT 35000 Introduction to Statistics	3
MATH 41400 Numerical Methods	3
Course for concentration or minor	3
2nd Written Communication Course	3
Total	**16**
Fourth Semester	
MATH 35100 Elementary Linear Algebra	3
MATH 26600 Ordinary Differential Equations	3
PHYS 15200 Mechanics	4
Arts and Humanities (choose from list)	3
Course for concentration or minor	3
Total	**16**

Junior Year

Fifth Semester	
STAT 41600 Probability	3
Statistics Elective Course	3
Courses for concentration or minor	6
Social Sciences (choose from list)	3
Total	**15**
Sixth Semester	
STAT 41700 Statistical Theory	3
STAT 42100 Modern Statistical Modeling/R & SAS	3
Arts and Humanities/Social Sciences (choose from list)	3
Course for concentration or minor	2
Life and Physical Science (approved elective)	3
Total	**14**

Senior Year

Seventh Semester	
STAT 51200 Applied Regression Analysis	3
MATH 42100 Linear Prog. & Opt. Techniques	3
Course for concentration or minor	3
Free Electives	4
Total	**13**
Eighth Semester	
MATH 49200 Capstone Experience	3
Course for concentration or minor	3
Life and Physical Science (approved elective)	3
Free Electives	4
Total	**13**

Secondary School Teaching Option

Students who wish to teach in secondary schools must meet the requirements for teacher certification in the state in which they expect to teach. Interested persons can obtain these requirements by writing to the Department of Public Instruction, Certification Office, in the capital city of any state.

To satisfy Indiana law, a student should have 40 credit hours in general education courses and a specified core of professional education courses as part of the requirement for a teaching license. Students should be sure to see an

advisor to ensure that these hours are properly distributed and that the professional education requirements are met.

Courses taken to satisfy the Area IIIC requirements must include PHYS 15200 (or a more advanced physics course).

The Area IV major requirements are as follows:

1. Core curriculum: MATH 16500, MATH 16600, MATH 17100, MATH 26100, MATH 26600, and MATH 35100
2. MATH 27600 Discrete Math
3. MATH 30000 Logic and the Foundations of Algebra
4. MATH 45300 Abstract Algebra
5. MATH 46300 Intermediate Euclidean Geometry for Secondary Teachers
6. Probability and Statistics: STAT 35000
7. MATH 58300 History of Elementary Mathematics
8. EDUC-M457 Methods of Teaching Senior High/ Junior High/Middle School Mathematics

Secondary School Teaching Option Sample Program (124 credits required)

Freshman Year

First Semester	
MATH 16500 Analytic Geometry and Calculus I	4
MATH 17100 Multidimensional Mathematics	3
SCI-I120 Windows on Science	1
ENG-W131 Reading, Writing and Inquiry	3
World Language	4
Total	**15**
Second Semester	
MATH 16600 Analytic Geometry and Calculus II	4
MATH 27600 Discrete Mathematics	3
COMM-R110 Fundamentals of Speech Communication	3
2nd Written Communication Course	3
World Language	4
Total	**17**

Sophomore Year

Third Semester	
MATH 26100 Multivariate Calculus	4
MATH 30000 Logic and the Foundations of Algebra	3
EDUC-H341 American Culture and Education	3
PSY-B110 Introduction to Psychology	3
Life and Physical Science (approved elective)	3
Total	**16**
Fourth Semester	
MATH 26600 Ordinary Differential Equations	3
MATH 35100 Elementary Linear Algebra	3
MATH 58300 History of Mathematics	3
PHYS 15200 Mechanics	4
Arts and Humanities (choose from list)	3
Total	**16**

Junior Year

Education Block IIA3

Fifth Semester	
CSCI 23000 Computing I	4
Block I-Diversity & Learning, Content Area Literacy, Field Exp.	10
Life and Physical Science (approved elective)	3
Total	**17**
Sixth Semester	
MATH 46300 Intermediate Euclidean Geometry for Secondary Teachers	3
Education Block IIA	7
Education Block IIB-EDUC-M457 Methods of Teaching Senior High/Junior High/ Middle School Mathematics	3
Arts and Humanities/Social Sciences (choose from list)	3
Total	**16**

Senior Year

Seventh Semester	
MATH 45300 Abstract Algebra	3
STAT 35000 Introduction to Statistics	3
Block III-High School Methods, Field Exp.	4
Life and Physical Science (approved elective)	3
Total	**13**
Eighth Semester	
Block IV-Student Teaching in Middle School/Junior High School Student Teaching in High School	14
Total	**14**

Math-Physics Double Major

This option is for students intending to double major in mathematics and physics.

Courses taken to satisfy the Area IIIC requirements must include PHYS 15200, PHYS 25100, CHEM-C105, and CHEM-C106.

The Area IV major requirements are as follows:

1. Core curriculum: MATH 16500, MATH 16600, MATH 17100, MATH 26100, MATH 26600, and MATH 35100
2. MATH 30000 Logic and the Foundations of Algebra
3. MATH 41400 Numerical Methods
4. MATH 42600 Introduction to Applied Mathematics
5. MATH 44400 Foundations of Analysis I
6. Twelve (12) additional credit hours: three credit hours selected from MATH 35300/35400/45300; three credit hours selected from mathematics courses at the 300 level or above and statistics courses numbered 35000 or higher; three additional credit hours from mathematics or statistics, or from physics courses numbered three hundred or above; and PHYS 44200
7. Students planning on attending graduate school in mathematics or physics are advised to take MATH 44500 and MATH 45300.
8. The double major in mathematics and physics also requires the following additional courses in physics: PHYS 29900, PHYS 31000, PHYS 33000, PHYS 34200, PHYS 35300, PHYS 40000, PHYS 40100, PHYS 41800.
9. Laboratory courses CHEM-C125 and CHEM-C126
10. Minimum of two credit hours of PHYS 49000 Capstone Experience

Math-Physics Double Major Option Sample Program (123 credits required)

Freshman Year

First Semester	
MATH 16500 Analytic Geometry and Calculus I	4
MATH 17100 Multidimensional Mathematics	3
SCI-I120 Windows on Science	1
ENG-W131 Reading, Writing and Inquiry	3
CHEM-C105/125 Principles of Chemistry I Lec/Lab	5
Total	**16**
Second Semester	
MATH 16600 Analytic Geometry and Calculus II	4
COMM-R110 Fundamentals of Speech Communication	3
PHYS 15200 Mechanics	4
CHEM-C106/126 Principles of Chemistry II Lec/Lab	5
Total	**16**

Sophomore Year

Third Semester	
MATH 26100 Multivariate Calculus	4
MATH 30000 Logic and the Foundations of Algebra	3
PHYS 25100 Heat, Electricity & Optics	5
PHYS 29900 Intro to Computational Physics	2
2nd Written Communication Course	3
Total	**17**
Fourth Semester	
MATH 26600 Ordinary Differential Equations	3
MATH 35100/51100 Elementary Linear Algebra	3
PHYS 34200 Modern Physics	3
CSCI 23000 Computing I	4
Social Science (choose from list)	3
Total	**16**

Junior Year

Fifth Semester	
MATH 44400 Foundations of Analysis I	3
MATH 45300 or MATH/STAT Elective	3
PHYS 31000 Intermediate Mechanics	4
Arts and Humanities (Choose from List)	3
World Language	4
Total	**17**
Sixth Semester	
MATH 35300/35400 or MATH/STAT Elective	3
MATH 42600 Intro to Applied Math/Modeling	3
PHYS 33000 Intermediate Electricity & Magnetism	3
PHYS 35300 Electronics Laboratory	2
World Language	4
Total	**15**

Senior Year

Seventh Semester	
MATH 41400 Numerical Methods	3
PHYS 40000 Physical Optics	3
PHYS 40100 Physical Optics Laboratory	2
PHYS 44200 Quantum Mechanics	3
Arts and Humanities or Social Science	3
Total	**14**

Eighth Semester	
PHYS 49000 (Capstone)	3
PHYS 41800 Thermal and Statistical Physics	3
MATH/STAT/PHYS Elective	3
General Elective	3
Total	**12**

Minor in Mathematical Sciences

An undergraduate minor in mathematics is useful in many fields. A scientist or engineer may need knowledge of differential equations and linear algebra, while someone in business or a social science may need a background in probability or statistics.

Requirements

1. The calculus sequence MATH 16500, MATH 16600, MATH 17100, and MATH 26100 (15 cr.)
2. Two additional courses selected from mathematics courses numbered MATH 26600 or higher or from statistics courses numbered STAT 35000 or higher
3. Nine (9) credit hours of the minor must be completed at IUPUI.
4. The grade in each course submitted for the minor must be C (2.0) or higher.*

*A single grade of C- (1.70) will be allowed in any MATH course counting towards the minor.

Correspondence courses may not be used to fulfill requirements for the minor.

Graduate Programs

The Department of Mathematical Sciences offers graduate training leading to the Purdue University Ph.D. in Mathematics with concentrations in pure mathematics, applied mathematics, and statistics. In addition, the department offers a Master of Science degree in Mathematics, with concentrations in pure mathematics, applied mathematics, math education, and applied statistics. Together with the Department of Biostatistics in the Indiana University School of Medicine and the Indiana University Fairbanks School of Public Health at IUPUI, the department also administers and offers an Indiana University Ph.D. in Biostatistics. Requirements for both Ph.D. programs are completed entirely on the IUPUI campus. The M.S. degree requires two years of full-time study, and the Ph.D. typically requires two to three additional years of full-time study.

Admission Requirements

Students entering a graduate program in mathematics should have completed an undergraduate program containing as many courses as possible in abstract algebra, linear algebra, advanced calculus, differential equations, complex analysis, logic and foundations, statistics and probability.

Students entering the MS graduate program in pure or applied mathematics should hold at least a bachelor's degree (or equivalent) from an accredited institution of higher learning in mathematics, or in the physical sciences or engineering with a strong mathematics background. A minimal cumulative GPA of 3.0 is required. The minimal mathematics background includes at least 13 credit hours of mathematics courses past the calculus sequence (single and multivariate calculus and differential equations).

Students entering the MS graduate program in applied statistics must have at least a bachelor's degree (or equivalent) from an accredited institution. A minimum cumulative GPA of 3.0 is required. The minimal mathematics background is an undergraduate course sequence in univariate and multivariate calculus (equivalent to MATH 16500, 16600, 17100, and 26100 at IUPUI), plus a linear algebra course (equivalent to MATH 35100 or 51100 at IUPUI). Applicants who lack only the linear algebra course may be admitted conditionally and then must complete such a course as soon as practicable.

Students entering the master's program in mathematics education must have at least a bachelor's degree (or equivalent) from an accredited institution. A minimum cumulative GPA of 3.0 is required. The minimal mathematics background includes undergraduate coursework in univariate and multivariate calculus (at IUPUI, MATH 16500, 16600, 17100, and 26100), differential equations, (at IUPUI, MATH 26600), linear algebra (at IUPUI, MATH 35100 or 51100), and abstract algebra (at IUPUI, MATH 45300).

Students entering the Ph.D. program in mathematics must have either an M.S. in mathematics or have successfully completed a bachelor's degree (or equivalent), from an accredited university, with advanced courses in mathematics. A minimum cumulative GPA of 3.0 is required. Competitive applicants will have successfully completed the following course work: linear algebra, abstract algebra, complex analysis, partial differential equations (PDE), ordinary differential equations (ODE), mathematical statistics, probability.

Students entering the graduate program in biostatistics must have a suitable bachelor's or master's degree from an accredited institution and show promise for successfully completing all the degree requirements. In addition to satisfying general Indiana University Graduate School requirements for admission, applicants must have at least a B (3.00 GPA) average in course taken during the last two years of their earlier degree studies, and a grade of B+ (3.50 GPA) in courses required as prerequisites for the program. The minimal mathematics background consists of an undergraduate course sequence in univariate and multivariate calculus (equivalent to MATH 16500, MATH 16600 and MATH 26100 at IUPUI) and a course in linear algebra (equivalent to MATH 35100). In addition, applicants should have had a calculus-based undergraduate level course in probability or statistics. Prospective applicants who do not have this background must acquire it prior to admission to the program.

Application for Admission

Students who wish to pursue an advanced degree in the Department of Mathematical Sciences should complete an online application available from the department's web site at: https://science.iupui.edu/math/admissions/apply/index.html.

For Ph.D. mathematics applicants, the GRE general score is required. For Ph.D. biostatistics applicants, the GRE general test is required. Students for whom English is not their native language and who have not completed a

post-secondary degree program from an English-speaking university within the past two years must submit TOEFL scores. While this application is being processed, the student may enter IUPUI as a graduate non-degree student. No more than 12 hours of credit earned under this classification may be applied toward an advanced degree. Those who do not want to pursue an advanced degree, but who desire to take graduate courses for personal improvement, may also take courses under the graduate non-degree classification.

Transfer Credit

The Department of Mathematical Sciences will accept by transfer a maximum of 12 hours of graduate credit to an MS degree and 30 to a Ph.D. degree in excess of undergraduate degree requirements from approved institutions. Transfer credit must be approved by the student's faculty advisor.

Assistantships and Fellowships

Competitive financial support is available to qualified full-time thesis students in the form of university fellowships, school fellowships, graduate teaching assistantships, and research assistantships.

English Requirements

All advanced degree candidates are required to demonstrate acceptable proficiency in English composition.

Students for whom English is not their native language must take the EAP exam administered by the IUPUI English for Academic Purposes program. Students not scoring high enough will be required to take designated courses in English while pursuing their graduate studies.

Master of Science (Pure and Applied Mathematics Concentrations)

The Master of Science with focus in pure or applied mathematics consists of a minimum of 30 credit hours. Course grades must be A or B with the possible exception of at most two grades of C. Neither a thesis nor a comprehensive examination is required. Several core courses are specific to an M.S. plan of study and vary according to the student's interest in (a) pure mathematics with a Ph.D. objective, (b) pure mathematics without a Ph.D. objective, (c) applied mathematics with a Ph.D. objective, or (d) applied mathematics without a Ph.D. objective. The remaining courses are selected by the student and his or her advisory committee.

Master of Science (Applied Statistics Concentration)

The Master of Science degree with a concentration in Applied Statistics consists of a minimum of 30 credit hours. Course grades must be A or B with the possible exception of at most two grades of C. A combined written and oral final examination is required. Candidates for this degree may choose either the thesis option or the non-thesis option. Both options require 15 credit hours in the core curriculum consisting of STAT 51200, STAT 51400, STAT 51900, STAT 52400, and STAT 52800.

The non-thesis option consists of 15 credit hours beyond the core curriculum, at least 9 of which must be statistics (STAT) courses. The remaining courses may be taken in mathematics or in areas relevant to statistical applications, subject to approval of the academic advisor.

The thesis option requires a thesis worth 6 credit hours on a topic approved by the student's academic advisor. At least 6 of the remaining 9 credit hours must be taken in statistics coursework beyond the core curriculum.

The remaining 3 credit hours of coursework may be taken in Mathematics or in a subject related to statistical applications that has been approved by the advisor. An oral defense of the thesis is required.

Master of Science (Mathematics Education Concentration)

The Master of Science with focus in mathematics education consists of a minimum of 30 credit hours and is tailored for secondary school teachers and students who are preparing to become secondary school teachers. Course grades must be A or B with the possible exception of at most two grades of C. Core requirements include a course in abstract algebra (MATH 50500), a course in analysis (MATH 54700 or MATH 50400), a course in geometry (MATH 56100 or MATH 56300), a course in probability (STAT 51600), and a course in statistics (STAT 51700).

Master of Science in Computational Data Science

This degree program is offered through the Departments of Computer & Information Science and Mathematical Sciences of the IUPUI School of Science. The objective of the program is to prepare students to enter the workforce in the rapidly advancing field of data science, an interdisciplinary domain that cuts across computer science and statistics, by providing a solid, comprehensive background in the related topics of theory and their applications.

This program will provide the skills necessary that will enable students to be flexible and competitive in today's job market by gaining deep understanding of theory, implementation (e.g., algorithms and appropriate computing languages), as well as the inherent "nature" of different data modalities, such as classification and prediction challenges on specific data (e.g., sparse and/or incomplete data).

The curriculum requires 30 credits in total that can be completed in three semesters. There are 9 credits for core courses in Computer Science, 6 credits for Statistics core courses, 12 credits for elective courses from Computer Science and/or Statistics, and 3 credits for the capstone course. The students must choose at least two electives from Computer Science and at least two electives from Statistics.

Successful completion of the program requires a minimum plan of study GPA of 3.0, the minimum grade in any course is C and the maximum number of courses with grades of C or C+ is two.

Core Courses:
CSCI 59000 Introduction to Data Science
CSCI 57300 Data Mining
CSCI 57800 Statistical Machine Learning
STAT 51200 Applied Regression Analysis

STAT 52900 Applied Decision Theory and Bayesian Analysis

Capstone Courses:
CSCI 69500 MS Capstone Project
STAT 59800 Topics in Statistical Methods

Elective courses:
CSCI 52000 Computational Methods in Analysis
CSCI 54100 Database Systems
CSCI 55200 Advanced Graphics & Visualization
CSCI 58000 Algorithm Design, Analysis & Implementation
CSCI 59000 Large-Scale Machine Learning
CSCI 59000 High Performance Computing
STAT 51400 Design of Experiments
STAT 52000 Time Series and Applications
STAT 52300 Categorical Data Analysis
STAT 52400 Applied Multivariate Analysis
STAT 52501 Generalized Linear Models
STAT 53600 Introduction to Survival Analysis
The course sequence is crucial for successful completion of this program. Students should consult with the departmental advisor.

