School of Science

Welcome to the School of Science at IU Indianapolis!

The School of Science at IU Indianapolis 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 IU Indianapolis 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 IU Indianapolis 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.

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 undergrad 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 IU Indianapolis 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.

Mission

The IU Indianapolis 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 IU Indianapolis' vision as an urban research university with national and global impact.

Vision

The IU Indianapolis 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
- CHRISTINE J. PICARD, Ph.D., Associate Dean for Research and Graduate Education
- RAJEEV R. RAJE, Ph.D., Associate Dean for Planning, Finance, and Faculty Affairs
- JANE R. WILLIAMS, Ph.D., Associate Dean for Academic Affairs and Strategic Initiatives

Departmental Chairpersons

- TERI BELECKY-ADAMS, Ph.D., Department of Biology
- PARTHA BASU, Ph.D., Department of Chemistry and Chemical Biology
- KATHY J. LICHT, Ph.D., Department of Earth and Environmental Sciences
- JEFFREY X. WATT Ph.D., Department of Mathematical Sciences
- RICARDO S. DECCA, Ph.D., Department of Physics
- JANE R. WILLIAMS, Ph.D., Interim Chair, Department of Psychology

Program Directors

- TERI BELECKY-ADAMS, Ph.D., Biotechnology
- GABRIEL M. FILIPPELLI, Ph.D., Environmental Science
- GINA M. LONDINO-SMOLAR, M.S., Forensic and Investigative Sciences
- JANE R. WILLIAMS, Ph.D., Interdisciplinary Studies
- BETHANY S. NEAL-BELIVEAU, 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 2024 (Fall semester). Students who enter after this date may be subject to different requirements; students who entered before August 2024 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 areas before the dates established by the university calendar for registration. In such meetings students should, at 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 their 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 Indianapolis awards students degrees from Indiana University (IU). This list shows all the degrees awarded and the institution granting the degree.

Biology

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

Biotechnology

- Bachelor of Science

Chemistry

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

    - Thesis Option
- Doctor of Philosophy

Environmental Science

- Bachelor of Science
    - 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
    - Forensic Biology Concentration
    - Forensic Chemistry Concentration
- Master of Science
    - Non-Thesis Option
    - Thesis Option

Geology

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

Interdisciplinary Studies

- Bachelor of Science

Mathematical Sciences

- Bachelor of Science
    - Actuarial Science Concentration
    - Applied Math Option
    - Applied Statistics Concentration
    - Pure Math Option
    - Math Education
- Bachelor of Science
    - Actuarial Science 100% Online Collaborative
    - Applied Statistics 100% Online Collaborative
- Bachelor of Science (Mathematical Sciences) / Bachelor of Science (Physics) double major
- Master of Science
    - Pure/Applied Math Non-Thesis Option
    - Pure/Applied Math Thesis Option
    - Applied Statistics
    - Computational Data Science
    - Math Education Non-Thesis Option
    - Math Education Thesis Option
- Doctor of Philosophy (Mathematics)
    - Applied Math
    - Pure Math
    - Mathematical Statistics
- Doctor of Philosophy (Biostatistics)
    - Indiana University Ph.D. program, pursued at IU Indianapolis, in collaboration with the Richard M. Fairbanks School of Public Health. The degree is awarded through the Richard M. Fairbanks School of Public Health.

Neuroscience

- Bachelor of Science

Physics

- Bachelor of Science
    - Physics
    - Biophysics Option
    - Physics Teaching Option
- Bachelor of Science (Physics) / Bachelor of Science (Mathematical Sciences) double major - PU
- Master of Science
- Doctor of Philosophy

Psychology

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

Undergraduate Minors in the School of Science

- Astronomy
- Biology
- Chemistry
- Climate Resilience
- Environmental Science
- Forensic and Investigative Sciences
- Geochemistry
- Geology
- Health Psychology
- Mathematics
- Neuroscience
- Physics
- Psychology

Graduate (Doctoral) Minors in the School of Science

- Developmental Biology & Genetics
- Forensic Science
- Physiology
- Scientific Foundations

Contact Information

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

Phone: (317) 274-0625
Fax: (317) 274-0628
science@iu.edu

Contacts for Academic and Student Affairs

Joseph L. Thompson
Executive Director
Academic and Student Affairs
jlthomp@iu.edu