General Admission Requirements for MS in Computational Data Science

Prerequisite coursework and/or degrees:

4-year Bachelor's degree in Computer Science, Engineering, Mathematics, Statistics or related fields. 4-year Bachelor's degree in any other area of study will be considered on a case-by-case basis, based on the coursework and corresponding grades in the applicant's transcripts, as well as on the overall potential of successfully completing this program.

GPA: Scores on the Graduate record Exam (GRE) must be submitted for admission consideration.

English Proficiency Requirements: All applicants whose native language is not English are required to submit scores for TOEFL or IELTS. An overall TOEFL IBT score of 80 or higher, or an IELTS band score of 6.5 or higher is required. Applicants submitting TOEFL scores must also meet the following section minimum requirements in addition to the minimum Total requirement: 18 Writing, 18 Speaking, 14 Listening, 19 Reading.

Doctor of Philosophy (Mathematics)

To be admitted to candidacy for the Ph.D. degree, the student must fulfill the following requirements and must be accepted by the graduate committee of the Department of Mathematical Sciences.

Requirements

- The student must pass a suite of four qualifying exams. They must select at least two out of four subject areas from the Core 4 with at least one being either Real Analysis (MATH 54400) or Abstract Algebra (MATH 55300). They must also pass two additional exams from either the remaining Core 4 or the Area Exams.
- The student must satisfy, by one of the five options approved by the graduate school, the world language requirement in German, Russian, or French.
- The student must submit to the graduate school through the department a plan of study including at least 42 credit hours of approved Purdue University graduate coursework.
- The student must pass an advanced topics examination. This examination may be taken only by students who have already passed the qualifying examinations.

A candidate will be recommended to the faculty to receive the Ph.D. degree after a dissertation, submitted in final form, has been accepted by the advisory committee and successfully defended at an open colloquium or seminar.

Doctor of Philosophy (Biostatistics)

Together with the Department of Biostatistics in the Indiana University School of Medicine and the Indiana University Fairbanks School of Public Health at IUPUI, the Department of Mathematical Sciences offers graduate training leading to a Ph.D. in Biostatistics from Indiana University, with all requirements completed on the IUPUI campus. To be admitted to candidacy for the Ph.D. degree, the student must fulfill the following requirements.

Requirements

- The student must pass an initial qualifying examination on the five core courses: STAT 51900, STAT 52500, STAT 52800, STAT 53600, and PBHL-B546.
- The student must complete at least 45 credit hours of formal coursework, consisting of 33 credit hours of required courses and additional 12 credit hours in elective statistics/biostatistics courses of which six credit hours must be at the 600 level and above. An additional 45 credit hours are required and will consist of coursework in a minor area (minimum of 9 credits), further elective courses, independent studies, and directed Ph.D. dissertation research.
- The student must pass a preliminary oral examination, which consists of an oral presentation on an advanced research topic.

A candidate will be recommended to the faculty to receive the Ph.D. degree after a dissertation, submitted in final form, has been accepted by the advisory committee and successfully defended before an open colloquium or seminar.

The department has set time limits for the completion of the Ph.D. degree.

Neuroscience Program

402 N. Blackford Street, LD 124
Indianapolis, IN 46202-3276
Phone: (317) 278-2237; Fax: (317) 274-6756
https://science.iupui.edu/neuroscience/index.html

- **Director** Teri L. Belecky-Adams, Ph.D.

Neuroscience is a rapidly advancing field that examines the structure and function of the nervous system with particular focus on the intersection between the brain and behavior. This field has emerged through the explosive growth of research in the neural sciences and increased

interest in the mechanisms that support behavior in humans and in animal models.

The Bachelor of Science degree in Neuroscience offers an interdisciplinary curriculum that is grounded in biology, psychology, physics, chemistry, computer science and mathematical sciences, with the nervous system as a common focus. All students are encouraged to participate in research in laboratories across the School of Science and the IU School of Medicine utilizing the state-of-the-art experimental methods available to them.

Neuroscience courses will be drawn primarily from the Department of Biology and the Department of Psychology. Foundational coursework will also be completed in Chemistry, Physics, Neuroscience, and Computer Science. The degree program culminates in a capstone research experience.

Because neuroscience is a rapidly advancing field of inquiry, there is a high demand for trained professionals with knowledge and skills related to neuroscience for careers in medicine, academic or government-supported research, health-related sciences, and biotechnology. It is anticipated that a substantial proportion of graduates may elect to continue their training in graduate or professional school, particularly schools of medicine.

- Bachelor of Science Degree Requirements
- Plan of Study
- Minor in Neuroscience Requirements
-

Bachelor of Science in Neuroscience Degree Requirements

Degree Requirements

First-Year Experience Course (1 cr.)

Beginning freshmen and transfer students with fewer than 19 credit hours are required to take SCI-I120 Windows on Science (1 cr.) or an equivalent first-year experience course.

Area I English Composition and Communication Competency (9 cr.)

See the School of Science requirements under “Undergraduate Programs” in this bulletin. The second semester of English composition may be satisfied with ENG-W231 (or ENG-W230, ENG-W270 / ENG-W150, ENG-W320, ENG-W350, TCM 22000, or TCM 32000).

Area II World Language Competency

No world language proficiency is required for a Bachelor of Science degree. However, knowledge of a world language is strongly recommended for any student planning to attend graduate school.

Area IIIA Arts and Humanities, Social Sciences, and Cultural Understanding Competencies (12 cr.)

- List H Arts and Humanities Competency: Choose one course (3cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.
- List S Social Sciences Competency: Choose one course (3cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin. NOTE: PSY-B110 (or an equivalent introductory psychology course) cannot be used to satisfy this requirement, as the course is required in the major.
- One additional course from List H or List S
- List C Cultural Understanding Competency: Choose one course (3cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.

For the most current list of courses in the areas of Arts and Humanities, Social Sciences and Cultural Understanding, please refer to the IUPUI General Education Curriculum.

Area IIIC Life and Physical Sciences Competency (19-20 cr.)

The following courses are required:

CHEM-C105 Principles of Chemistry I (3 cr.) and CHEM-C125 Experimental Chemistry I (2 cr.)

CHEM-C106 Principles of Chemistry II (3 cr.) and CHEM-C126 Experimental Chemistry II (2 cr.)

CHEM-C341 Organic Chemistry Lectures I (3 cr.) and CHEM-C343 Organic Chemistry Laboratory I (2 cr.)

One of the following courses or course sequences is required:

CHEM-C342 Organic Chemistry Lectures I (3 cr.) and CHEM-C344 Organic Chemistry Laboratory I (2 cr.)

PHYS 15200 Mechanics (4 cr.) **OR** PHYS-P201 General Physics I (5 cr.) **OR** PHYS 21800 General Physics I (4 cr.)

Area IIID Analytical Reasoning Competency (9 cr.)

Two courses in calculus are required. The starting point to be worked out with the departmental advisor based on the math placement test and/or background of the student. Acceptable calculus sequences include

MATH 23100 / MATH 23200 Calculus for the Life Sciences I and II (3 cr./3 cr.)

MATH 22100 / MATH 22200 Calculus for Technology I and II (3 cr./3 cr.)

MATH 16500 / MATH 16600 Analytic Calculus and Geometry I and II (4 cr./4 cr.)

The computer programming requirement may be satisfied with the following. Alternate computer science programming courses may be approved in consultation with an academic advisor.

CSCI-N200 Principles of Computer Science (3 cr.) **OR** CSCI-N201 Programming Concepts (3 cr.) **OR** CSCI-N207 Data Analysis Using Spreadsheets (3 cr.) **OR** CSCI-N211 Introduction to Databases (3 cr.)

Note: Computer Science CSCI-N241 and CSCI-N299 do not count in Area IIID, but may count as a general elective.

Area IV Neuroscience Major Requirements (minimum 48 cr.)

A minimum grade of C- (1.70) or higher is required in all courses in AREA IV, including neuroscience electives. An overall GPA of 2.00 GPA is required for AREA IV.

A. Foundation Courses (25 cr.)

- BIOL-K101 Concepts of Biology I (5 cr.)
- BIOL-K103 Concepts of Biology II (5 cr.) (P: BIOL-K101)
- BIOL-K324 Cell Biology (3 cr.) (P: BIOL-K103 and CHEM-C106)
- NSCI-K416 or BIOL-K416 Cellular & Molecular Neuroscience (3 cr.) (P: BIOL-K324)
- PSY-B110 Introduction to Psychology (3 cr.)
- NSCI-B201 or PSY-B201 Foundations in Neuroscience (3 cr.) (P: PSY-B110 or BIOL-K101)
- NSCI-B301 or PSY-B301 Systems Neuroscience (3 cr.) (P: PSY-B201)

B. Statistical Research Methods(3 cr.)

- PSY-B305 Statistics (3 cr.) (P: Math credit in School of Science and PSY-B110)

  OR
- STAT 35000 Introduction to Statistics (3 cr.) (P: MATH 16600)

C. Neuroscience Electives (18 cr.)

Students must complete 3 credits (1 course) from the biology electives course list, and 3 credits (1 course) from the psychology electives course list. Students must also complete an additional 12 credit hours (4 courses) from any courses included in the biology, psychology or chemistry/physics electives course lists. At least 6 Neuroscience elective courses must be completed overall.

A course cannot be used to satisfy two AREA requirements. For example, if CHEM-C342 Organic Chemistry Lecture II is taken for the AREA IIIC Life and Physical Sciences requirement, then it cannot be subsequently used to satisfy AREA IV Part C neuroscience elective requirement. This applies to other courses, including CHEM-C344, PHYS 15200, and PHYS-P201. This is not a complete list of courses that could count in more than one AREA.

Biology Electives Course List

- BIOL-K322 Genetics and Molecular Biology (3 cr.) [strongly recommended, as this serves as a prerequisite for other higher-level electives and is generally required for admission to graduate and professional programs] (P: BIOL-K103 and CHEM-C106)
- BIOL-K331 Developmental Biology (3 cr.) (P: BIOL-K103 and BIOL-K322)
- BIOL-K338 Introductory Immunology (3 cr.) (P: BIOL-K103, BIOL-K322, BIOL-K324, CHEM-C106)
- BIOL-K384 Biological Chemistry (3 cr.) (P: BIOL-K322 or BIOL-K324 and CHEM-C341)
- NSCI-K451 or BIOL-K451 Neuropharmacology (3 cr.) (P: BIOL-K324)
- BIOL-K484 Cellular Biochemistry (3 cr.) (P: BIOL-K322 and CHEM-C342, P or C: BIOL-K324)
- NSCI-K488 or BIOL-K488 Endocrinology in Health and Disease (3 cr.) (P: BIOL-K324 and BIOL-K322 or approved equivalents)
- BIOL-N461 Cadaveric Human Anatomy (only 3 cr. can count here, the other 2 in the lab requirement) (P: BIOL-N261 or permission of instructor)
- BIOL 54410 Sensory Systems (3 cr.) (P: BIOL-K324)
- BIOL 55900 Endocrinology (3 cr.)
- BIOL 56800 Regenerative Biology and Medicine (3 cr.)
- BIOL 57100 Developmental Neurobiology (3 cr.) (Not offered every semester)
- BIOL 69700 Molecular Mechanisms of Neurodegenerative Disease (3 cr.)

Psychology Electives Course List

- PSY-B334 Perception (3 cr.) (P: PSY-B110)
- PSY-B340 Cognition (3 cr.) (P: PSY-B110)
- PSY-B344 Learning (3 cr.) (P: PSY-B110)
- PSY-B356 Motivation (3 cr.) (P: PSY-B110)
- NSCI-B394 or PSY-B394 Drugs and Behavior (3 cr.) (P: PSY-B110)
- NSCI-B398 or PSY-B398 Brain Mechanisms of Behavior (3 cr.) (P: PSY-B301)
- NSCI-I535 or PSY-I535 Clinical Neuroscience (3 cr.)
- PSY-I545 Psychopharmacology (3 cr.)
- PSY-I560 Behavioral Genetics (3 cr.)

Chemistry/Physics Electives Course List

- CHEM-C342 Organic Chemistry II (3 cr.) (If used in AREA IIIC, then the course cannot apply to the AREA IV Part C requirement.)
- CHEM-C371 Chemical Informatics (1 cr.)
- CHEM-C372 Chemical Informatics II: Molecular Modeling (2 cr.)
- CHEM-C484 Biomolecules and Catabolism (3 cr.)
- CHEM-C485 Biosynthesis and Physiology (3 cr.)
- PHYS 15200 Mechanics (4 cr.) (If used in AREA IIIC, then the course cannot apply to the AREA IV Part C requirement.)
- PHYS 25100 Heat, Electricity and Optics (5 cr.)
- PHYS-P201 General Physics I (5 cr.) (If used in AREA IIIC, then the course cannot apply to the AREA IV Part C requirement.)
- PHYS-P202 General Physics II (5 cr.)
- PHYS 21900 General Physics II (4 cr.)
- PHYS 58500 Introduction to Molecular Biophysics (3 cr.)

D. Upper-level Laboratory (1-2 cr.)

To receive credit for a laboratory for which there is an accompanying pre- or co-requisite lecture, the lecture must be completed with a minimum grade of C. Laboratory courses can be enrolled concurrently with the lecture (often preferred) or in a semester after the completed lecture.

- BIOL-K323 Genetics and Molecular Biology Laboratory (2 cr.)
- BIOL-K325 Cell Biology Laboratory (2 cr.)
- BIOL-K333 Developmental Biology Laboratory (1 cr.)
- BIOL-K339 Immunology Laboratory (2 cr.)
- CHEM-C344 Organic Chemistry Laboratory II (2 cr.) (If used in AREA IIIC, then the course cannot apply to the AREA IV Part C requirement.)
- CHEM-C486 Biological Chemistry Laboratory (2 cr.)
- BIOL-N461 Cadaveric Anatomy (2 cr. of the course can count here)

E. Capstone (1 course or course sequence; where not indicated, credit hours to be determined in consultation with advisor)

- BIOL-K493 Independent Research (minimally 2 cr.) and BIOL-K494 Senior Research Thesis (minimally 1 cr.) (2 semesters - fall and spring - and requires application due in spring semester before the fall semester starts)

  OR

- PSY-B499 Capstone Honors Research (2 semesters - fall and spring - and requires application due in spring semester before the fall semester starts)

  OR

- NSCI-N491 Behavioral Neuroscience Capstone Lab (spring semesters only)

  OR

- NSCI-N492 Capstone in Computational Neuroscience (fall semesters only)

  OR

- CHEM-C494 Intro to Capstone in Chemistry (1 cr.) (junior standing) and CHEM-C495 Capstone in Chemistry (1 cr.) (senior standing). Requires permission from the instructor and independent project advisor.

  OR

- MATH 49200 Capstone Experience

  OR

- PHYS 49000 Undergraduate Readings and Research

Neuroscience Plan of Study

No single semester-by-semester plan of study will guide all students through the degree option because of the flexibility encouraged within the program. However, one possible sequence of courses is given below; variations from this example should be made in consultation with the program advisor.

Sample Program (120 cr. required)

Freshman Year

First Semester	
SCI-I120 Windows on Science	1
BIOL-K101 Concepts of Biology I	5
MATH 23100 Calculus for Life Science I	3
PSY-B110 Introduction to Psychology	3
ENG-W131 Reading, Writing and Inquiry	3
Total	**15**
Second Semester	
COMM-R110 Fundamentals of Speech Communication	3
BIOL-K103 Concepts of Biology II	5
MATH 23200 Calculus for Life Science II	3
CHEM-C105 Principles of Chemistry I	3
CHEM-C125 Experimental Chemistry I	2
Total	**16**

Sophomore Year

Third Semester	
CHEM-C106 Principles of Chemistry II	3
CHEM-C126 Experimental Chemistry II	2
2nd Written Communications Course	3
CSCI-N207 Data Analysis Using Spreadsheets	3
PSY-B201 Foundations of Neuroscience	3
Arts & Humanities (choose from list)	3
Total	**17**
Fourth Semester	
BIOL-K324 Cell Biology	3
CHEM-C341 Organic Chemistry I Lecture	3
CHEM-C343 Organic Chemistry I Laboratory	2
Social Science (choose from list)	3
Cultural Understanding (choose from list)	3
PSY-B301 Systems Neuroscience	3
Total	**17**

Junior Year

Fifth Semester	
BIOL-K416 Cellular and Molecular Neuroscience	3
Major Upper-Level Laboratory Course (choose from list)	2
Statistical Research Methods course (choose from list)	3
Life and Physical Science (choose from list)	5
Elective/Minor course	3
Total	**16**
Sixth Semester	
Major Neuroscience Elective Course	3
Neuroscience Psychology Elective Course	3

Neuroscience General Elective Course	5
Elective (RISE course)	3
Total	**14**

Senior Year

Seventh Semester	
Neuroscience Biology Elective Course	3
Neuroscience Major Elective Course	3-5
Capstone course	1-3
Elective/Minor courses	6
Arts & Humanities/Social Science (choose from list)	3
Total	**13 - 17**
Eighth Semester	
Capstone course	1 - 3
Neuroscience Major Elective course	2 - 4
Elective/Minor courses	1 - 6
Total	**8 - 12**

Minor in Neuroscience Requirements

Minor in Neuroscience

The School of Science offers a minor in the field of neuroscience. Neuroscience is a very interdisciplinary field, encompassing biology, chemistry, mathematics and psychology, as well as other disciplines. Students majoring in one of these areas may have a strong interest in neuroscience, but prefer to major in one of the specific disciplines.

Due to its interdisciplinary nature, a minor in neuroscience intentionally and transparently links different disciplines together. The minor will allow students to understand, apply and analyze the connections among disciplines. These abilities will help them apply their life sciences learning to the rest of their education, and better prepare them for graduate and/or professional studies in this new and expanding field.

Minor Requirements

The minor requires 15 credit hours (5 courses):

Core Courses

- NSCI-B/PSY-B201 Foundations of Neuroscience (3 cr.) P: PSY-B110 or BIOL-K101
- NSCI-B/PSY-B301 Systems Neuroscience (3 cr.) P: PSY-B201
- NSCI-K/BIOL-K416 Cellular and Molecular Neuroscience (3 cr.) P: BIOL-K324

2 Neuroscience elective courses:

One course from the Biology Elective Course List (3 cr.)

- BIOL-K322 Genetics and Molecular Biology P: BIOL-K103 & CHEM-C106 (This course is strongly recommended, as it serves as a prerequisite for other higher-level electives and generally is required for admission to graduate and professional programs.)
- BIOL-K331 Embryology P: BIOL-K103 & BIOL-K322
- BIOL-K338 Introductory Immunology P: BIOL-K103 & CHEM-C106
- BIOL-K384 Cellular Biochemistry P: CHEM-C341 and BIOL-K324 or BIOL-K322
- BIOL-K483 Biological Chemistry P: CHEM-C342
- BIOL 55900 Endocrinology P: BIOL 55600 or equivalent & CHEM-C342
- BIOL 56800 Regenerative Biology and Medicine P: BIOL-K324 or BIOL-K331 or a biochemistry course
- BIOL 57100 Developmental Neurobiology P: consent of instructor (Not offered every semester)

One course from the Psychology Elective Course List (3 cr.)

- PSY-B334 Perception P: see below*
- PSY-B340 Cognition P: PSY-B110
- PSY-B344 Learning P: see below*
- PSY-B356 Motivation P: see below*
- NSCI-B/PSY-B394 Drugs and Behavior P: see below*
- PSY-B398 Brain Mechanisms of Behavior P: PSY-B301 or PSY-B320
- PSY-I535 Clinical Neuroscience
- PSY-I545 Psychopharmacology**
- PSY-I560 Behavioral Genetics*

  - * P: Three (3) credit hours of introductory psychology
  - ** Requires permission of instructor

Apply for a minor

To qualify for minor certification, students must complete the online form. For more information on the Neuroscience program, please contact Cynthia Williams, director of student development, or call 317-274-6765.

Department of Psychology

IUPUI
Science Building, LD 124
402 N. Blackford Street
Indianapolis, IN 46202-3275
Phone: (317) 274-6947; fax: (317) 274-6756
https://science.iupui.edu/psychology/

Department Chair: Stephen L. Boehm II, Ph.D. (Interim)

Department Advisors:

- Graduate Programs:
  - Jesse Stewart, Ph.D. (Director of Graduate Studies)
  - Leslie Ashburn-Nardo, Ph.D. (Applied Social and Organizational Psychology; Industrial/ Organizational Psychology)
  - Cristine Czachowski, Ph.D. (Addiction Neuroscience)
  - Melissa Cyders, Ph.D. (Clinical Psychology)
- Undergraduate Programs:
  - Bethany Neal-Beliveau, Ph.D. (Director of Undergraduate Studies)

Psychology is the study of behavior and mental processes. Psychologists apply the scientific method to a range of questions that are as varied as how eyes perceive light and form, how children develop a sense of morality, and under what conditions people help in emergencies. As an applied profession, psychologists use research results to solve personal and social problems. Because the subject matter of psychology is broad, psychologists have become specialized. Specialization allows each psychologist to apply the general principles of science and behavior to a given area of interest. These include motivation and learning, child and adult development, social behavior of humans and animals, personality, thought processes, consumer behavior, and many more. Many psychologists, who function as research professionals, have academic positions in colleges and universities where they teach and conduct research. Psychologists who function as applied professionals specialize in areas that include clinical, counseling, health care, rehabilitation, human factors, and industrial psychology.

The Department of Psychology offers undergraduate programs leading to the Bachelor of Arts (B.A.) and Bachelor of Science (B.S.) degrees. Four recurring themes are emphasized throughout the curriculum. First, psychology is a science, and its purpose is to describe, explain, predict, and change behavior. Second, behavior is influenced by person variables (internal factors), environment variables (external factors), and their interaction. Third, psychology has evolved in a socio-historical context and its major theoretical perspectives reflect this phenomenon, and fourth, cultural contexts influence how psychological concepts are understood and applied by individuals.

The Department of Psychology offers graduate study in industrial/organizational psychology [Master of Science (M.S.) degree], addiction neuroscience [Doctor of Philosophy (Ph.D.) degree]. applied social and organizational psychology (Ph.D. degree) and clinical (Ph.D. degree).

- Undergraduate Programs
- Undergraduate Honors Programs
- Graduate Programs
- Plan of Study
- Minor

Undergraduate Degree Programs

Bachelor of Arts and Bachelor of Science

Students are encouraged to consult with an academic advisor for determination of whether to pursue B.A. or a B.S. degree.

Degree Requirements

The School of Science Requirements for the Bachelor of Arts and Bachelor of Science degrees are listed in this bulletin (see Area and General Requirements under "Undergraduate Programs").

First-Year Experience Course

Beginning freshmen and transfer students with fewer than 19 credit hours are required to take SCI-I120 Windows on Science (1 cr.) or an equivalent first-year experience course.

Transfer students with over 19 credit hours are not required to take SCI-I120, but are strongly urged to take PSY-B303 *Career Planning for Psychology Majors* (1 cr.) in their first semester on campus.

Area Requirements

Area I English Composition and Communication Competency

See the School of Science requirements under “Undergraduate Programs” in this bulletin.

All students are required to complete three courses, totaling 9 credit hours:

- ENG-W131 Reading, Writing, and Inquiry I
- Second semester of English composition (ENG-W231 is recommended)
- COMM-R110 Fundamentals of Speech Communication

Area II World Language Competency

See the School of Science Area Requirements under "Undergraduate Programs" for details

Bachelor of Arts students must have first-year proficiency in a world language: (first-year sequence or two 4-cr. courses); or exam placement into a second-year or third-year course.

Bachelor of Science students are not required to have first-year world language proficiency.

Area IIIA Arts and Humanities, Social Sciences, and Cultural Understanding Competencies

See the School of Science requirements under “Undergraduate Programs” in this bulletin for details.

All students are required to complete four courses, totaling 12 credit hours.

List H Arts and Humanities Competency: Choose one course from the list of course choices located in the School of Science Area requirements under "Undergraduate Programs" in this bulletin.

List S Social Sciences Competency: Choose one course from the list of course choices located in the School of Science Area requirements "Undergraduate Programs" in this bulletin. The Social Sciences course cannot be a psychology course.

One additional course from either the Arts and Humanities or Social Sciences list of course choices.

List C Cultural Understanding Competency: Choose one course from the list of course choices located in the School of Science Area requirements under "Undergraduate Programs" in this bulletin. The Culutural Understanding course cannot be a psychology course.

For the most current list of courses in the areas of Arts and Humanities, Social Sciences and Cultural Understanding, please refer to the IUPUI General Education Curriculum.

Area IIIC Life and Physical Sciences Competency

See the School of Science requirements under “Undergraduate Programs” in this bulletin for details.

Bachelor of Arts students are required to complete at least four science lectures courses (minimum of 12 credit

hours), and at least one of the courses must have a laboratory component.

Bachelor of Science students are required to complete at least four science lectures courses (minimum of 12 credit hours), and at least one of the courses must have a laboratory component. Two of the required four courses must be biology and/or chemistry courses.

Students should consult with an academic advisor in the Department of Psychology to determine which courses are most appropriate to take based on their academic and career goals.

Note: There are science courses that do not count in Area IIIC, as well as overlapping courses with credit not being allowed for both of two overlapping courses / course sequences. A partial list can be found in the School of Science Area or General Requirements. If you have a question about whether a course is applicable or if it overlaps with a course that you have already taken, please consult with an academic advisor in the Department of Psychology or check with the School of Science Dean's Office prior to registering to confirm.

Area IIID Analytical Reasoning Competency

See the School of Science requirements under "Undergraduate Programs" in this bulletin for details.

Bachelor of Arts students must have at least one 3-cr. course in mathematics and one 3-cr. course in computer programming. MATH-M118 Finite Mathematics and CSCI-N207 Data Analysis Using Spreadsheets are recommended to fulfill the IIID Analytical Reasoning Competency Requirement.

Bachelor of Science students must have at least two 3-cr. courses beyond algebra and trigonometry, (total of 6 credit hours). In addition, one 3-cr. computer programming course is required. MATH-M118 Finite Mathematics, MATH-M119 Brief Survey of Calculus, and CSCI-N207 Data Analysis Using Spreadsheets are recommended to fulfill the IIID Analytical Reasoning Competency Requirement. However, some pre-professional programs require specific mathematics courses, so students should consult with an academic advisor.

Note: There are math and computer science courses that do not count for any credit toward a degree in the School of Science or do not count as a Baccalaureate requirement. A partial list can be found in the School of Science Area and General Requirements. If you have a question about whether a course counts toward your degree or fulfills the Baccalaureate requirement, please consult with an academic advisor in the Department of Psychology or check with the School of Science Dean's Office prior to registering to confirm.

Area IV Major Requirements

See the following section, "Major in Psychology (B.A. or B.S.)."

Major in Psychology (B.A. or B.S.)

The Department of Psychology at IUPUI has a program for majors that requires a minimum of 40 credit hours of selected course work.

Introductory Sequence (Three courses; 7 credit hours)

- PSY-B110 Introduction to Psychology
- PSY-B203 Ethics and Diversity in Psychology
- PSY-B303 Career Planning for Psychology Majors

Research Methods Sequence (Two courses, one labs; 9 credit hours)

- PSY-B305 Statistics (P: MATH-M118 or other upper-level mathematics course)
- PSY-B311 Research Methods in Psychology (P: PSY-B305)
- PSY-B312 Research Methods Lab in Psychology (P: PSY-B305)

Psychology Foundation Courses (Four courses, 12 credit hours)

- PSY-B310 Life Span Development
- PSY-B320 Behavioral Neuroscience*
- PSY-B340 Cognition
- PSY-B370 Social Psychology

*Students earning a double major in Psychology and Neuroscience or a minor in Neuroscience must replace PSY-B320 with the NSCI-B201/NSCI-B301 sequence. Students will not receive credit for both PSY-B320 and NSCI-B301.

Psychology Content Courses (three courses; 9 credit hours)

Select three of the following courses:

- PSY-B307 Tests and Measurement
- PSY-B322 Introduction to Clinical Psychology
- PSY-B334 Perception
- PSY-B344 Learning
- PSY-B346 Theories of Personality
- PSY-B356 Motivation
- PSY-B358 Introduction to Industrial/Organizational Psychology
- PSY-B360 Child and Adolescent Psychology
- PSY-B365 Health Psychology
- PSY-B376 The Psychology of Women
- PSY-B380 Abnormal Psychology
- PSY-B385 Positive Psychology
- PSY-B386 Introduction to Counseling
- PSY-B394 Drugs and Behavior
- PSY-B396 Alcoholism and Drug Abuse

Capstone (One course; 3 credit hours)

Select one of the following courses:

- PSY-B433 Capstone Laboratory in Psychology
- PSY-B454 Capstone Seminar in Psychology
- PSY-B499 Capstone Honors Research*

*PSY-B499 requires an application due in April for the following academic year and a two-semester commitment that begins in the fall semester. Ask your advisor for details.

Note: Students should discuss capstone options with an academic advisor to determine which is most appropriate for you based on your career and academic goals. Each option has a set of prerequisites that must be completed before enrolling in the capstone. Except under special circumstances, capstone courses are taken during the senior year.

Elective Courses

Depending on your program, there will be approximately 40 credit hours of electives. These elective courses can be used to complete minor, certificate, or double major requirements. Psychology offers a number of courses that fulfill the RISE initiative. Students should talk to an advisor to determine which elective courses fit best with their academic and career goals.

Plans of Study

Although there is no single semester-by-semester plan of study for either the B.A. or the B.S. degree, one possible sequence of courses for each of these degrees is given below. Variations from these examples should be made, based on the student's academic history and career plans, through consultation with an academic advisor. For career and graduate school information related to psychology, please refer to relevant sections of the psychology department's website https://science.iupui.edu/psychology/. To graduate in four years, a student generally must take an average of 15 credits per semester. Students with heavy outside commitments (e.g., work and/or family) may want to decrease their course load each semester. By taking additional courses each summer, it may still be possible to graduate in four years.

Bachelor of Arts Sample Program (120 cr. required)

Freshman Year

First Semester	
SCI-I120 Windows on Science	1
PSY-B110 Introduction to Psychology	3
ENG-W131 Reading, Writing and Inquiry I	3
World Language (Cultural Understanding)	4
MATH-M118 Finite Mathematics*	3
Total	**14**
Second Semester	
COMM-R110 Fundamentals of Speech Communication	3
World Language**	4
Life and Physical Sciences (choose from approved list)***	3
PSY-B203 Ethics and Diversity in Psychology	3
Arts and Humanities (choose from list)	3
Total	**16**

Sophomore Year

Third Semester	
ENG-W231 Professional Writing Skills	3
PSY-B303 Career Planning Psychology Majors	1
Psychology Foundations course (choose from approved list)	3
Life and Physical Sciences (choose from approved list)	4
PSY-B305 Statistics	3
Total	**14**
Fourth Semester	
CSCI-N207 Data Analysis Using Spreadsheets	3
PSY-B311 Research Methods in Psychology	3
PSY-B312 Research Methods Lab	3
Psychology Foundations Course (choose from approved list)	3
Arts and Humanities/Social Sciences (choose from list)	3
Total	**15**

Junior Year

Fifth Semester	
Psychology Foundations course (choose from approved list)	3
Psychology Foundations course (choose from approved list)	3
Psychology Content course (choose from approved list)	3
Life and Physical Sciences (choose from approved list)	3
Elective/minor course	3
Total	**15**
Sixth Semester	
Psychology Content course (choose from approved list)	3
Social Science (choose from list)	3
Life and Physical Sciences (choose from approved list)	3
Elective/RISE course	3
Elective/minor course	3
Total	**15**

Senior Year

Seventh Semester	
Psychology Content course (choose from approved list)	3
Elective/minor courses	12
Total	**15**
Eighth Semester	
Psychology Capstone course	3
Elective/minor courses	13
Total	**16**

* Students who do not test successfully into MATH-M118 must complete one or more lower-level math classes to develop the skills necessary to perform well in MATH-M118. Credits earned for these remedial math classes do not count as part of the required 120 credit hours to graduate.

** For students needing courses to establish first-year proficiency in a modern foreign language. Otherwise, other courses may be taken to fulfill area requirements or electives.

***Students should check with their Academic Advisor or the Psychology Peer Advising office for the approved list.

Bachelor of Science Sample Program (120 cr. required)

Freshman Year

First Semester	
SCI-I120 Windows on Science	1
PSY-B110 Introduction to Psychology	3
ENG-W131 Reading, Writing and Inquiry I	3
MATH-M119 Brief Survey of Calculus 1*	3
Life and Physical Science (choose from approved list)**	4
Total	**14**
Second Semester	
PSY-B203 Ethics and Diversity in Psychology	3
COMM-R110 Fundamentals of Speech Communication	3
Arts and Humanities (choose from list)	3
MATH-M118 Finite Mathematics*	3
Life and Physical Science (choose from approved list)	3
Total	**15**

Sophomore Year

Third Semester	
ENG-W231 Professional Writing Skills	3
PSY-B303 Career Planning Psychology Majors	1
PSY-B305 Statistics	3
Psychology Foundations course (choose from approved list)	3
CSCI-N207 Data Analysis Using Spreadsheets	3
Total	**13**
Fourth Semester	
PSY-B311 Research Methods in Psychology	3
PSY-B312 Research Methods Lab	3
Psychology Foundations course (choose from approved list)	3
Arts and Humanities/Social Sciences (choose from list)	3
Cultural Understanding (choose from list)	3
Total	**15**

Junior Year

Fifth Semester	
Psychology Foundations course (choose from approved list)	3
Psychology Content course (choose from approved list)	3
Psychology Content course (choose from approved list)	3
Life and Physical Science (choose from approved list)	3
Elective/minor course	3
Total	**15**
Sixth Semester	
Psychology Foundations course (choose from approved list)	3
Social Science (choose from list)	3
Life and Physical Sciences (choose from approved list)	3
Elective (RISE course)	3
Elective/minor course	3
Total	**15**

Senior Year

Seventh Semester	
Psychology Content course (choose from approved list)	3
Elective/minor courses	12
Total	**15**
Eighth Semester	
Psychology Capstone course	3
Elective/minor courses	15
Total	**18**

* Students who do not test successfully into MATH-M118/ MATH-M119 must complete one or more lower-level math courses to develop the skills necessary to perform well in MATH-M118/MATH-M119. Credits earned for the remedial math courses do not count as part of the required 120 credit hours to graduate.

** Students should check with their Academic Advisor or the Psychology Peer Advising Office for the approved list.

Minors

Minor in Health Psychology

The Department of Psychology offers an undergraduate minor program in health psychology that requires a minimum of 15 credit hours of selected course work. Interested students should obtain information from the Psychology Advising Office (psyadv@iupui.edu). Course requirements are as follows:

Required Courses (Fours courses: 12 credit hours)

- PSY-B365 Health Psychology
- PSY-B320 Behavioral Neuroscience*
- PSY-B370 Social Psychology
- PSY-B380 Abnormal Psychology

*The NSCI-B201/NSCI-B301 sequence will count in lieu of PSY-B320.