Academic Affairs

Jane R. Williams
Associate Dean
Academic Affairs and Strategic Initiatives
jrwillim@iu.edu

Diana S. Sims-Harris
Senior Student Affairs and Advising Administrator
Student Affairs
dsimshar@iu.edu

Darryl Newsom
Administrative Recorder
danewsom@iu.edu

Krista Swisher
Academic Affairs Coordinator
kswishe@iu.edu

Kristen Coulter
Assistant to the Dean
krcoulte@iu.edu

Undergraduate Student Affairs and Outreach

Chloe Broeker
Associate Director of Undergraduate Enrollment Marketing and Public Relations
cebroeke@iupui.edu

Graduate Student Affairs

Jiliang Li
Associate Dean
Research and Graduate Education
jilili@iu.edu

Pre-Professional and Career Preparation (PREPs)

Jaime Sperandio
Director of Pre-Professional and Career Advising
Office of Pre-Professional and Career Preparation (PREPs)
jsperan@iu.edu

Hailey Allen
Assistant Director of Employer & Career Services
haimorg@iu.edu

Anna Jessen
Assistant Director of Pre-Professional Advising
anjessen@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 here.

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. 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 through which the student is enrolled.

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 any Indiana University campus.

A science major interested in the Grade Replacement Policy should speak with their academic advisor.

For more information about the policy, click here.

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 IU Indianapolis. 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 Registrar's Office for review and 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.

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

Students receiving Fresh Start at IU Indianapolis 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 IU Indianapolis 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 IU Indianapolis campus after their return in order to meet the graduation residency requirement.

For more information about this policy click here.

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 click here.

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" grade. 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 IU Indianapolis, 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 IU Indianapolis Student Central website for information here.

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 here.

Residency Requirements

For undergraduate students: Residence at IU Indianapolis for at least two semesters and completion, while at IU Indianapolis, 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 IU Indianapolis.

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 IU Indianapolis, a transfer course must be a grade of C or higher. Students should be aware that completing coursework at another college or university may result in a postponement of their graduation for at least one semester due to the timing of processing and reviewing transfer credit.

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 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 IU Indianapolis 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 Bachelor of Arts degree programs or two Bachelor of Science 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 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 IU Indianapolis or by simultaneously completing two baccalaureate major programs from the School of Science, one leading to a Bachelor of Arts degree and the other leading to a Bachelor of Science 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 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.

Updating a Major, Adding a Second Major, Adding a Minor, or Adding a Preprofessional Designation within the School of Science

A student who desires to change or add majors within the School of Science, or add a minor or preprofessional designation, should apply the School of Science by completing the Internal Admissions Application. If the application 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 IU Indianapolis 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 here.

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

IU Indianapolis recognizes outstanding performance in course work by awarding bachelor's degrees with 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 Indiana University applicable to the graduation index (degree grade point average) on record.
- The minimum graduation index for distinction 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;
- 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;
- 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 IU Indianapolis 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 IU Indianapolis 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 IU Indianapolis 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 IU cumulative 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 IU Indianapolis 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 IU Indianapolis, baccalaureate degree requirements within the School of Science, and courses within the major.

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.

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 English 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 Department of World Languages and Culture for items related to the placement test, 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.

- 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-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 Writing of 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 of Interior Environments (3 cr.)
- HER-H100 Art in Culture (was 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.)

- 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-F260 Personal Finance (3 cr.) (NOTE: BUS-F260 is equivalent to F-151, F-152 and F-251 combined)
- 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.)
- 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 (3 cr.)
- FOLK-F101 Introduction to Folklore (3 cr.)
- GEOG-G110 Human Geography in a Changing World (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 and Applications of Lifestyle Wellness (3 cr.)
- INFO-I202 Social Informatics (3 cr.)
- INFO-I270 Intro to Human-Computer Interaction Principles and Practices (3 cr.)
- INFO-I275 Intro to Human-Computer Interaction Theory (3 cr.)
- JOUR-J110 Foundations of Journalism and Mass Communication (3 cr.)
- MSPT-Z100 Motorsports Studies (3 cr.)
- NEWM-N132 Game Design Psychology: Theory and Prototyping (3 cr.)
- PBHL-A140 Preparing for Disasters (3 cr.)
- PBHL-H101 Influencing 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.)
- WGSS-W105 Introduction to Women's, Gender, and Sexuality Studies (3 cr.)