Elective Courses (One course; 3 credit hours)

Select one course from the following:

- PSY-B203 Ethics and Diversity in Psychology
- PSY-B310 Lifespan Development
- PSY-B386 Introduction to Counseling
- PSY-B394 Drugs and Behavior
- PSY-B396 Alcoholism and Drug Abuse
- SOC-R321 Women and Health
- SOC-R381 Social Factors in Health and Illness
- Other approved course (contact Psychology advisor)

PLEASE NOTE:

- No grade lower than C- is acceptable for any course in the minor.
- A minimum grade point average of 2.00 in minor courses is required.
- A minimum of 6 credit hours in the minor must be completed at IUPUI.
- Students pursuing a Psychology major cannot earn a minor in Health Psychology.
- Students pursuing a minor from the department must select either Health Psychology or Psychology. They cannot earn both minors.

Note: PSY-B110 or equivalent is a prerequisite for upper-level psychology courses.

Minor in Psychology

The Department of Psychology offers an undergraduate minor program in psychology that requires a minimum of 15 credit hours of selected course work. Interested students should obtain information from the Psychology Advising Office (psyadv@iupui.edu). Course requirements are as follows:

Psychology Foundation Courses (Two courses; 6 credit hours)

Select two courses from the following:

- PSY-B310 Life Span Development
- PSY-B320 Behavioral Neuroscience*
- PSY-B340 Cognition
- PSY-B370 Social Psychology

*The NSCI-B201/NSCI-B301 sequence will count in lieu of PSY-B320

NOTE: Additional foundation courses will count towards required content courses.

Psychology Minor Content Courses (Three courses; 9 credit hours)

Select three additional psychology courses from the following:

- PSY-B203 Ethics and Diversity in Psychology
- PSY-B307 Tests and Measurement
- PSY-B322 Introduction to Clinical Psychology
- PSY-B334 Perception
- PSY-B344 Learning
- PSY-B346 Theories of Personality
- PSY-B356 Motivation
- PSY-B358 Introduction to Industrial/Organizational Psychology
- PSY-B360 Child and Adolescent Psychology
- PSY-B365 Health Psychology
- PSY-B375 Psychology and Law
- PSY-B376 The Psychology of Women
- PSY-B380 Abnormal Psychology
- PSY-B385 Positive Psychology
- PSY-B386 Introduction to Counseling
- PSY-B394 Drugs and Behavior
- PSY-B396 Alcoholism and Drug Abuse
- PSY-B398 Brain Mechanisms of Behavior

PLEASE NOTE:

- No grade lower than C- is acceptable for any course in the minor.
- A minimum grade point average of 2.00 in minor courses is required.
- A minimum of 6 credit hours of the minor must be taken at IUPUI.
- Students pursuing a Psychology major cannot earn a minor in Psychology.
- Students pursuing a minor from the department must select either Psychology or Health Psychology. They cannot earn both minors.

Note: PSY-B110 or equivalent is a prerequisite for upper-level psychology courses.

Psi Chi: The International Honor Society in Psychology

To become a member of Psi Chi, an undergraduate psychology major must have earned at least 9 credit hours of psychology classes and possess an overall GPA of 3.00 and a GPA of 3.50 in psychology classes. Interested students should submit an application to the Psi Chi faculty advisor. There is a one-time, lifetime membership fee.

Graduate Programs

The department offers Purdue University Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degree programs and one Indiana University Ph.D. degree program. At the M.S. level, a program is offered in industrial/organizational psychology. At the Ph.D. level, programs are offered in addiction neuroscience, applied social and organizational psychology and clinical psychology.

M.S. Program

Industrial/Organizational Psychology

The Industrial/Organizational Psychology M.S. program is designed to prepare individuals for positions in industry or for entry into an industrial/ organizational doctoral program. Students are familiarized with the scientist-practitioner model, which emphasizes both research and the application of problem-solving skills to organizational problems. Students in the Program are taught analytic methods for diagnosing work-related problems, developing solutions, and evaluating the effectiveness of those solutions. The curriculum focuses on both the traditional personnel psychology areas of selection, training, compensation, and performance evaluation as well as topics of organizational psychology such as decision-making, motivation, leadership, and organizational effectiveness. The M.S. degree must be completed on a full-time basis and normally takes two years to finish.

A minimum of 30 credit hours is required including departmental core, area core, and elective courses.

Ph.D. Programs

Addiction Neuroscience

The Addiction Neuroscience Ph.D. program is designed to promote a comprehensive understanding of the neurobiological bases of behavior, with an emphasis on the behavioral and neurobiological aspects of drugs of abuse and addictive behaviors. General goals of the Program are to develop knowledge and expertise in the neurobiological mechanisms of behavior, develop skills in applying methods of behavioral neuroscience research to the problems of alcohol and drug abuse and addiction, and train competence in communication and teaching of knowledge and research skills. Students will obtain broad training in the combined disciplines of the neurosciences (e.g., behavioral and developmental neuroscience, psychopharmacology, and neurobiology) and the behavioral sciences (e.g., experimental psychology, cognitive psychology, learning, experimental design and analysis, and animal models of drug abuse and addiction). A minimum of 85 credit hours (post-baccalaureate) are required, plus approval of the plan of study by the student's advisory committee. The Program intends to train students seeking careers in teaching and/or research in academic environments, medical institutions, pharmaceutical firms, and governmental agencies.

Applied Social and Organizational Psychology

The Applied Social and Organizational Psychology (ASOP) Ph.D. program subscribes to the scientist-practitioner model and is designed to train researchers and practitioners to address societal and organizational issues using theories and methods from social and industrial/organizational (I/O) psychology. Graduates will be prepared for the unique challenges associated with today's increasingly global and diverse workplace through the infusion of diversity throughout our curriculum as well as an innovative concentration in Diversity Science. Diversity Science utilizes social science methods to examine the creation and maintenance of group differences as well as the consequences (e.g., psychological, organizational, and societal) of those differences. The ASOP curriculum integrates aspects of social and I/O psychology, including attitudes and social cognitive processes, staffing and development, and organizational issues at the micro, meso, and macro levels, with a heavy emphasis on quantitative methods and supervised research. As an Indiana University degree program, students must also complete a 12-14 credit hour minor (e.g., in Mixed Methods in Data Analytics for Social/Behavioral Sciences or a customized minor as approved by faculty committee). Graduates will be prepared for faculty positions in Social or I/O Psychology or related sub-disciplines of Psychology or Management.

In addition, they will be prepared for management, consulting, diversity specialist, or research positions in profit, not-for-profit, or governmental agencies. The program is full-time, requires a minimum of 91 credit hours, and is expected to take approximately five years to complete.

Clinical Psychology

The Clinical Psychology Ph.D. program is designed to integrate the assessment and intervention strategies of empirically-based clinical psychology with health/ rehabilitation psychology's emphasis on optimizing the adaption of people with chronic, disabling medical conditions. The Program addresses the psychological and social consequences of physical and mental conditions.

As scientists, we study behaviors, experiences, and attitudes of people with chronic physical and/or mental health conditions and their families, and evaluate the effectiveness of treatment interventions. The Program emphasizes the acquisition of the methods, theories, and knowledge of behavioral science along with the practitioner skills of clinical psychology. As practitioners, we assess individuals and their environment, plan and implement psychosocial interventions, and monitor their progress over time. The Program focuses on a wide variety of social, psychological, and practical problems, such as social functioning, emotional well-being, family relationships, activities of daily living, employment, and independent living. As a Program, we offer specialization training in three areas within clinical psychology: clinical health psychology, severe mental illness/psychiatric rehabilitation or substance use. Within these areas, there is a strong emphasis on research. The range of populations subsumed is broad and includes such populations as people with severe and persistent mental illness, cardiovascular disease, chronic pain, cancer, and substance use disorders.

The Program adheres to a clinical science model of training. As such, students seeking strong research training in conjunction with clinical training with an emphasis in clinical health psychology, severe mental illness/psychiatric rehabilitation, or substance use would be the best fits for this program.

Graduates of the Program will be qualified to assume positions as academicians, evaluators, researchers, trainers, planners, consultants, and direct clinical service providers. The Program emphasizes rigorous academic training, which is combined with practical application in a wide variety of clinical settings in Indianapolis and elsewhere. Full-time study and a minimum of 90 credit hours (post-baccalaureate) are required, and it is expected that it will take five to six years to complete the Program. The Program includes a diverse training in psychology, including a psychology core, statistics and measurement, clinical psychology, internships and practica, and an empirical thesis and doctoral dissertation. Clinical

specialty courses in Health Psychology, Substance Use, and Psychiatric Rehabilitation are offered. A course in ethics is also required.

Financial Support

Financial support for eligible graduate students at both the M.S. and Ph.D. levels is available through teaching and research assistantships, tuition stipends, and fellowships. Full assistantships require a minimum of 20 hours of work per week and include at least partial tuition remission in addition to salary.

Admission Requirements

Industrial/Organizational Psychology

Undergraduate training in psychology, mathematics, and the sciences is highly desirable though not required; we will consider applicants with bachelor's degrees in similar areas with coursework in social science statistics and research methods. To be competitive, applicants should have (a) an undergraduate (and graduate if applicable) grade point average of 3.00 or higher on a 4.00 scale, (b) three favorable letters of recommendation, ideally from faculty or others who can speak to the applicant's preparation for graduate level work in psychology, (c) a personal statement expressing an interest in industrial/organizational psychology, and (d) relevant research experience, preferably in psychology or a related social science.

Addiction Neuroscience

This Ph.D. Program is designed for individuals interested in academic or research careers studying addiction neuroscience. Successful applicants typically have (a) an undergraduate and graduate grade point average of 3.20 or higher on a 4.00 scale, (b) three favorable letters of recommendation, and (c) a personal statement expressing an interest in addiction neuroscience. Students with undergraduate degrees in psychology or the life sciences (e.g., biology, chemistry, neuroscience) are encouraged to apply, although other degrees along with appropriate course work will be given full consideration on application.

Applied Social and Organizational Psychology

A bachelor's degree in psychology is highly desirable, but we will consider applicants with bachelor's or graduate degrees in similar areas with coursework in social science statistics and research methods. To be competitive, applicants should have (a) an undergraduate (and graduate, if applicable) grade point average of 3.20 or higher on a 4.00 scale, (b) three favorable letters of recommendation, ideally from faculty or others who can speak to the applicant's preparation for graduate level work in psychology, (c) a personal statement expressing an interest in applied social and organizational psychology, and (d) relevant research experience, preferably in psychology or a related social science.

Clinical Psychology

Undergraduate training in psychology, mathematics, and the physical sciences is highly desirable, though not required.

Except in unusual circumstances, students admitted to the Program are expected to have completed at least 15 credit hours in psychology.

Although there are no specific undergraduate course prerequisites for Program entry, students without coursework in the following areas will likely be at a disadvantage when taking some of the required courses and may be asked by their instructors to complete some remedial activity prior to enrolling in the graduate course (e.g., reading an undergraduate text or taking an undergraduate course):

1. Test and Measurement
2. Statistics
3. Abnormal Psychology

The Ph.D. Program seeks talented and motivated people who have an interest in clinical health psychology, severe mental illness/psychiatric rehabilitation, or substance use and who have the potential to make creative contributions as clinical psychologists. Admission to the Ph.D. Program is competitive and only under unusual circumstances will students be considered for admission if they fail to meet the following minimum standards: (a) an undergraduate and graduate grade point average of 3.20 or higher on a 4.00 scale, (b) competitive GRE scores, (c) three favorable letters of recommendation, and (d) a personal statement expressing an interest in the field of clinical psychology. Prior research experience is recommended, but not required for admission. Scores on the Verbal and Quantitative sections at or above the 50th percentile are recommended to be competitive for admission. The Psychology GRE is recommended, but not required.

Admission Information

Students are admitted only for fall enrollment, and the deadline for receipt of application materials is specific to each graduate program:

- December 1 - Clinical (Ph.D.)
- December 1 - Addiction Neuroscience (Ph.D.)
- December 15 - Applied Social and Organizational Psychology (Ph.D.)
- February 1 - Industrial/Organizational Psychology (M.S.)

Students interested in information about admission to graduate programs in psychology should visit the Psychology Department webpage at https://science.iupui.edu/psychology/ for information on admission requirements and application instructions. Questions may be emailed to the graduate program coordinator at gradpsy@iupui.edu.

Transfer Credit

A maximum of 8 credit hours can be transferred into the M.S. program, and a maximum of 30 credit hours can be transferred into the Ph.D. program. Transfer hours will be accepted only if they are appropriate and judged acceptable by the student's plan-of-study committee. For full information regarding transfer of credit, please see the Policies and Procedures webpage at: https://bulletins.iu.edu/iu/gradschool/2021-2022/policies/credit.shtml.

Temporary Student Status

A student may enroll in some graduate courses without formal admission into a Psychology graduate program; however, the student must be admitted by the IUPUI Graduate Office into the Graduate Non-Degree Program. No more than 12 hours of credit may be applied to an

advanced degree program if an individual is later admitted as a regular graduate student. However, if an application to a regular degree program is approved during the session in which a person is enrolled for the 12th credit hour as a non-degree registrant, then all credits taken before and during that term will be eligible for inclusion in a plan of study for a degree program. For inclusion, the courses must be appropriate to the degree program and acceptable to the department and the graduate school. No course in which a grade of less than B (e.g., B-) has been received will be permitted in a plan of study if the course was taken while the student was enrolled as a non-degree registrant. Non-degree registrants may be required to secure consent from each of the departments in which they would like to register for courses

Research Facilities

The Department of Psychology has extensive laboratory and computer facilities to support faculty and student research. More than 8,000 square feet of laboratory space in the School of Science complex is devoted to psychological research in the areas of clinical psychology, industrial/organizational psychology, and social psychology life span development, and cognition. Separate animal quarters and modern laboratories are also available in the SELB Building to support research in neuroscience. Internship and practicum sites are available at the Indiana University Medical Center and with numerous other organizations in the Indianapolis metropolitan area.

Research Interests of Faculty

Major research interests of faculty include social psychology, industrial/organizational psychology, diversity psychology, measurement theory and development, program planning and evaluation, clinical psychology, health psychology, psychiatric rehabilitation, psychopathology, behavioral and psychopharmacology, developmental neuroscience, behavioral genetics, neurochemistry, animal cognition, and substance use/addiction. A more detailed listing of faculty research interests is available from the department.

Department of Physics

IUPUI
Science Building, LD 154
402 N. Blackford Street
Indianapolis, IN 46202-3273
Phone: (317) 274-6900; fax: (317) 274-2393
https://science.iupui.edu/physics/

Department Chair: Ricardo S. Decca, Ph.D.

Department Advisors:

- Graduate Programs: Horia Petrache, Ph.D.

Physics is the study of matter and energy, from the smallest scale, as in the study of elementary particles, to the largest, as in the study of the formation and evolution of stars and galaxies. In this sense, physics is the science that underlies all of the other sciences. In principle, as well as in practice, physics is involved in virtually all scientific and technical endeavors (e.g., biophysics, geophysics, health physics, etc.).

Physicists tend to view themselves primarily as solvers of problems, especially problems that can be expressed in mathematical terms. Physics students are trained to solve complex problems by learning to analyze complex relations in mathematical terms, often with the help of today's fast computers. Because of this broadly based and flexible problem-solving background, physics graduates find employment in a variety of fields, many of which are not directly associated with physics.

The Department of Physics offers a program leading to a Bachelor of Science degree from Purdue University. In addition, the department offers courses in physics and astronomy for nonmajors. The department also offers graduate courses that lead to a Purdue Master of Science degree. Qualified students may be authorized to pursue the Ph.D. degree in physics at IUPUI in areas where a program has been arranged with Purdue, West Lafayette.

Members of the department conduct research in several disciplines of physics and participate in joint projects with a number of other research groups, such as the Indianapolis Center for Advanced Research and the IU School of Medicine. Student participation in these projects is welcomed and encouraged.

Students majoring in physics consolidate their undergraduate studies by putting what they have learned to use in a capstone experience in one of the department's research laboratories. Each student joins a faculty member in a project that provides experience in a professional setting. The student must obtain the approval of a faculty member and register for PHYS 49000.

Guide to Service Courses

Each student should consult an advisor in the department in which a degree is sought to determine which service course is appropriate. A general guide to the schools served by these courses is as follows:

- AST-A100 / AST-A105: General science courses for students in all majors.
- AST-A130: Focused short courses for students in all majors.
- PHYS 14000: Focused short courses for students in all majors.
- PHYS 10000: For students in allied health, business, and liberal arts (a traditional survey course).
- PHYS 20000: For students in education, SPEA, and liberal arts (a nontraditional course).
- PHYS 21800 / PHYS 21900: A noncalculus sequence for technology students.
- PHYS-P201 / PHYS-P202: A noncalculus sequence for preprofessional students.
- PHYS 15200 / PHYS 25100 / PHYS 34200: For students in science and engineering requiring a calculus-based sequence.

- Undergraduate Degree Options
- Bachelor of Science
- Bachelor of Science-Biophysics Option
- Bachelor of Science Physics and Mathematical Sciences
- Bachelor of Science Physics and Electrical Engineering

- Bachelor of Science in Physics and Mechanical Engineering
- Plan of Study
- Graduate Program
- Minor

Physics-Undergraduate Degree Options

Degree Requirements

Minimum requirements for the School of Science are given in this bulletin (see the School of Science requirements under “Undergraduate Programs”).

First-Year Experience Course

Beginning freshmen and transfer students with fewer than 19 credit hours are required to take SCI-I120 Windows on Science (1 cr.) or an equivalent first-year experience course.

Area I English Composition and Communication Competency

ENG-W131 or W140 Reading Writing and Inquiry (3 cr.)