- 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 (4 cr.)
- ASL-A132 First Year ASL II (4 cr.)
- ASL-A211 Second Year ASL I (3 cr.)
- ASL-A212 Second Year ASL II (3 cr.)
- CLAS-C213 Sport & Competition in the Ancient World (3 cr.)
- CLAS-L131 Beginning Latin I (4 cr.)
- CLAS-L132 Beginning Latin II (4 cr.)
- COMM-C282 Let's Talk: Communicating Across Social Identities (3 cr.)
- COMM-C299 Communicating Queer Identity (3 cr.)
- EALC-C131 Beginning Chinese I (4 cr.)
- EALC-C132 Beginning Chinese II (4 cr.)
- EALC-C201 Second Year Chinese I (3 cr.)
- EALC-C202 Second Year Chinese II (3 cr.)
- EALC-J131 Beginning Japanese I (4 cr.)
- EALC-J132 Beginning Japanese II (4 cr.)
- EALC-J201 Second Year Japanese I (3 cr.)
- EALC-J202 Second Year Japanese II (3 cr.)
- EDUC-E201 Multicultural Education and Global Awareness (3 cr.)
- ENG-L245 Introduction to Caribbean Literature (3 cr.)
- FREN-F131 First Year French I (4 cr.)
- FREN-F132 First Year French II (4 cr.)
- FREN-F203 Second Year French I (3 cr.)
- FREN-F204 Second Year French II (3 cr.)
- GER-G131 First Year German I (4 cr.)
- GER-G132 First Year German II (4 cr.)
- GER-G203 Second Year German I (3 cr.)
- GER-G204 Second Year German II (3 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 (4 cr.)
- NELC-A132 Basic Arabic II (4 cr.)
- NELC-A200 Intermediate Arabic I (3 cr.)
- NELC-A250 Intermediate Arabic II (3 cr.)
- PBHL-A120 Culture, Health, and Happiness (3 cr.)
- PSY-B203 Ethics and Diversity in Psychology (3 cr.) (NOTE: PSY-B203 does not count for List C for psychology majors.)
- REL-R101 Religion and Culture (3 cr.)
- REL-R103 The Bible and Culture (3 cr.)
- SPAN-S131 First Year Spanish I (4 cr.)
- SPAN-S132 First Year Spanish II (4 cr.)
- SPAN-S203 Second Year Spanish I (3 cr.)
- SPAN-S204 Second Year Spanish II (3 cr.)
- SWK-S102 Understanding Diversity in a Pluralistic Society (1-4 cr.)
- TSEM-T208 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 IU Indianapolis General Education Curriculum.

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-I100, PHYS-I140, PHYS-I200, 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-I010.

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 in this Area.

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 minimally 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, MATH-I001, MATH-M001, MATH-I002, MATH-I110, MATH-I111, MATH-I123, MATH-I130, MATH-I132, MATH-I136; BUS-K201, BUS-K204, and CSCI-N100-level courses 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 as computer programming, 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, Forensic & Investigative Sciences, and Neuroscience).

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 IU Indianapolis School of Science offers the following undergraduate degree programs:

Baccalaureate Degrees

- Biology (B.A.)
- Biology (B.S.)
- Biology Secondary School Teaching (B.A.)
- Biotechnology (B.S.)
- Chemistry (B.A.)
- Chemistry (B.S., ACS certified)
- Chemistry Secondary School Teaching (B.A.)
- Earth Science Secondary School Teaching
- Environmental Science (B.S.)
- Forensic and Investigative Sciences (B.S. FEPAC accredited)
- Geology (B.A.)
- Geology (B.S.)
- Interdisciplinary Studies (B.S.)
- Mathematics (B.S.)
- Mathematics Teaching B.S.
- Neuroscience (B.S.)
- Physics (B.S.)
- Physics Secondary School Teaching (B.S.)
- Psychology (B.A. and 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 IU Indianapolis (see departmental/program requirements).
5. Residence at IU Indianapolis for at least two semesters and completion, while at IU Indianapolis, 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 IU Indianapolis, 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. (Per IU Policy ACA-56)

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-I110, MATH 11100, MATH-I111, MATH 12300, MATH-I123, MATH 13000, MATH-I130, MATH 13200, MATH-I132, MATH 13600, MATH-I136; 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.

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 IU Indianapolis 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 15 credit hours of military credit for basic training can apply towards the degree program. For coursework taken as part of a military occupation or position beyond basic training, military personnel will receive distributed or undistributed credit. (Per IU Policy ACA-78)

14. An online application for a degree or certificate graduation must be completed by the following deadlines. Applications must be submitted by January 15 for August graduation; May 15 for December graduation; and October 15 for May 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 2023, May 2024, or August 2024 will participate in the May 2024 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
    - BIOL-N212 and BIOL-N207
    - BIOL-N214 and BIOL-N211
    - 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/CHEM-C326 and CHEM-C410/CHEM-C411
    - GEOL-G185 and GEOG-G185
    - GEOL-G221 and GEOL-G306
    - GEOL-G222 and GEOL-G306
    - MATH-M119 and MATH 22100 (MATH-I221) or MATH 23100 (MATH-I231) or MATH 24100 (MATH-I241) or MATH 16300 or MATH 16500 (MATH-I165)
    - MATH 15100 or 15900 (MATH-I159) and MATH 15300/15400 (MATH-I153/MATH-I154)
    - MATH 15100 and MATH 15900 (MATH-I159)
    - MATH 22100/MATH 22200 (MATH-I221/MATH-I222) and MATH 23100/MATH 23200 (MATH-I231/MATH-I232)
    - MATH 22100/MATH 22200 (MATH-I221/MATH-I222) and MATH 24100/MATH 24200 (MATH-I241/MATH-I242)

- MATH 23100/MATH 23200 (MATH-I231/ MATH-I232) and MATH 24100/MATH 24200 (MATH-I241/MATH-I242)
- MATH 22100/MATH 22200 (MATH-I221/ MATH-I222) and MATH 16300/MATH 16400 or MATH 16500/MATH 16600 (MATH-I165/MATH-I166)
- MATH 23100/MATH 23200 (MATH-I231/ MATH-I232) and MATH 16300/MATH 16400 or MATH 16500/MATH 16600 (MATH-I165/MATH-I166)
- MATH 24100/MATH 24200 (MATH-I241/ MATH-I242) and MATH 16300/MATH 16400 or MATH 16500/MATH 16600 (MATH-I165/MATH-I166)
- MATH 16300 and MATH 16500 (MATH-I165)
- MATH 16400 and MATH 16600 (MATH-I166)
- PHYS-P201/PHYS-P202 or PHYS 21800/ PHYS 21900 (PHYS-I218/PHYS-I219) and PHYS 15200/PHYS 25100 (PHYS-I152/ PHYS-I251)
- PSY-B320 and BIOL-L391 Addictions (IU East)
- PSY-B320 and NSCI-N301
- SCI-I120 and UCOL-U110
- STAT 30100 (STAT-I301) 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

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.

A minimum of 6 credit hours in the minor must be completed at IU Indianapolis.

Check with the department or program offering the minor for additional minimum courses to be completed at IU Indianapolis, and other restrictions or requirements.

- Astronomy
- Biology
- Chemistry
- Climate Resilience
- Environmental Science
- Forensic and Investigative Sciences
- Geology
- Geochemistry
- Health Psychology
- Mathematics
- Neuroscience
- Physics
- Psychology

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 IU Indianapolis 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 IU Indianapolis.

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.

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

Undergraduate

Student Learning Outcomes

Forensic and Investigative Sciences

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

Program Level Student Learning Outcomes

Aligned with

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. Identify common pattern evidence in forensic science and describe 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 profiles using population genetics
    1. Problem Solver: Thinks Critically and Analyzes, Synthesizes, and Evaluates
    2. Innovator: Investigate and Creates/Designs

5. Summarize 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. Demonstrate the use of common microscopes used in analysis of trace evidence and identify 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. Conduct a literature review of a current forensic science topic and present findings professionally
    1. Communicator: Evaluates Information and Conveys Ideas Effectively
    2. Innovator: Investigate and Creates/Designs