The second semester of English composition may be satisfied only with ENG-W270 (preferred), ENG-W230, ENG-W231, ENG-W250, ENG-W331, ENG-W350, or TCM 32000. (3 cr.)

Area II World Language Competency

Proficiency in a world language is not required for a Bachelor of Science degree from the School of Science, with the exception of Mathematical Science degrees.

Area IIIA Arts and Humanities, Social Sciences, and Cultural Understanding Competencies (12 cr.)

List H course: Choose one course (3 cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.

List S course: Choose one course (3 cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.

List C course: Choose one course (3 cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.

One additional course from either List H or List S

For the most current list of courses in the areas of Arts and Humanities, Social Sciences and Cultural Understanding, please refer to the IUPUI General Education Curriculum.

Area IIIC Life and Physical and Sciences Competency

Minimum requirements for the School of Science are given in this bulletin (see the School of Science requirements under “Undergraduate Programs”).

Courses must include CHEM-C105/CHEM-C125 and CHEM-C106/CHEM-C126 with laboratory or their approved equivalent. For Physics majors, course options in this area also include: ECE 20100, ECE 20200, ECE 20400, ECE 27000, ME 30100, ME 31000 and ME 34000.

Students must have grades of C- or higher in Life and Physical Sciences courses. A grade of D or D+ will be allowed for one course only.

Area IIID Analytical Reasoning Competency

Minimum requirements for the School of Science are given in this bulletin (see the School of Science requirements under “Undergraduate Programs”)

Twenty-four (24) credit hours of courses in mathematics are required, which must include MATH 16500, MATH 16600, MATH 17100, MATH 26100 and MATH 26600 and two (2) additional courses beyond MATH 26600.

Students must have grades of C- or higher in Analytical Reasoning courses. A grade of D or D+ will be allowed for one course only.

Area IV Physics Concentration

The Department of Physics offers four options for students pursuing the Bachelor of Science degree: a traditional physics program; a biophysics option; a program designed for students planning a career in physics teaching; an accelerated program with a B.S. in physics and a B.S. in electrical engineering; and an accelerated program known as the BPMME program because students earn both a bachelor’s in physics and a master’s in mechanical engineering.

Students pursuing the traditional program must complete PHYS 15200, PHYS 25100, PHYS 29900, PHYS 30000, PHYS 31000, PHYS 33000, PHYS 34200, PHYS 35300, PHYS 40000, PHYS 40100, PHYS 41800, PHYS 44200, and PHYS 49000. These students must complete 6 hours of mathematics above the level of MATH 26600 in courses approved by the Department of Physics.

Students pursuing the biophysics option must complete: Introductory course sequence PHYS-P201 or PHYS 15200, PHYS-P202 or PHYS 25100, PHYS 29900, PHYS 31000, PHYS 33000, PHYS 34200, PHYS 35300, PHYS 44200, PHYS 58500, and PHYS 49000 (Biophysics Capstone). In addition, a minimum of 13 credit hours of biology and 21 credit hours of chemistry is required. Please refer to the Biophysics Option section of the bulletin for detailed information. Note: For this option, students are NOT required to complete two (2) additional courses beyond MATH 26600.

Students pursuing the teaching option must complete: PHYS 15200, PHYS 25100, PHYS 30000, PHYS 31000, PHYS 33000, PHYS 34200, PHYS 35300, and PHYS 49000. The Department of Physics may substitute other science courses for the 400-level courses and recommend education courses in order to meet teacher certification requirements. These students must complete 6 hours of mathematics above the level of MATH 26600 in courses approved by the Department of Physics.

Students pursuing the program in physics and mathematical sciences must complete PHYS 15200, PHYS 25100, PHYS 29900, PHYS 31000, PHYS 3300, PHYS 34200, PHYS 35300, PHYS 40000, PHYS 40100, PHYS 41800 and PHYS 44200. Students must complete the MATH sequence up to MATH 26600 and MATH 35100, MATH 30000, MATH 41400, MATH 42600 and MATH 44400. Additionally, students must take twelve (12) additional credit hours: three credit hours selected from MATH 35300/35400/45300; three credit hours selected

from mathematics courses at the 300 level or above and statistics courses numbered 35000 or higher; three additional credit hours from mathematics or statistics or from physics courses numbered 300 level or above. Please refer to the dual degree Physics/Math section of the bulletin for detailed information.

Students pursuing the program in physics and mechanical engineering must complete: PHYS 15200, PHYS 25100, PHYS 30000, PHYS 31000, PHYS 33000, PHYS 34200, PHYS 35300, PHYS 40000, PHYS 40100, PHYS 41800 and PHYS 55000. These students must complete 3 hours of mathematics above the level of MATH 26600 in courses approved by the Department of Physics. Students in this program must satisfy additional requirements specified by the Department of Mechanical Engineering.

Students pursuing the program in physics and electrical engineering must complete the traditional physics program except PHYS 29900, PHYS 30000, PHYS 49000, a computer programming class, 2 life/physical science classes, and one MATH elective at the 26600-level or higher. The following electrical engineering classes must be completed: ENGR 29700, ECE 20100, ECE 20700, ECE 20200, ECE 26100 & 26300 (concurrently), ECE 20800 & 25500 (concurrently), ECE 27000, ECE 30100, ECE 36200, ECE 38200, ECE 21000, ECE 40100, ECE 44000, ECE 30200, ECE 48700, ECE 48800, and 15 hours of ECE electives in consultation with the electrical engineering advisor. Attendance may be required during summer sessions to avoid academic overload during the fall and spring semesters. Please keep in regular contact with the electrical engineering advisor for frequency and availability of electrical engineering classes. Please refer to the Physics and Electrical Engineering section of the bulletin for detailed information.

Students pursuing the program in physics with the embedded Electrical Engineering minor must complete the physics classes for the traditional program plus the following Electrical Engineering classes: ECE 30200, ECE 26300 concurrently with ECE26100, ECE 30100, ECE 36200, and an additional 4-credit-hour ECE elective (ECE 32100 or ECE 36500 or ECE 38200 or ECE 44000).

No more than 6 credit hours of studio, clinical, athletic, or performing arts courses will be approved. See the departmental advisor for details.

Bachelor of Science Physics

Degree Requirements

First-Year Experience Course

Beginning freshmen and transfer students with fewer than 19 credit hours are required to take SCI-I120 Windows on Science (1 cr.) or an equivalent first-year experience course.

Area I English Composition and Communication Competency

Written Communication (6 cr.)

ENG-W131 or W140 Reading Writing and Inquiry (3 cr.)

Minimum requirements for the School of Science are given in this bulletin (see the School of Science requirements under “Undergraduate Programs”). The second semester of English composition may be satisfied with ENG-W150, ENG-W230, ENG-W231, ENG-W270, TCM 22000, or TCM 32000 (or an approved second composition course) with a grade of C (2.0) or higher.

Speech Communication Competency

COMM-R110, Fundamentals of Speech Communication (3 cr.).

Area II World Language Competency

No world language proficiency is required for a Bachelor of Science degree from the School of Science with the exception of Mathematical Science majors.

Area IIIA Arts and Humanities, Social Sciences, and Cultural Understanding Competencies (12 cr.)

List H course: Choose one course (3 cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.

List S course: Choose one course (3cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.

One additional course from either list H or List S.

List C course: Choose one course (3 cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.

For the most current list of courses in the areas of Arts and Humanities, Social Sciences and Cultural Understanding, please refer to the IUPUI General Education Curriculum.

Area IIIC Life and Physical Sciences Competency

Chemistry Courses

Complete CHEM-C105/CHEM-C125 (5 credits) and CHEM-C106/CHEM-C126 (5 credits) with a grade of C- or better in each course.

Science Electives

Complete two additional approved courses in biology, chemistry, forensic science, geology or approved ECE or ME courses (6 credits).

Area IIID Analytical Reasoning Competency (27 credits)

Required Math courses

Complete MATH 16500, MATH 16600, MATH 17100, MATH 26100, and MATH 26600 with a grade of C- or higher in each course.

Math Electives

Complete an additional 6 credits of mathematics beyond MATH 26600. Please consult your advisor for approved courses.

Computer Science courses

The computer programming requirement (3 cr.) of the School of Science may be satistied with CSCI 23000 or CSCI-N317. Students with significant programming experience may request authorization to satisfy this requirement with other courses.

Students mus have grades of C- or higher in Analytical Reasoning courses. A grade of D or D+ will be allowed for one course only.

NOTE: Computer Science CSCI-N241 and CSCI-N299 do not count in Area IIID, but may count as a general elective.

Area IV Physics Major Requirements

Physics: A minimum of 38 credit hours of physics is required. No grade below C- is acceptable for courses within the major subject.

Introductory:

- PHYS 15200 Mechanics (4 cr.)
- PHYS 25100 Heat, Electricity & Optics (5 cr.)
- PHYS 29900 Introduction to Computational Physics (2 cr.)

Intermediate/Advanced:

- PHYS 30000 Introduction to Elementary Mathematical Physics (3 cr.)
- PHYS 31000 Intermediate Mechanics (4 cr.)
- PHYS 33000 Intermediate Electricity & Magnetism (3 cr.)
- PHYS 34200 Modern Physics (3 cr.)
- PHYS 35300 Advanced Physics Laboratory I: Modern Physics and Electronics (2 cr.)
- PHYS 40000 Physical Optics (3 cr.)
- PHYS 40100 Advanced Physics Laboratory II Modern Optics (2 cr.)
- PHYS 41600 (Honors Thermal & Statistical Physics - 4 cr.) or PHYS 41800 (Thermal & Statiscal Physics - 3 cr.)
- PHYS 44200 Quantum Mechanics (3 cr.)
- PHYS 49000 Capstone Experience (3 cr.)

A minimum of 120 credits is required for graduation. this total must include at least 32 credits in courses at the 300-400 level taken at the IUPUI campus. residence of at least two semesters on the IUPUI campus is also required for graduation.

No more than 6 credit hours of clinical, athletic, or performing arts courses will be approved. see the advisor for your field for details.

Biophysics Option

First-Year Experience Course

Beginning freshmen and transfer students with fewer than 19 credit hours are required to take SCI-I120 Windows on Science (1 cr.) or an equivalent first-year experience course.

Area I English Composition and Communication Competency

Written Communication (6 cr.)

ENG-W131 or W140 Reading Writing and Inquiry (3 cr.)

The second semester of English composition may be satisfied with ENG-W230, ENG-W231, ENG-W250, ENG-W270, ENG-W331 or TCM 32000.

Speech Communication Competency

COMM-R110, Fundamentals of Speech Communication (3 cr.).

Area II World Language Competency

No world language proficiency is required for a Bachelor of Science degree from the School of Science, with the exceptino of Mathematical Science majors.

Area IIIA Arts and Humanities, Social Sciences, and Cultural Understanding Competencies (12 cr.)

List H course: Choose one course (3 cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.

List S course: **For the Biophysics Concentration students must complete SOC-R100 (Introduction to Sociology) and PSY-B110 (Introduction to Psychology)**. These courses will fulfill both the List S requirement and the requirement for an additional course from either List H or List S listed below.

List C course: Choose one course (3 cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.

For the most current list of courses in the areas of Arts and Humanities, Social Sciences and Cultural Understanding, please refer to the IUPUI General Education Curriculum.

Area IIIC Life and Physical and Sciences Competency

See requirements listed below under Area IV Physics (Biophysics) Concentration Requirements.

Students must have grades of C- or higher in Life and Physical Sciences courses. A grade of D or D+ will be allowed for one course only.

Area IIID Analytical Reasoning Competency (21 credits)

Eighteen (18) credit hours of courses in mathematics are required, which must include MATH 16500, MATH 16600, MATH 17100, MATH 26100, and MATH 26600.

The computer programming requirement (3 cr.) of the School of Science may be satisfied with CSCI 23000, CSCI-N305, CSCI-N331, or any higher-level CSCI course.

Students must have grades of C- or higher in Analytical Reasoning courses. A grade of D or D+ will be allowed for one course only.

Note: Computer Science CSCI-N241 and CSCI-N299 do not count in Area IIID, but may count as a general elective.

Area IV Physics (Biophysics) Concentration Requirements

Chemistry: A minimum of 21 credit hours is required.

Introductory:

- CHEM-C105 Principles of Chemistry I (3 cr.)
- CHEM-C125 Experimental Chemistry I (2 cr.)
- CHEM-C106 Principles of Chemistry II (3 cr.)
- CHEM-C126 Experimental Chemistry II (2 cr.)

Intermediate:

- CHEM-C341 Organic Chemistry I (3 cr.)
- CHEM-C343 Organic Chemistry I Laboratory (2 cr.)

- CHEM-C342 Organic Chemistry II (3 cr.)
- CHEM-C360 Elementary Physical Chemistry (3 cr.) - OR - CHEM-C361 Physical Chemistry of Bulk Matter (3 cr.)

CHEM-C344 Organic Chemistry II (3 cr.) is not required but is recommended

Biology: A minimum of 13 credit hours of biology is required.

Introductory:

- BIOL-K101 Concepts of Biology I (5 cr.)
- BIOL-K103 Concepts of Biology II (5 cr.)

Advanced:

- BIOL-K483 Biological Chemistry (3 cr.)

Physics: A minimum of 32 credit hours of physics is required.

Introductory:

- PHYS-P201 General Physics I (5 cr.) and PHYS-P202 General Physics II (5 cr.) -OR-
- PHYS 15200 Mechanics (4 cr.) and PHYS 25100 Heat, Electricity & Optics (5 cr.)
- PHYS 29900 Introduction to Computational Physics (2 cr.)

Intermediate/Advanced:

- PHYS 31000 Intermediate Mechanics (4 cr.)
- PHYS 33000 Intermediate Electricity & Magnetism (3 cr.)
- PHYS 34200 Modern Physics (3 cr.)
- PHYS 35300 Electronics Laboratory (2 cr.)
- PHYS 44200 Quantum Mechanics (3 cr.)
- PHYS 58500 Introduction to Molecular Biophysics (3 cr.)
- PHYS 49000 Capstone Experience (3 cr.)

A minimum of 120 credits is required for graduation. This total must include at least 32 credits in courses at the 300-400 level taken at the IUPUI campus. Residence of at least two semesters on the IUPUI campus is also required for graduation.

No more than 6 credit hours of clinical, athletic, or performing arts courses will be approved. See the departmental advisor for details.

Physics-Math Double Major

This option is for students intending to double major in physics and mathematics.

Degree Requirements

First-Year Experience Course

Beginning freshmen and transfer students with fewer than 19 credit hours are required to take SCI-I120 Windows on Science (1 cr.) or an equivalent first-year experience course.

Area I English Composition and Communication Competency

Minimum requirements for the School of Science are given in this bulletin (see the School of Science requirements under “Undergraduate Programs”). The second semester of English composition may be satisfied only with ENG-W270 (preferred), ENG-W230, ENG-W231, ENG-W250, ENG-W331, ENG-W350, or TCM 32000.

Area II World Language Competency

See School of Science requirements under "Undergraduate Programs". Students must have first-year proficiency in a world language (first year sequence (131 & 132) or a 200-level world language course or 200-level world language proficiency.

Area IIIA Arts and Humanities, Social Sciences, and Cultural Understanding Competencies (12 cr.)

List H course: Choose one course (3 cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.

List S course: Choose one course (3 cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.

List C course: Choose one course (3 cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.

One additional course from either List H or List S

For the most current list of courses in the areas of Arts and Humanities, Social Sciences and Cultural Understanding, please refer to the IUPUI General Education Curriculum.

Area IIIC Life and Physical and Sciences Competency

Courses taken to satisfy the Area IIIC requirements must include PHYS 15200, PHYS 25100, CHEM-C105, and CHEM-C106.

Area IIID Analytical Reasoning Competency (21 credits)

Courses taken to satisfy the Area IIID requirements must include MATH 16500, MATH 16600, MATH 17100, MATH 26100, and MATH 26600.

The computer programming requirement (3 cr.) of the School of Science will be satisfied with CSCI 23000.

Note: Computer Science CSCI-N241 and CSCI-N299 do not count in Area IIID, but may count as a general elective.

The Area IV major requirements are as follows:

1. Additional physics requirements: PHYS 29900, PHYS 31000, PHYS 33000, PHYS 34200, PHYS 35300, PHYS 40000, PHYS 40100, PHYS 41800.
2. The calculus sequence: MATH 16500, MATH 16600, MATH 17100, MATH 26100, MATH 26600, and MATH 35100.
3. Additional math requirements: MATH 30000, MATH 41400, MATH 42600, MATH 44400.
4. Twelve (12) additional credit hours: three credit hours selected from MATH 35300/35400/45300; three credit hours selected from mathematics courses at the 300 level or above and statistics courses numbered 35000 or higher; three additional credit hours from mathematics or statistics, or from physics courses numbered three hundred or above; and PHYS 44200

5. Students planning on attending graduate school in mathematics or physics are advised to take MATH 44500, MATH 45300, and PHYS 44200.
6. Laboratory courses CHEM-C125 and CHEM-C126.
7. Minimum of two credit hours of PHYS 49000 Capstone Experience.

Bachelor of Science Physics and Electrical Engineering

Degree Requirements

First-Year Experience Course

Beginning freshmen and transfer students with fewer than 19 credit hours are required to take SCI-I120 Windows on Science (1 cr.) or an equivalent first-year experience course.

Area I English Composition and Communication Competency

Written Communication (6 cr.)

ENG-W131 or W140 Reading Writing and Inquiry (3 cr.)

Students must complete TCM 32000 with a grade of C (2.0) or higher to satisfy the second semester of English composition.