FIS-I 205

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 ; 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-I 206

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-I 300

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-I 301

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-I 305

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-I 415

1. Describe how ethics are applied to the presentation of expert testimony in court
2. Investigate 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

FIS-I 380 - 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

FIS-I 480 - 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

Bachelor of Arts & Bachelor Science in Geology

Broad Earth Sciences Undergraduate Program Goals

Upon graduating, students with an undergraduate degree in Geology (B.A. and B.S.) 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 B.A. and B.S. in Geology

Students who graduate with a B.A. or B.S. 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 B.A. in Earth Sciences 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 IU Indianapolis 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 IU Indianapolis' Principles of Undergraduate Learning (now IU Indianapolis Profiles of Learning for Undergraduate Student Success), 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 IU Indianapolis' 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 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 Indianapolis, 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 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 IU Indianapolis 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). Information about this test is available from the Office of International Affairs here.

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 Graduate School Indianapolis at the Web site here.

Additional information can be obtained at the Graduate School Indianapolis, 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
Web: click here

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
Web: click here

Department of Earth and Environmental Sciences

Engineering, Science, and Technology Building, SL 118
723 West Michigan Street
Indianapolis, IN 46202-5132
(317) 274-7484; fax (317) 274-7966
Web: click here

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
Web: click here

Department of Mathematical Sciences
Science Building, LD 270
402 North Blackford Street
Indianapolis, IN 46202-3216
Phone: (317) 274-6918; fax: (317) 274-3460
Web: click here

Department of Physics
Science Building, LD 154
402 North Blackford Street
Indianapolis, IN 46202-3273
Phone: (317) 274-6900; fax: (317) 274-2393
Web: click here

Department of Psychology
Science Building, LD 124
402 North Blackford Street
Indianapolis, IN 46202-3275
Phone: (317) 274-6947; fax: (317) 274-6756
Web: click here

Degree Programs
Master of Science Degrees

Indiana University Master of Science degrees are offered in all School of Science departments. All departments award either a thesis or nonthesis option.

- Actuarial Science
- Applied Social and Organizational Psychology
- Applied Statistics
- Biology
- Chemistry
- 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

Indiana University Ph.D. degrees are offered are offered in all School of Science departments.

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

Ph.D. Minors

- Algebra & Discrete Math
- Applied Mathematics
- Biophysics
- Developmental Biology & Genetics
- Forensics Science
- Geometry & Topology
- Mathematical Analysis
- Mathematical Physics
- Mathematical Sciences
- Molecular Physics
- Neurobiology
- Physiology
- Psychology of Teaching
- Quantum Science
- Scientific Foundations
- Statistics
- Statistics for Social Behavioral Sciences

Graduate Program Admissions

- Biology
- Chemistry
- Earth and Environmental Sciences
- Forensic and Investigative Sciences
- Mathematics
- Physics
- Psychology

Biology, M.S. and Ph.D.
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 IU Indianapolis 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 IU Indianapolis.

Application Process
REMEMBER: ALL MATERIALS MUST BE SUMBITTED TO THE DEPARTMENT BEFORE THE GRADUATE COMMITTEE WILL REVIEW THE APPLICATION 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**

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, that individual may write a standard letter and mail it to the department. They can also include an optional recommendation form, but it is NOT required. You may call the Department of Biology at (317) 274-0577, or e-mail biograd@iu.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:

IU Indianapolis 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: IU Indianapolis = 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 here.

Application Deadlines

Ph.D.: Priority deadline is December 15, although applications may be submitted through January 31. After January, please contact the Director of Graduate Studies (Dr. Lata Balakrishnan or email biograd@iu.edu).

M.S. Thesis (full time with support): March 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, M.S. and Ph.D.

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 & Assistantships: 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 Indianapolis

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

Graduate Continuing Non-Degree (GND) Students

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

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 IU Graduate School Indianapolis.

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 IU Indianapolis 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 IU Graduate School Indianapolis.

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 and Environmental Sciences will consider applications for admission throughout the year.

Forensic and Investigative Sciences, M.S.

The M.S. Program in Forensic Science, which awards an Indiana 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 M.S., the thesis M.S. or the non-thesis, accelerated MS. The M.S. 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. The non-thesis program can accommodate part-time students as well.