Speech Communication Competency

COMM-R110, Fundamentals of Speech Communication (3 cr.).

Area II World Language Competency

No world language proficiency is required for a Bachelor of Science degree from the School of Science, with the exceptino of Mathematical Science majors.

Area IIIA Arts and Humanities, Social Sciences, and Cultural Understanding Competencies (12 cr.)

List H course: Choose one course (3 cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.

List S course: Choose one course (3cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.

One additional course from either list H or List S.

List C course: Choose one course (3 cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.

For the most current list of courses in the areas of Arts and Humanities, Social Sciences and Cultural Understanding, please refer to the IUPUI General Education Curriculum.

Area IIIC Life and Physical Sciences Competency

Chemistry Courses

Complete CHEM-C105/CHEM-C125 (5 credits) and CHEM-C106/CHEM-C126 (5 credits) with a grade of C- or better in each course.

ECE Science Electives

Students must complete:

- ECE 20100 Linear Circuit Analysis I (3 cr.)
- ECE 20200 Linear Circuit Analysis II (3 cr.)
- ECE 20700 Electronic Measurement Techniques (1 cr.)
- ECE 20800 Electronic Devices and Design Laboratory (1 cr.)

Area IIID Analytical Reasoning Competency (28 credits)

Required Math courses

Complete MATH 16500, MATH 16600, MATH 17100, MATH 26100, and MATH 26600 with a grade of C- or higher in each course.

Additional Courses

Complete ECE 30200 Probabilistic Methodology in Electronic Engineering (3 cr.)

Complete MATH 35100 Elementary Linear Algebra (3 cr.) or MATH 51100 Linear Algebra with Applications (3 cr.)

Computer Science courses

Complete ECE 26300 Introduction to Computing in Electrical Engineering (3 cr.) and ECE 26100 Engineering Programming Laboratory (1 cr.). These courses must be taken together (concurrently).

Students mus have grades of C- or higher in Analytical Reasoning courses. A grade of D or D+ will be allowed for one course only.

NOTE: Computer Science CSCI-N241 and CSCI-N299 do not count in Area IIID, but may count as a general elective.

Area IV Physics Major Requirements

No grade below C- is acceptable for courses within the major subject.

Introductory:

- PHYS 15200 Mechanics (4 cr.)
- PHYS 25100 Heat, Electricity & Optics (5 cr.)
- PHYS 29900 Introduction to Computational Physics (2 cr.)

Intermediate/Advanced:

- PHYS 31000 Intermediate Mechanics (4 cr.)
- PHYS 33000 Intermediate Electricity & Magnetism (3 cr.)
- PHYS 34200 Modern Physics (3 cr.)
- PHYS 35300 Advanced Physics Laboratory I: Modern Physics and Electronics (2 cr.)
- PHYS 40000 Physical Optics (3 cr.)
- PHYS 40100 Advanced Physics Laboratory II Modern Optics (2 cr.)
- PHYS 41600 (Honors Thermal & Statistical Physics - 4 cr.) or PHYS 41800 (Thermal & Statistical Physics - 3 cr.)
- PHYS 44200 Quantum Mechanics (3 cr.)

Area IV Electrical Engineering Major Requirements

No grade below C- is acceptable for courses within the major subject.

- ECE 21000 Sophomore Seminar (1 cr.)
- ENGR 29700 Computer Tools for Engineering (1 cr.)
- ECE 25500 Introduction to Electronic Analysis and Design (3 cr.)

- ECE 27000 Introduction to Digital System Design (4 cr.)
- ECE 30100 Signals and Systems (3 cr.)
- ECE 36200 Microprocessor Systems and Interfacing (4 cr.)
- ECE 38200 Feedback System Analysis and Design (3 cr.)

Capstone Requirement

The Capstone Requirement is satisfied with ECE 48700 Senior Design I (1 cr.) and ECE 48800 Senior Design II (2 cr.).

A minimum of 120 credits is required for graduation. this total must include at least 32 credits in courses at the 300-400 level taken at the IUPUI campus. residence of at least two semesters on the IUPUI campus is also required for graduation.

No more than 6 credit hours of clinical, athletic, or performing arts courses will be approved. see the advisor for your field for details.

Bachelor of Science Physics and Master of Science Mechanical Engineering

Degree Requirements

First-Year Experience Course

Beginning freshmen and transfer students with fewer than 19 credit hours are required to take SCI-I120 Windows on Science (1 cr.) or an equivalent first-year experience course.

Area I English Composition and Communication Competency

Written Communication (6 cr.)

ENG-W131 or ENG-W140 Reading Writing and Inquiry (3 cr.)

Students must complete TCM 32000 with a grade of C (2.0) or higher to satisfy the second semester of English composition

Speech Communication Competency

COMM-R110, Fundamentals of Speech Communication (3 cr.).

Area II World Language Competency

No world language proficiency is required for a Bachelor of Science degree from the School of Science, with the exception of Mathematical Science majors.

Area IIIA Arts and Humanities, Social Sciences, and Cultural Understanding Competencies (12 cr.)

List H course: Choose one course (3 cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.

List S course: Choose one course (3cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.

One additional course from either list H or List S.

List C course: Choose one course (3 cr.) from this list. The list of course choices is located under the School of Science requirements “Undergraduate Programs” in this bulletin.

For the most current list of courses in the areas of Arts and Humanities, Social Sciences and Cultural Understanding, please refer to the IUPUI General Education Curriculum.

Area IIIC Life and Physical Sciences Competency

Chemistry Courses

Complete CHEM-C105/CHEM-C125 (5 credits) and CHEM-C106/CHEM-C126 (5 credits) with a grade of C- or better in each course.

Two additional lecture courses in this area chosen from biology, chemistry, forensic science, and geology. Not all courses offered through these department satisfy this requirement. Check with your academic advisor to confirm before you enroll in a science elective.

For physics majors, course options in this area also include: ECE 20100, ECE 20200, ECE 20400, ECE 27000, ME 30100, ME 31400, and ME 34000.

Students must have grades of C- or higher in the Life and Physical Sciences courses. A single grade of D or D+ will be allowed in one course only in this area.

Area IIID Analytical Reasoning Competency (28 credits)

Required Math courses

Complete MATH 16500, MATH 16600, MATH 17100, MATH 26100, and MATH 26600 with a grade of C- or higher in each course.

Additional Courses

Complete MATH 53700 Applied Mathematics for Scientists and Engineers I (3 cr.) or approved alternative course.

Complete MATH 53800 Applied Mathematics for Scientists and Engineers II (3 cr.) or approved alternative course.

Computer Science courses

The computer programming requirement of the School of Science may be satisfied with CSCI 23000, CSCI-N305, CSCI-N317, CSCI-N331, CSCI-N341, or any higher-level CSCI course.

Students must have grades of C- or higher in Analytical Reasoning courses. A grade of D or D+ will be allowed for one course only.

NOTE: Computer Science CSCI-N241 and CSCI-N299 do not count in Area IIID, but may count as a general elective.

Area IV Physics Major Requirements

No grade below C- is acceptable for courses within the major subject.

Introductory:

- PHYS 15200 Mechanics (4 cr.)
- PHYS 25100 Heat, Electricity & Optics (5 cr.)
- PHYS 29900 Introduction to Computational Physics (2 cr.)

Intermediate/Advanced:

- PHYS 31000 Intermediate Mechanics (4 cr.)
- PHYS 33000 Intermediate Electricity & Magnetism (3 cr.)
- PHYS 34200 Modern Physics (3 cr.)
- PHYS 35300 Advanced Physics Laboratory I: Modern Physics and Electronics (2 cr.)
- PHYS 40000 Physical Optics (3 cr.)
- PHYS 40100 Advanced Physics Laboratory II Modern Optics (2 cr.)
- PHYS 41800 Thermal & Statistical Physics (3 cr.)
- PHYS 55000 Introduction to Quantum Mechanics (3 cr.)

Area IV Mechanical Engineering Major Requirements

No grade below C- is acceptable for courses within the major subject.

- ME 27200 Mechanics of Materials (4 cr.)
- ME 33000 Modeling and Analysis of Dynamic Systems (3 cr.)
- ME 46200 Engineering Design (4 cr.)
- ME 5##### ME Primary Area Electives (9 cr.)
- Additional ME 5## Primary Area Electives (9 cr.) for non-thesis option or ME 69800 Thesis (9 cr.)

Capstone Requirement

The Capstone Requirement is satisfied with ME 46200 Engineering Design (4 cr.)
Students should take PHYS 55000 and one other PHYS or MATH course, e.g. PHYS 51000 Physical Mechanics or PHYS 60000 Methods of Theoretical Physics, during the last two years. Note that PHYS 60000 is routinely used as a substitute for the MATH requirement in the Physics graduate program, and hence could be taken in lieu of MATH 53800. Alternatively, PHYS 51000 or PHYS 60000 could be taken as the science elective in the tenth semester.

A minimum of 120 credits is required for graduation for the bachelor of science degree; 30 credit hours are required for graduation for the master of science degree. Residence of at least two semesters on the IUPUI campus is also required for graduation.

No more than 6 credit hours of clinical, athletic, or performing arts courses will be approved. See the advisor for your field for details.

Plans of Study

Bachelor of Science Sample Program (120 cr. required)

The Department of Physics recommends the following sample program leading to the degree of Bachelor of Science.

Freshman Year

First Semester	
CHEM-C105 Principles of Chemistry I	3
CHEM-C125 Experimental Chemistry I	2
MATH 16500 Analytic Geometry and Calculus I	4
MATH 17100 Multidimensional Mathematics	3
ENG-W131 Reading, Writing and Inquiry	3
SCI-I120 Windows on Science	1
Total	**16**
Second Semester	
PHYS 15200 Mechanics	4
CHEM-C106 Principles of Chemistry II	3
CHEM-C126 Experimental Chemistry II	2
MATH 16600 Analytic Geometry and Calculus II	4
COMM-R110 Fundamentals of Speech Communication	3
Total	**16**

Sophomore Year

Third Semester	
PHYS 25100 Heat Electricity and Optics	5
PHYS 29900 Intro to Computational Physics	2
MATH 26100 Multivariate Calculus	4
CSCI 23000 or CSCI-N317	3-4
Arts & Humanities (choose from list)	3
Total	**17-18**
Fourth Semester	
PHYS 30000 Intro. to Elem. Math Physics	3
PHYS 34200 Modern Physics	3
MATH 26600 Ordinary Differential Equations	3
2nd Written Communication Course	3
Social Sciences (choose from list)	3
Total	**15**

Junior Year

Fifth Semester	
PHYS 31000 Intermediate Mechanics	4
MATH Course (MATH 35100 or MATH 511)*	3
Arts & Humanities/Social Sciences (choose from list)	3
Cultural Understanding (choose from list)	3
Elective	3
Total	**16**

Sixth Semester	
PHYS 33000 Intermediate Electricity and Magnetism	3
PHYS 35300 Electronics Laboratory	2
MATH Course Above 26600 (MATH 35100 or MATH 51100)*	3
Life and Physical Science (approved elective)	3
Elective	3
Total	**14**

Senior Year

Seventh Semester	
PHYS 40000 Physical Optics	3
PHYS 40100 Physical Optics Laboratory	2
PHYS 44200 Quantum Mechanics	3
Life and Physical Science (approved elective)	3
Elective	3
Total	**14**
Eighth Semester	
PHYS 41800 Thermal & Statistical Physics	3
PHYS 49000 Capstone Experience	3
Electives	7
Total	**13**

*MATH 35100 (Elem. Linear Algebra) or MATH 51100 (Linear Algebra with Applications) are strongly encouraged

Biophysics Option Sample Program (minimum 120 cr. required)

Freshman Year

First Semester	
CHEM-C105 Principles of Chemistry I	3
CHEM-C125 Experimental Chemistry I	2
MATH 16500 Analytic Geometry and Calculus I	4
ENG-W131 Reading, Writing and Inquiry	3
COMM-R110 Fundamentals of Speech Communication	3
SCI-I120 Windows on Science	1
Total	**16**
Second Semester	
PHYS-P201 General Physics I or PHYS 15200 Mechanics	4-5
CHEM-C106 Principles of Chemistry II	3
CHEM-C126 Experimental Chemistry II	2
MATH 16600 Analytic Geometry and Calculus II	4
MATH 17100 Multidimensional Mathematics	3
Total	**16-17**

Sophomore Year

Third Semester	
PHYS-P202 General Physics II or PHYS 25100 Heat, Elec. & Optics	5
CHEM-C341 Organic Chemistry I	3
CHEM-C343 Organic Chemistry Laboratory I	2
MATH 26100 Multivariate Calculus	4
PHYS 29900 Intro to Computational Physics	2
Total	**16**
Fourth Semester	
BIOL-K101 Concepts of Biology I	5
CHEM-C342 Organic Chemistry II (Recommended Only)	3
PHYS 34200 Modern Physics	3
PHYS 35300 Electronics Laboratory	2
MATH 26600 Ordinary Differential Equations	3
Total	**16**

Junior Year

Fifth Semester	
BIOL-K103 Concepts of Biology II	5
PHYS 31000 Intermediate Mechanics	4
Cultural Understanding (choose from list)	3
PSY-B110 Introduction to Psychology	3
Total	**15**
Sixth Semester	
BIOL-K483 Biological Chemistry	3
PHYS 33000 Interm. Electricity & Magnetism	3
CHEM-C360 Intro. Physical Chemistry or CHEM-	3

C361 Physical Chem Bulk Matter	
SOC-R100 Introduction to Sociology	3
ENG-W270 Argumentative Writing	3
Total	**15**

Senior Year

Seventh Semester	
PHYS 44200 Quantum Mechanics	3
PHYS 49000 Capstone Experience	3
PHYS 58500 Intro. to Molecular Biophysics	3
Elective	3
Total	**12**
Eighth Semester	
Computer Programming (approved elective)	3
Arts and Humanities (choose from list)	3
Electives	9
Total	**15**

Physics-Math Double Major (minimum 123 cr. required)

Freshman Year

First Semester	
CHEM-C105 Principles of Chemistry I Lecture	3
CHEM-C125 Principles of Chemistry I Laboratory	2
MATH 16500 Analytic Geometry and Calculus I	4
MATH 17100 Multidimensioal Mathematics	3
ENG-W131 Reading, Writing and Inquiry	3
SCI-I120 Windows on Science	1
Total	**16**
Second Semester	
PHYS 15200 Mechanics	4
CHEM-C106 Principles of Chemistry II	3
CHEM-C126 Experimental Chemistry II	2
MATH 16600 Analytic Geometry and Calculus II	4
COMM-R110 Fundamentals of Speech Communication	3
Total	**16**

Sophomore Year

Third Semester	
PHYS 25100 Heat, Elec. & Optics	5
MATH 26100 Multivariate Calculus	4
MATH 30000 Logic & Foundations of Algebra	3
PHYS 29900 Intro to Computational Physics	2
2nd Written Communication Course	3
Total	**17**
Fourth Semester	
MATH 26600 Ordinary Differential Equations	3
MATH 35100/51100 Elementary Linear Algebra	3
PHYS 34200 Modern Physics	3
CSCI 23000 Computing I	4
Social Science (choose from list)	3
Total	**16**

Junior Year

Fifth Semester	
PHYS 31000 Intermediate Mechanics	4
MATH 44400 Foundations of Analysis I	3
MATH 45300 or MATH STAT Elective	3
Arts & Humanities (choose from list)	3
World Language	4
Total	**17**
Sixth Semester	
PHYS 33000 Interm. Electricity & Magnetism	3
PHYS 35300 Adv. Physics Laboratory I	2
MATH 35300/35400 or MATH/STAT Elective	3
MATH 42600 Intro. to Applied Math/Modeling	3
World Language	4
Total	**15**

Senior Year

Seventh Semester

PHYS 44200 Quantum Mechanics	3
PHYS 40000 Physical Optics	3
PHYS 40100 Physical Optics Laboratory	2
MATH 41400 Numerical Methods	3
Arts & Humanities or Social Science (choose from list)	3
Total	**14**
Eighth Semester	
PHYS 49000 Capstone	3
PHYS 41800 Thermal & Statistical Physics	3
MATH/STAT/PHYS Elective	3
General Elective	3
Total	**12**

Bachelor of Science in Physics and Electrical Engineering Sample Program (136 cr. required)

The Department of Physics recommends the following sample program for students pursuing the program.

Freshman Year

First Semester	
ENGR 19500 Intro. to the Engineering Profession	1
CHEM-C105 Principles of Chemistry I	3
CHEM-C125 Experimental Chemistry I	2
MATH 16500 Analytic Geometry and Calculus I	4
ENG-W131 Reading, Writing & Inquiry or ENG-W140 Elem Composition Honors	3
Arts and Humanities (choose from list)	3
Total	**16**
Second Semester	
PHYS 15200 Mechanics	4
CHEM-C106 Principles of Chemistry II	3
CHEM-C126 Experimental Chemistry II	2
MATH 16600 Analytic Geometry and Calculus II	4
MATH 17100 Multidimensional Mathematics	3
Total	**16**

Summer Year 1

Summer Year 1	
COMM-R110 Fundamentals of Speech Communication	3
Total	**3**

Sophomore Year

Third Semester	
PHYS 25100 Heat Electricity and Optics	5
MATH 26100 Multivariate Calculus	4
ECE 20100 Linear Circuit Analysis I	3
ECE 207 Electronic Measurement Techniques	1
ECE 26300 C Programming and ECE 26100 Engineering Programming Lab	4
Total	**17**
Fourth Semester	
PHYS 34200 Modern Physics	3
ECE 21000 Sophomore Seminar	1
MATH 26600 Ordinary Differential Equations	3
ECE 25500 Intro. to Electronics Analysis & Desing and ECE 20800 Electronic Design and Devices lab	4
ECE 27000 Digital Logic with lab	4
ENGR 29700 Computer Tools for Engineering	1
Total	**16**

Summer Year 2

Summer Year 2	
Arts & Humanities or Social Sciences (choose from list)	3
Arts & Humanities or Social Sciences (choose from list)	3
Total	**6**

Junior Year

Fifth Semester

PHYS 31000 Intermediate Mechanics	4
MATH 35100 Elementary Linear Algebra or MATH 51100 Linear Algebra with Applications	3
ECE 20200 Linear Circuit Analysis II	3
ECE 36200 Microprocessor Systems and Interfacing	4

TCM 32000 Written Comm. in Science & Industry	3
Total	**17**
Sixth Semester	
PHYS 33000 Intermediate Electricity and Magnetism	3
PHYS 35300 Electronics Laboratory	2
ECE 30200 Probabilistic Methods in Electrical Engineering	3
ECE 30100 Signals & Systems	3
ECE 32700 Engineering Economics or ECON-E201 Intro. Microeconomics	3
Cultural Understanding (choose from list)	3
Total	**17**

Senior Year

Seventh Semester	
PHYS 40000 Physical Optics	3
PHYS 40100 Physical Optics Laboratory	2
PHYS 44200 Quantum Mechanics	3
ECE 44000 Introduction to Comm. Systems Analysis	4
ECE 48700 Senior Design I	1
ECE Elective	3
Total	**16**
Eighth Semester	
PHYS 41800 Thermal and Statistical Physics	3
ECE 40100 Engineering Ethics and Professionalism	1
ECE 38200 Feedback Sys Analysis & Design	3
ECE 48800 Senior Design II	2
EE Electives	6
Total	**15**

Bachelor of Science with Embedded Electrical Engineering Minor Sample Program (120 cr. required)

The Department of Physics recommends the following sample program leading to the degree of Bachelor of Science with an embedded minor in Electrical Engineering.

Freshman Year

First Semester	
SCI-I120 Windows on Science	1
CHEM-C105 Principles of Chemistry I	3
CHEM-C125 Experimental Chemistry I	2
MATH 16500 Analytic Geometry and Calculus I	4
MATH 17100 Multidimensional Mathematics	3
ENG-W131 or W140 Reading, Writing & Inquiry	3
Total	**16**
Second Semester	
PHYS 15200 Mechanics	4
CHEM-C106 Principles of Chemistry II	3
CHEM-C126 Experimental Chemistry II	2
MATH 16600 Analytic Geometry and Calculus II	4
COMM-R110 Fundamentals of Speech Communication	3
Total	**16**

Sophomore Year

Third Semester	
PHYS 25100 Heat Electricity and Optics	5
PHYS 29900 Intro to Computational Physics	2
MATH 26100 Multivariate Calculus	4
ECE 26300 C Programming (3) and ECE 26100 Engineering Programming Lab (1)	4
Arts & Humanities (choose from list)	3
Total	**18**
Fourth Semester	
PHYS 30000 Intro. to Elem. Math Physics	3
PHYS 34200 Modern Physics	3
MATH 26600 Ordinary Differential Equations	3
2nd Written Communication Course	3
Social Sciences (choose from list)	3
Total	**15**

Junior Year
Fifth Semester

PHYS 31000 Intermediate Mechanics	4

MATH 35100 Elementary Linear Algebra or MATH 51100 Linear Algebra with Applications*	3
ECE 20400 Intro Electl & Electron Circuits	4
Arts & Humanities or Social Sciences (choose from list)	3
Total	**14**
Sixth Semester	
PHYS 33000 Intermediate Electricity and Magnetism	3
PHYS 35300 Electronics Laboratory	2
ECE 30200 Probabilistic Methods in Electrical Engineering	3
ECE 30100 Signals & Systems	3
Cultural Understanding (choose from list)	3
Total	**14**

Senior Year

Seventh Semester	
PHYS 40000 Physical Optics	3
PHYS 40100 Physical Optics Laboratory	2
PHYS 44200 Quantum Mechanics	3
ECE 36200 Microproc Sys & Interfacing	4
Total	**12**
Eighth Semester	
PHYS 41800 Thermal and Statistical Physics	3
PHYS 49000 Capstone Experience	3
ECE Elective**	4
Elective	4
Total	**14**

*MATH 35100 ((Elem. Linear Algebra) or MATH 51100 (Linear Algebra with Applications) are strongly encouraged

**ECE 32100 or ECE 36500 or ECE 38200 or ECE 44000

Bachelor of Science and Master of Science (BPMME)Sample Program (131 cr. required)

The Department of Physics recommends the following sample program for students pursuing the BPMME program

Freshman Year

First Semester	
CHEM-C105 Principles of Chemistry I	3
CHEM-C125 Experimental Chemistry I	2
MATH 16500 Analytic Geometry and Calculus I	4
MATH 17100 Multidimensional Mathematics	3
ENG-W131 Reading, Writing and Inquiry	3
SCI-I120 Windows on Science	1
Total	**16**
Second Semester	
PHYS 15200 Mechanics	4
CHEM-C106 Principles of Chemistry II	3
CHEM-C126 Experimental Chemistry II	2
MATH 16600 Analytic Geometry and Calculus II	4
COMM-R110 Fundamentals of Speech Communication	3
Total	**16**

Sophomore Year

Third Semester	
PHYS 25100 Heat Electricity and Optics	5
MATH 26100 Multivariate Calculus	4
CSCI 23000 or CSCI-N317	3-4
Arts and Humanities (choose from list)	3
Total	**15-16**
Fourth Semester	
PHYS 33000 Intermediate Electricity and Magnetism	3
PHYS 34200 Modern Physics	3
PHYS 35300 Electronics Laboratory	2
MATH 26600 Ordinary Differential Equations	3
Social Sciences (choose from list)	3
Total	**14**

Junior Year

Fifth Semester	
PHYS 31000 Intermediate Mechanics	4
ME 27200 Mechanics of Materials	3

ME 33000 Modeling and Analysis of Dynamic Systems	3
Life and Physical Sciences (approved elective) ME Course Strongly Encouraged	3
2nd Written Communication	3
Total	**16**
Sixth Semester	
PHYS 41800 Thermal and Statistical Physics	3
ME 46200 Engineering Design	3
MATH Course (MATH 35100 or MATH 51100)*	3
Life and Physical Sciences (approved elective) ME Course Strongly Encouraged	3
Arts and Humanities/Social Sciences (choose from list)	3
Total	**15**

Senior Year

Seventh Semester	
ME 500-level ME primary area course	3
Elective: 400 or 500 level Engineering or Physics	3
MATH 53700 Applied Mathematics for Sci. & Eng I	3
Physics 55000 Introduction to Quantum Mechanics	3
Total	**12**
Eighth Semester	
ME 500-level ME primary area course	3
Elective: 400 or 500 level Engineering or Physics	3
MATH 53800 Applied Mathematics for Sci. & Eng II	3
Cultural Understanding (Choose from List)	3
Total	**12**

Fifth Year

Ninth Semester	
ME 500-level ME primary area course	3
ME 500-level ME primary area course	3
Total	**6**
Tenth Semester	
ME 69800 (thesis option) or ME 500-level ME primary/ related area course	3
ME 69800 (thesis option) or ME 500-level ME primary/ related area course	3
Science Elective: Graduate PHYS or MATH course	3
CAND 99100 Candidate for Graduation (with an M.S. in ME)	0
Total	**9**

Minor in Physics

The Department of Physics offers an undergraduate minor in physics with the following requirements:

- The introductory physics sequence: PHYS 15200 and PHYS 25100.
- Introduction to Computational Physics: PHYS 29900
- Modern Physics: PHYS 34200.
- Six (6) more credit hours chosen from PHYS 30000, PHYS 31000, PHYS 33000, PHYS 40000, PHYS 41800, PHYS 44200 or other courses approved by the department/advisor.
- The grade for each course submitted for the minor must be a C (2.0) or higher.

Residency:
Correspondence courses may not be used to fulfill requirements for the minor.

Grades:
No grade below C is acceptable for a course in the minor. A minimum grade point average of 2.0 in the minor is required.

Graduate Programs

Graduate Program

The Department of Physics offers graduate programs leading to Purdue University Master of Science and Doctor of Philosophy degrees. For master's degree students, both thesis and nonthesis options are available.

Admission Requirements

Students who seek enrollment in the physics graduate program should have a baccalaureate degree from an accredited institution and have a background in the usual undergraduate courses in physics, mathematics, and other sciences. An average grade point average of 3.0 (B) or higher in physics courses is expected. Graduates from related fields of study in pure and applied science or engineering may be accepted on a probationary basis until they have completed any necessary undergraduate courses in physics. The Graduate Record Examination (GRE) is normally expected of all applicants. The GRE physics test is recommended, but not required.

Transfer Credit

The Department of Physics will normally accept, from approved institutions, a maximum of 6 transfer hours

of graduate credit that are in excess of undergraduate degree requirements.

Application for Admission

Application materials and information can be obtained online at www.physics.iupui.edu or by writing to the chairperson of the graduate committee, IUPUI Department of Physics, Science Building, LD 154, 402 N. Blackford Street, Indianapolis, IN 46202-3273; phone (317) 274-6900. While the application is being processed, it is possible to enter IUPUI as a temporary graduate student. Generally, only 12 hours of credit earned under this classification may be counted toward an advanced degree.

Financial Assistance

Most physics graduate students receive financial support. Types of support available include teaching and research assistantships, fellowships, and tuition remission.

Master of Science

The general requirements include admission to regular graduate status, completion of the English requirement, passing the core physics classes (PHYS 51000, PHYS 51700, PHYS 53000, and PHYS 55000 or equivalent) with a 3.0 grade point average and no grades below B-, satisfactory completion of an approved plan of study, and 30 hours of graduate credit as outlined below.

The English requirement for candidates whose native language is English is satisfied by having no undergraduate grades below B in English composition or by scoring 600 or higher on the Verbal Aptitude Section of the Graduate Record Examination. Students who do not satisfy the English requirement by either of the above methods may take a written examination administered by the Department of English to demonstrate their proficiency. Students whose native language is not English must pass the TOEFL examination with a grade of 79 or higher (with minimums of 18 in Writing, 18 in Speaking, 14 in Listening, and 19 in Reading) and take a diagnostic test when they arrive at IUPUI. The score on this test will determine what English courses are required.

A placement test will be given to all new students in the week before the start of their first semester in our program. The purpose of the test is to identify problem areas in physics and mathematics and to decide a plan of study for each student. A second test might be given in the second semester on a case-by-case basis.

The student’s plan of study is worked out in cooperation with the student’s graduate advisor and committee. It must be submitted and accepted by the graduate school no later than the semester before the one in which the student plans to graduate. The English requirement must be satisfied before the plan of study may be filed.

The master’s degree requires the satisfactory completion of 30 credit hours of course work at the 500 and 600 level. Twenty-four (24) credit hours must be in physics and biophysics. In the thesis option, 6 of the physics credit hours will be earned by enrolling in PHYS 69800 Research M.S. Thesis. This option requires a written thesis. In the non-thesis option, 6 of the physics credit hours will typically be earned through enrollment in PHYS 59000 Reading and Research. This option requires a written report. Six (6) credit hours must be in mathematics, which may be replaced in part by PHYS 60000 Methods of Theoretical Physics. The grade requirements are A or B in 500-level courses; A, B, or C in 600-level courses; A, B, or C in mathematics courses; and a minimum grade point average of 2.8.

Doctor of Philosophy

The general requirements include admission to regular graduate status, completion of the English requirement, passing the qualifying examination, satisfactory completion of an approved plan of study, passing a preliminary exam, and 60 hours of graduate credit after the completion of an M.S. There are four core courses that must be completed: PHYS 61700, Statistical Mechanics; PHYS 63000, Advanced Theory of Electricity and Magnetism; PHYS 66000, Quantum Mechanics I; PHYS 66100, Quantum Mechanics II. The student must take three additional specialty courses approved by the Graduate Committee. These in general would be relevant to the student's area of interest. Additional courses may be taken based on the student's background and needs.

The English requirement for candidates whose native language is English is satisfied by having no undergraduate grades below B in English composition or by scoring 600 or higher on the Verbal Aptitude Section of the Graduate Record Examination. Students who do not satisfy the English requirement by either of the above methods may take a written examination administered by the Department of English to demonstrate their proficiency. Students whose native language is not English must pass the TOEFL examination with a grade of 79 or higher (with minimums of 18 in Writing, 18 in Speaking, 14 in Listening, and 19 in Reading) and take a diagnostic test when they arrive at IUPUI. The score on this test will determine what English courses are required.

A placement test will be given to all new students in the week before the start of their first semester in our program. The purpose of the test is to identify problem areas in physics and mathematics and to decide a plan of study for each student. A second test might be given in the second semester on a case-by-case basis.

The preliminary exam is a certification exam where the student presents a plan of work to be followed to perform his/her research. It is defended in front the advisory committee. Besides the preliminary exam, students need to present annual progress reports to the advisory committee.

Departments & Centers

- Teaching Certification
- Pre-Professional Programs
- Honors Program
- Undergraduate Research

Graduate Pre-Professional Programs

Undergraduate

Special Programs

Graduate Preprofessional Programs

Preparation for a career in the graduate health professions (e.g., medicine, dentistry, pharmacy, et al) is a multi-dimensional task. One important aspect is intellectual and academic development—the college education. The preprofessional student is urged to select a degree program that is of greatest interest to them. There is no preprofessional major. Most graduate health profession careers depend upon daily use of science, so a strong science foundation is critical in the student's preparation. These careers also require academic breadth and depth, so a balanced science/non-science curriculum is advised. While some health professional programs (dental, pharmacy, veterinary medicine) may not require an undergraduate degree for especially strong applicants, the vast majority of the successful applicants have an undergraduate degree. Having a bachelor's degree provides the necessary background, and serves as a backup plan if the student does not matriculate to a professional program.

Students may choose from a variety of majors while completing preprofessional requirements. Students are encouraged to consult with prospective major academic advisor, as well as the School of Science Preprofessions Health advisor in the PREPs Office (if enrolled in a School of Science degree program; if not, see the health professions adviser in the Health and Life Science Advising Center).

There are many schools across the country for each health profession from which to choose and we encourage students to apply to multiple programs. However, our preprofessional course advising is aligned with the programs with which we are most closely affiliated – IUPUI, IU Bloomington and Purdue University in West Lafayette.

Post-baccalaureate students may choose to take prerequisite courses through the School of Science for entry into professional programs. These students should consult with the health professions' advisor for help with the admission process and course selection.

Graduate professional programs require not only specific prerequisite courses, a strong GPA, and a profession-specific or general entrance test, but also experience including shadowing in the field, volunteering and leadership activities. See your health professions adviser to discuss opportunities and resources to build professional development skills.

Pre-Medical Program

Students planning to apply to medical school must choose a degree program in addition to taking courses that fulfill the admission requirements for their chosen medical school. While many opt to complete their degrees with science majors, any major is acceptable. Freshmen should declare their chosen major and seek advising for their degree requirements from the academic advisor in their major department. IUPUI offers preprofessions health advising for the School of Science at the Preprofessional and Career Preparation (PREPs) office and for majors outside of the School of Science advising is conducted by the Health Life Sciences Advising Center (HLS). Pre-medical students should consult their preprofessions health advisor within their first semester at IUPUI. Baccalaureate students who are selecting courses in the School of Science to prepare for medical school are also invited to use the preprofessions health advising service for help with the admission process.

Following are the IUPUI courses that meet the requirements for application to IU School of Medicine and most medical schools around the country, and represent the content for the Medical College Admission Test (MCAT). Please see medical school websites for any school specific requirements. The premedical student should complete the bachelor's degree. The MCAT is required for all medical schools both allopathic (M.D.) and Osteopathic (D.O.).

BIOL-K101 Concepts of Biology I	5 cr.
BIOL-K103 Concepts of Biology II	5 cr.
CHEM-C105 / CHEM-C125 Principles of Chemistry I/ Lab	3 cr./2 cr.
CHEM-C106 / CHEM-C126 Principles of Chemistry II/ Lab	3 cr./2 cr.
CHEM-C341 / CHEM-C343 Organic Chemistry I/Lab	3 cr./2 cr.
CHEM-C342 Organic Chemistry II*	3 cr.
PHYS-P201 General Physics I	5 cr.
PHYS-P202 General Physics II	5 cr.
BIOL-K483 Biological Chemistry	3 cr.
PSY-B110 Introduction to Psychology	3 cr.
SOC-R100 Introduction to Sociology	3cr.

*CHEM-C344 (Organic Chemistry II Laboratory) is not required for the IU School of Medicine. Students are strongly encouraged to complete the course as it may be required by other universities as well as a requirement for Science degree completion.

Pre-Dental, Pre-Veterinary Medicine, Pre-Optometry

Dentistry, Veterinary Medicine, and Optometry are career goals and not majors at the undergraduate level. Students generally select a bachelor degree of their choice in which they can excel and incorporate specific pre-requisites prior to entering a dental, veterinary or optometry school. Since these careers involve a strong background in life and physical sciences as well as working with people, students often choose a major in Biology, Psychology or Chemistry to fulfill their requirements. Students should also include coursework in humanities to ensure they are well rounded. In very rare situations, a handful of students are admitted to these professional programs after completing only the 90 hours of pre-requisites; however

this is not the norm. A bachelor degree is strongly recommended. Pre-Dental, Pre-Veterinary Medicine and Pre-Optometry coursework requires careful planning and preparation. Advising for degree requirements is provided in the department where the major is housed. Pre-Professional advising on pre-dental, pre-optometry, and pre-veterinary professional development such as resources for shadowing, internships, research, and volunteering as well as interview preparation is available in the Pre Professional and Career Preparation (PREPs) office. Post baccalaureate and graduate students working on pre-dental requirements are also advised in the same manner. Pre-requisites listed below are for Indiana University and Purdue University programs. Students applying to different programs are encouraged to check with the schools admissions office for a current listing of specific program pre-requisites.