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

The full-time thesis M.S. program consists of 30 semester credit hours. It is anticipated that the program will be completed within two years. The thesis program requires 18 credit hours of course work and 12 credit hours 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 will be completed within 12 calendar months for full-time students. This may include up to six credits of internship.

How to Apply for the Full-Time Thesis M.S.

Application to the program can be done completely online. Information about the online application can be found here.

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. 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 **December 15** of the year you wish to start. Applications must be complete by

December 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 forensic 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 December 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 M.S.

Application to the program can be done completely online. Information about the online application can be found here.

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 received after March 15 will be considered if positions are available. Applications will also be considered for the Spring term if there is availability (completed applications by October 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 forensic 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. IU Indianapolis online application
2. A statement of personal and professional goals (300-500 words) should be submitted as part of the online application.
3. A resume or CV should be submitted as part of the online application.
4. Three letters of recommendation should be submitted through the online application.
5. Unofficial transcripts and evidence of degrees awarded from each post-secondary school attended are suitable for admission purposes. Following admission to IU Indianapolis, official documents must be submitted for verification. 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*. All international applicants must demonstrate English proficiency for admission into IU Indianapolis graduate programs. Non-native English speaking domestic applicants may also be required to complete standardized testing depending on their English proficiency. English proficiency for admission purposes can be satisfied by one of the following options:
    1. TOEFL score report not more than two years old with the following minimum scores: TOEFL iBT Special Home Edition: Total score of **79,** or TOEFL Essentials: Total score of **8.**
    2. IELTS (International English Language Testing System) Indicator -Online: Overall Band Score of at least **6.5**.
    3. Duolingo English Test (DET): Minimum score of **110.**
    4. Complete Bachelor's degree or higher from the U.S. or other country where English is an official language or the predominant native language..
    5. Graduate from the IU Indianapolis Program for Intensive English: at least Level 7.
7. Non-waivable, non-refundable application fee for domestic and international applicants.
8. International Student Financial Information Form (For international students only)
9. Supplemental Question Form should be submitted as part of the online application.

*All English proficiency exams must be submitted before admission. Once a student is admitted, English proficiency exams or updated scores will not be accepted.

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

Upon admission, send official transcripts and degree certifications to the following address:

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

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

Admission Deadlines

Fall Semester

- International applicants: March 1
- Domestic applicants: May 1*

Spring Semester

- International applicants: October 1
- Domestic applicants: November 15*

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

- 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 IU Graduate School Indianapolis. 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@iu.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@iu.edu for more information before applying for Summer admission (unless you are math education).

MS in Computational Data Science

Prerequisite coursework and/or degrees: Qualified applicants must have a 4-year Bachelor's degree in Computer Science, Mathematics, Data Science, Statistics, Engineering, or related fields. Applicants with a 4-year Bachelor's degree in any other area of study will be evaluated 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.

Generally, applicants are expected to have completed, with at least a grade of B, the following prerequisite courses: Calculus sequence including Multivariate Calculus, Linear Algebra, Probability, Statistics, and Data Structures. An applicant who has not taken one of these advanced courses may be considered for conditional admission and be required to enroll in the prerequisite course in their first semester of the program.

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

International applicants are required to demonstrate proof of English proficiency as described below.

Application Process

1. IU Indianapolis online application
2. A statement of personal and professional goals (300-500 words) should be submitted as part of the online application.
3. A resume or CV should be submitted as part of the online application.
4. Three letters of recommendation should be submitted through the online application.
5. Unofficial transcripts and evidence of degrees awarded from each post-secondary school attended are suitable for admissions purposes. Following admission to IU Indianapolis, official documents must be submitted for verification. 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*: All international applicants must demonstrate English proficiency for admission into IU Indianapolis graduate programs. Non-native English-speaking domestic applicants may also be required to complete standardized testing depend on their English proficiency. English proficiency for admission purposes can be satisfied by one of the following options:
    1. TOEFL score report not more than two years old with the following minimum scores: TOEFL iBT Special Home Edition: Total score of **79,** or TOEFL Essentials: Total score of **8.**
    2. IELTS (International English Language Testing System) Indicator -Online: Overall Band Score of at least **6.5**.
    3. Duolingo English Test (DET): Minimum score of **110.**
    4. Completed Bachelor's degree or higher from the U.S. or other country where English is an official language or the predominant native language.
    5. Graduate from the IU Indianapolis Program for Intensive English: at least Level 7.
7. Non-waivable, non-refundable application fee for domestic and international applicants.
8. International Student Financial Information Form (for international students only).
9. Supplemental Question Form should be submitted as part of the online application.