Pre-Dentistry

The Dental Admission Test (DAT) is required for admission to dental school. Applicants should also show evidence of manual dexterity and complete 100 hours of shadowing in General Dentistry.

BIOL-K101 Concepts of Biology I	5 cr.
BIOL-K103 Concepts of Biology II	5 cr.
BIOL-K384 Biological Chemistry	3 cr.
BIOL-K356 Microbiology or BIOL-K338 Immunology	3 cr.
BIOL-K324 Cell Biology or BIOL-K322 Genetic & Molecular Biology	3 cr.
BIOL-N217 Human Physiology	5 cr.
BIOL-N261 Human Anatomy	5 cr.
CHEM-C105 / CHEM-C125 Principles of Chemistry I/ Lab	3 cr./2 cr.
CHEM-C106 / CHEM-C126 Principles of Chemistry II/ Lab	3 cr./2 cr.
CHEM-C341 / CHEM-C343 Organic Chemistry I/Lab	3 cr./2 cr.
CHEM-C342 Organic Chemistry II*	3 cr.
PHYS-P201 General Physics I	5 cr.
PHYS-P202 General Physics II	5 cr.
PSY-B110 Introduction to Psychology	3 cr.
ENG-W131 Reading, Writing and Inquiry I	3 cr.
COMM-R110 Fundamentals of Speech Comm.	3 cr.

*CHEM-C344 (Organic Chemistry II Laboratory) is not required for the IU School of Dentistry. Students are encouraged to complete the course as it may be required by other universities.

Pre-Veterinary Medicine

The Graduate Record Exam (GRE) is required for admission to most veterinary schools. Purdue University no longer requires the GRE. It is also recommended that students gain some practical experience working with animals before applying to a veterinary program.

BIOL-K101 Concepts of Biology I	5 cr.
BIOL-K103 Concepts of Biology II	5 cr.
BIOL-K322 / BIOL-K323 Genetics and Molecular Biology/Lab	3 cr./2 cr.
BIOL-K356 / BIOL-K357 Microbiology/Lab	3 cr./2 cr.
(or MICR-J210 Microbiology and Immunology)	(4 cr.)
BIOL-K384 Biological Chemistry	3 cr.
CHEM-C105 / CHEM-C125 Principles of Chemistry I/ Lab	3 cr./2 cr.
CHEM-C106 / CHEM-C126 Principles of Chemistry II/ Lab	3 cr./2 cr.
CHEM-C341 / CHEM-C343 Organic Chemistry I/Lab	3 cr./2 cr.
CHEM-C342 / CHEM-C344 Organic Chemistry II/Lab	3 cr./2 cr.
PHYS-P201 General Physics I	5 cr.
PHYS-P202 General Physics II	5 cr.
STAT 30100 Elementary Statistical Methods I	3 cr.
(or STAT-N501 or SPEA-K300)	(3 cr.)
ANSC 22300 Animal Nutrition	3 cr.
(may be taken at Purdue WL or online)	
ENG-W131 Reading, Writing and Inquiry I	3 cr.
COMM-R110 Fundamentals of Speech Communication	3 cr.
Arts and Humanities electives	9 cr.

Pre-Optometry

The Optometry Aptitude Test (OAT) is required for admission. It is suggested that students also have some exposure to the Optometry profession before applying to a program.

BIOL-K101 Concepts of Biology I	5 cr.

BIOL-K103 Concepts of Biology II	5 cr.
BIOL-K356 / BIOL-K357 Microbiology/Lab	3 cr./2 cr.
Advanced Biology: BIOL-K322 Genetics and Molecular Biology	3 cr.
(or BIOL-K324 Cell Biology)	(3 cr.)
BIOL-K384 Biochemistry	3 cr.
BIOL-N217 Human Physiology*	(5 cr.)
BIOL-N261 Human Anatomy*	(5 cr.)
CHEM-C105 / CHEM-C125 Principles of Chemistry I/ Lab	3 cr./2 cr.
CHEM-C106 / CHEM-C126 Principles of Chemistry II/ Lab	3 cr./2 cr.
CHEM-C341 / CHEM-C343 Organic Chemistry I/Lab	3 cr./2 cr.
ENG-W131 Reading, Writing and Inquiry I	3 cr.
ENG-W270 Argumentative Writing	3 cr.
(or ENG-W231 Professional Writing Skills)	(3 cr.)
MATH 15300 Algebra and Trigonometry I	3 cr.
MATH 15400 Algebra and Trigonometry II	3 cr.
PHYS-P201 General Physics I	5 cr.
PHYS-P202 General Physics II	5 cr.
PSY-B110 Introduction to Psychology	3 cr.
STAT 30100 Elementary Statistical Methods I	3 cr.
(or STAT-N501 or PSY-B305 or ECON-E270)	(3 cr.)
If the student does NOT have a bachelor's degree, additional courses are required:	
Arts and Humanities	6 cr.
World language	6 cr.
(students having completed 2 or more years in high school with C or better are exempt)	
Social and Historical Studies	6 cr.
Additional credit hours to reach 90 credit hours	

*BIOL-N217 and BIOL-N261 are strongly recommended but not required.

Pre-Pharmacy

The Pre-Pharmacy program at IUPUI consists of approximately 70-90 hours of coursework required to apply to pharmacy schools. A bachelor degree is not required however; many students elect to complete a degree program in a science major before application to Pharmacy school. Students declaring pre-pharmacy upon admission are assigned to the Department of Biology for completion of the required courses. Admission information as well as professional development activities including resources for shadowing, volunteering, research and internships is provided by the Pre-Professional and Career Preparation (PREPs) Office. The Pharmacy College Admission Test (PCAT) is required by approximately 2/3 of Pharmacy schools. Purdue University does not require the PCAT for admission. Additional categories of electives are required for graduation from the pharmacy program at Purdue. Since they are not required for admission to the program, they may be completed concurrently with pre-requisite coursework or after admission to the program. Pre-requisite courses listed below are for the Purdue University School of Pharmacy. Students are encouraged to check with all schools they are applying to for specific course requirements.

BIOL-K101 Concepts of Biology I	5 cr.
BIOL-K103 Concepts of Biology II	5 cr.
BIOL-K356 / BIOL-K357 Microbiology/Lab	3 cr./2 cr.
BIOL-N217 Human Physiology	5 cr.
BIOL-N261 Human Anatomy	5 cr.
CHEM-C105 / CHEM-C125 Principles of Chemistry I/ Lab	3 cr./2 cr.
CHEM-C106 / CHEM-C126 Principles of Chemistry II/ Lab	3 cr./2 cr.
CHEM-C341 / CHEM-C343 Organic Chemistry I/Lab	3 cr./2 cr.
CHEM-C342 / CHEM-C344 Organic Chemistry II/Lab	3 cr./2 cr.
COMM-R110 Fundamentals of Speech Comm.	3 cr.
PSY-B110 Intro. to Psychology	3 cr
(or SOC-R100 Intro. to Sociology)	3 cr.
ECON-E101 Survey of Economic Issues and Problems	3 cr.
(or ECON-E201 Intro. to MicroEcon. or ECON-E202 Intro. to MacroEcon)	3 cr.
MATH 23100 / MATH 23200 Calculus for the Life Sciences I and II	3 cr./3 cr.
(or MATH 22100 / MATH 22200 or MATH 16500 / MATH 16600)	3 cr./3 cr. or 4 cr./4 cr.

STAT 30100 Elem. Statistical Methods I	3 cr.
(or STAT 35000 Intro. to Stats. or PSY-B305 Statistics)	3 cr.
PHYS-P201 General Physics I	5 cr.
ENG-W131 Reading Writing and Inquiry I	3 cr.

Pre-Occupational Therapy (OTD)

Students may select any undergraduate major and include a set of core courses needed for pre-requisites for a doctoral degree in Occupational Therapy. Undergraduate degree programs in Biology or Psychology may be of interest to the pre-occupational therapy student. Advising for undergraduate degree requirements is available in the major department. Additional pre-professional advising including resources such as shadowing, internships, volunteering, and research as well as application and admission assistance to OT programs is provided in the Pre-Professional and Career Preparation (PREPs) Office. An advisor in the IUPUI School of Health and Human Sciences is also available for consultation. Applicants must have completed a bachelor degree for consideration for a graduate program in OT. There is no entrance exam required. Students must have 40 observational hours in three different OT settings. Pre-requisite courses listed below are for Indiana University School of Health and Rehabilitation Sciences. Students are encouraged to check with all schools they are applying to for specific course requirements.

BIOL-N217 Human Physiology	5 cr.
BIOL-N261 Human Anatomy	5 cr.
PSY-B110 Introduction to Psychology	3 cr.
PSY-B310 Life Span Development	3 cr.
PSY-B380 Abnormal Psychology	3 cr.
SOC-R100 Introduction to Sociology	3 cr.
STAT 30100 Elementary Statistical Methods I	3 cr.
(or STAT-N501 or PSY-B305 or ECON-E270)	(3 cr.)
PHYS-P201 or PHYS 21800*	4-5 cr.
CLAS-C209 Medical Terms from Greek and Latin	2 cr.
(or HIA-M330 Medical Terminology or RADI-R108 Medical Terminology (need dept. consent))	3 cr. or 1 cr.

*Students should be at or above the level of mathematics in MATH 15300/15400 or MATH 15900 to be successful in Physics.

Pre-Physical Therapy (DPT)

Students may select any undergraduate major and include a set of core courses needed for pre-requisites for a doctoral degree in Physical Therapy. Undergraduate degree programs in Biology, Chemistry or Psychology may be of interest to the pre-physical therapy student.

Advising for undergraduate degree requirements is available in the major department. Additional pre-professional advising including resources such as shadowing, internships, volunteering, and research as well as application and admission assistance to PT programs is provided in the Pre-Professional and Career Preparation (PREPs) Office. An advisor in the IUPUI School of Health and Human Sciences is also available for consultation. Applicants must have completed a bachelor degree for consideration for a graduate program in PT. The Graduate Record Examination (GRE) is required for admission to DPT programs. Students must have 40 clinical observation hours for admission; 20 hours in an acute setting and 20 hours in an outpatient setting. Pre-requisite courses listed below are for Indiana University School of Health and Rehabilitation Sciences. Students are encouraged to check with all schools they are applying to for specific course requirements.

BIOL-N217 Human Physiology	5 cr.
BIOL-N261 Human Anatomy	5 cr.
CHEM-C105 / CHEM-C125 Principles of Chemistry I/ Lab	3 cr./2 cr.
CHEM-C106 / CHEM-C126 Principles of Chemistry II/ Lab	3 cr./2 cr.
PHYS-P201 General Physics I & PHYS-P202 General Physics II	5 cr. & 5 cr.
(or PHYS 21800 & 21900 General Physics)	4 cr. & 4 cr.
PSY-B110 Introduction to Psychology	3 cr.
PSY-B310 Life Span Development	3 cr.
STAT 30100 Elementary Statistical Methods I	3 cr.
(or STAT-N501 or PSY-B305 or ECON-E270 or SOC-R359 or SPEA-K300)	(3 cr.)
HIA-M330 Medical Terminology*	3 cr.
(or CLAS-C209 Med. Terms from Greek & Latin or RADI-R108 Med. Term.)	2 cr./1 cr.
Two 3-credit hour courses in the humanities, social sciences area.	6 cr.

*Medical Terminology required only if offered admission to program

Pre-Physician Assistant (PA)

Students may select any undergraduate major and include a set of core courses needed for pre-requisites for a graduate program as a Physician Assistant. Undergraduate degree programs in Biology, Chemistry or Psychology may be of interest to the pre-PA student.

Advising for undergraduate degree requirements is available in the major department. Additional pre-professional advising including resources such as shadowing, internships, volunteering, and research as well as application and admission assistance to PA programs is provided in the Pre-Professional and Career Preparation (PREPs) Office. An advisor in the IUPUI School of Health and Rehabilitation Science is also available for consultation. Applicants must have completed a bachelor degree for consideration for a graduate program as a Physician Assistant. The Graduate Record Examination (GRE) is optional for admission to the PA program offered by Indiana University but, many other programs still require it. In addition, PA programs also require that students have accumulated a minimum of 10 hours of hours of shadowing prior to acceptance to a PA graduate program. Indiana University no longer has this requirement. Pre-requisite courses listed below are for Indiana University School of Health and Rehabilitation Sciences. Students are encouraged to check with all schools they are applying to for specific course requirements.

BIOL-K101 Concepts of Biology I	5 cr.
BIOL-K103 Concepts of Biology II	5 cr.
BIOL-N261 Anatomy	5 cr.
BIOL-N217 Physiology	5 cr.
BIOL-N251 Intro to Microbiology	3 cr.
(or MICR-J210 Microbiology & Immunology or BIOL-K356 & K357 Microbiology and Lab)	(4 cr. or 3/2 cr.)
CHEM-C105/CHEM-C125 Principles of Chemistry I/ Lab	3/2 cr.
CHEM-C106/CHEM-C126 Principles of Chemistry II/ Lab	3/2 cr.
CHEM-C341/CHEM-C343 Organic Chemistry I/Lab	3/2 cr.
STAT 30100 (or SPEA-K300, or PSY-B305 or SOC-R359)	3 cr.
SHRS-N265 (or HPER-N220, or FN 30300, or SHRS-W361)	3 cr.
PSY-B110 Introduction to Psychology (or SOC-R100)	3 cr.
HIA-M330 (or CLAS-C209 or RADI-R108)	3 cr./2cr./1 cr.

IUPUI Honors College and Science Honors

The IUPUI Honors College is open to students in both the Purdue and Indiana University degree programs. Continuing science students with an overall grade point average (GPA) of 3.5 after their first full academic year of work can apply. Entering freshmen applicatns must have a cumulative high school GPA of 3.75 (weighted) and are required to provide ACT or SAT scores as part of their application materials. The deadline to apply for entering freshmen is November 15. Continuing students will apply via Science Honors. Applications for Science Honors are due mid-April each year. Students must have at least four semesters remaining after admission to complete the Science Honors program. Students with a GPA of more than 3.5 who are not enrolled in Honors College may be permitted to take honors courses. They should, however, discuss the matter with their academic advisor and the Honors College before doing so.

In general, students may take no more than 6 credit hours of honors coursework each semester. Students may earn honors credit by taking special Honors College courses (HON H300, HON H399, HON H400), by taking specially designed honors course sections, by doing special overseas or internship work, or by contracting for honors credit using an H-Option contract in conjunction with regular classes.

H-Option contracts are the most popular and frequent way that students earn honors credit. An H-Option requires that a student work out with the instructor of a course a specific contract for a paper, field project, oral presentation, etc., early in the semester. The contract is not merely an extension of the regular class work, but an opportunity not provided by regular assignments. The Honors College reviews all contracts prior to students beginning projects.

In order to receive an honors notation at graduation, students must complete 24 hours of honors coursework with at least a 3.3 cumulative GPA. For students entering the Honors College via Science Honors, 12 of the required 24 hours must be science courses. In order to remain in good honors academic standing, students also must maintain a 3.3 semester and cumulative GPA, enroll in honors coursework each semester, achieve a B or higher in all honors courses, and take honors coursework each fall and spring semester.

For additional information, contact the IUPUI Honors College, 0124 University Library, 755 W. Michigan Street, Indianapolis, IN 46202-5164; phone (317) 274-2660; https://honors.iupui.edu.

Undergraduate Research Program

IUPUI has established an Undergraduate Research Opportunities Program (UROP) to encourage and recognize undergraduates who participate in research projects with faculty in the school.

Undergraduate research students may receive the transcript notation on their academic transcript concurrent with the awarding of the degree by fulfilling a set of requirements listed below. Such a transcript notation provides obvious evidence of a student's participation in independent laboratory and scholarly and research other creative work. The notation will certify and spotlight research proficiency or successful completion of some other creative activity.

UROP has established a program of requirements that must be fulfilled to qualify for transcript notation. The requirements are:

1. Students must register for and complete five credits of formal research in their departments or units. Students whose departments have no independent research credit may use the Honors Course HON-H399. The definition of research credit will be left

up to the student's department or unit, but should conform to the general definition of research and consist substantially of an independent project by the student.
2. Students must prepare a substantial written product from the research. This could include a senior thesis or journal publication. Other appropriate activities to the discipline may be substituted for this, for example, an art exhibit or other performance. Substitutions must receive prior approval from the UROP Director.
3. Students must attend an outside professional meeting in a discipline at the state, regional, or national level. Attendance at other professional events will be considered as appropriate to the discipline. The student's faculty mentor will certify attendance. Students will be encouraged to present their work at a professional meeting or other event.
4. Students must participate in at least one annual UROP symposium. Students must present at least one oral paper to receive transcript notation. If appropriate to research and creative activity in the discipline, other types of presentations may be acceptable at the discretion of the UROP Director and with the recommendation the student's faculty mentor.
5. Students must prepare a Research Portfolio, which may be in an electronic form. The Research Portfolio is prepared with the student's faculty mentor and must be submitted four weeks prior to the student's anticipated graduation date. Information about preparing a research portfolio can be found at http://crl.iupui.edu/resources/.

Further information about undergraduate research opportunities and transcript notation may be found at http://crl.iupui.edu/resources/.

Courses