*All English proficiency exams must be submitted before admissions. Once a student is admitted, English proficiency exams or updated scores will not be accepted.

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

Upon admission, send official transcripts and degree certifications to the following address:

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

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

Admission Deadlines

Fall Semester

- International applicants: March 1
- Domestic applicants: May 1*

Spring Semester

- International applicants: October 1
- Domestic applicants: November 15*

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

*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 IU Graduate School Indianapolis. 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@iu.edu for more information.

Ph.D. in Biostatistics

The Ph.D. in Biostatistics is offered jointly with the Department of Biostatistics and Health Data Science of the Indiana University Fairbanks School of Public Health (FSPB), which administrate this program. It combines the statistical theory and modeling strengths of our Department of Mathematical Sciences with the exceptional biostatistical methods research, health sciences applications, and public health experience of the FSPB's department of biostatistics.

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. Any applicant who has a bachelor's or master's degree from an accredited institution and shows promise for successfully completing all the degree requirements will be considered for admission to this PhD program.

This program requires completion of at least 90 credit hours of graduate work and can be completed on either a full-time or part-time basis. 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.

In addition to satisfying general Indiana University Graduate School requirements for admission, applicants must have at least a B (3.00 GPA) average in courses 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.

Students entering this program should have a minimal mathematics background consisting of an undergraduate course sequence in univariate and multivariate calculus (equivalent to MATH-I 165, MATH-I 166 and MATH-I 261 at IU Indianapolis) and a course in linear algebra (including matrix theory). 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.

Those whose native language is not English must also take the Test of English as a Foreign Language (TOEFL) and achieve a score of 570 (or 230 on the computer version of the test, or 79 on the internet-based test). Final admission decisions will be made by the faculty admission committee.

Application Process

All application should be submitted though the Centralized Application Service of the Association of Schools and Programs of Public Health (ASPPH). 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.

A resume or CV.

GRE scores are not required for admission unless you are applying to the program as a full-time **funded** student, in which case you are strongly encourage to submit your current GRE scores.

Three letters of recommendation.

Official transcripts and evidence of degrees awarded from each post-secondary school attended.

Non-native speakers of English must provide proof of English proficiency. See the IUI Office of International Affairs English Language Requirements for details.

For additional information click here.

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

Admission Deadlines

Fall Semester

- Priority Application: December 15
- All Applications: February 1

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 see here for additional information.

Ph.D. in Mathematics

Admission Requirements

Applications are invited from individuals with a strong background in mathematics who either have an M.S. in mathematics or have been admitted to our combined M.S.-Ph.D. program. The Ph.D. in Mathematics requires completion of at least 90 credit hours of graduate work. An

awarded M.S. degree from an accredited university may contribute up to 30 credit hours toward this requirement, subject to approval. If an applicant does not hold an awarded M.S. degree, up to 12 credit hours of graduate work from an accredited university may be transferred toward the Ph.D. degree.

Application Process

1. IU Indianapolis online application
2. A statement of personal and professional goals (300-500 words) should be submitted as part of the online application.
3. A resume or CV should be submitted as part of the online application.
4. Three letters of recommendation should be submitted through the online application.
5. Unofficial transcripts and evidence of degrees awarded from each post-secondary school attended are suitable for admissions purposes. Following admission to IU Indianapolis, official documents must be submitted for verification. 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*: All international applicants must demonstrate English proficiency for admission into IU Indianapolis graduate programs.#Non-native English-speaking domestic applicants may also be required to complete standardized testing depend on their English proficiency.
   English proficiency for admission purposes can be satisfied by one of the following options:
   1. TOEFL score report not more than two years old with the following minimum scores: TOEFL iBT Special Home Edition: Total score of **79,** or TOEFL Essentials: Total score of **8.**
   2. IELTS (International English Language Testing System) Indicator-Online: Overall Band Score of at least **5**.
   3. Duolingo English Test (DET): Minimum score of **110.**
   4. Completed Bachelor's degree or higher from the U.S. or other country where English is an official language or the predominant native language.
   5. Graduate from the IU Indianapolis Program for Intensive English: at least Level 7.
7. Non-waivable, non-refundable application fee for domestic and international applicants.
8. International Student Financial Information Form (For international students only; review all required forms: click here).
9. Supplemental Question Form should be submitted as part of the online application.

*All English proficiency exams must be submitted before admissions. Once a student is admitted, English proficiency exams or updated scores will not be accepted.

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

Upon admission, send official transcripts and degree certifications to the following address:

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

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

Admission Deadlines

Fall Semester

- Domestic and International applicants: February 1

Spring Semester

- International applicants: October 1
- Domestic applicants: November 15

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

Physics, M.S. and Ph.D.

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 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 and physics subject tests are not required but they are strongly encouraged. The documentation of your official GRE score(s) must be sent directly to us by the Educational Testing Service.

TOEFL: International 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 timely manner to be considered for Fellowships and Assistantships offered at the Department and Campus level. If you have any doubt about the timing, please contact physics@iu.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

IU Indianapolis 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,
- submit a personal statement, and
- provide official transcripts (2 copies) of past academic work.

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

Application Deadlines

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

Online Applications

Applications are completed online, and additional information is available on the Department of Psychology website. Call **317-274-6945** or email gradpsy@iu.edu for additional information.

Apply to the Graduate Program

Addiction Neuroscience Ph.D.

Admission Requirements

Addiction Neuroscience Ph.D.

All application 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.

Application 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 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, or 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/or minority applicants 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@iu.edu@.

Applied Social and Organizational Psychology Ph.D.

PROGRAM Hiatus: The ASOP program is currently on hiatus and will not be admitting students for the next cycle.

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 application materials must be submitted by December 15.

Application 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.
- 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 program is designed for full#time students only.

All application materials must be submitted by December 1.

Application Materials

1. A graduate school application
2. A full set of undergraduate and graduate transcripts
3. Three (3) letters of recommendation
4. Personal statement
5. Departmental questions
6. Curriculum vitae
7. GRE (Graduate Record Examination) scores optional
8. International applicants must submit TOEFL (Test of English as a Foreign Language) scores *unless* the applicant has a bachelor's degree from a predominantly English-speaking country (check here for the official list).

Admission Requirements

- Bachelor’s degree from an accredited institution
- An undergraduate and graduate GPA (grade point average) of 3.20 or higher on a 4-point scale
- At least 15 credit hours in psychology
- 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.
- A personal statement displaying an interest in the field of clinical psychology with a focus in clinical health psychology, diversity science, and/or dual diagnosis (i.e., severe mental illness/psychiatric rehabilitation and substance use)

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 research methods, statistics, and abnormal psychology 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).

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 application 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 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

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.

Forensic and Investigative Sciences

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

- Analyze the Evolution of Forensic Science: Evaluate the historical development of forensic science globally and in the U.S., and assess its current state.
- Evaluate the Role of Forensic Science in the Judicial System: Critically analyze the role and impact of forensic science within the judicial system.
- Apply Rules of Evidence in Forensic Science: Synthesize and apply the rules of evidence pertaining to the introduction of scientific evidence.
- Assess Ethical Issues in Forensic Science: Critically evaluate the major ethical issues facing forensic scientists today and propose solutions.
- Implement Evidence Collection and Preservation Techniques: Demonstrate proficiency in the methods of collection, preservation of physical evidence, and maintenance of the chain of custody.
- Analyze and Apply Forensic Techniques: Integrate knowledge of various types of impression evidence and light microscopy applications to analyze forensic evidence.
- Evaluate and Apply Forensic Practice Standards: Critically assess and implement standards of forensic practice, including the ability to conduct comprehensive scientific investigations, prepare scientific reports, and provide effective courtroom testimony.

Specialized Outcomes for Students Completing the Thesis Track:

- Synthesize Forensic Science Knowledge: Conduct comprehensive literature reviews on forensic science topics, integrating findings to formulate research questions and hypotheses.
- Design and Execute Research: Participate in the design and execution of research projects, including the collection, documentation, and interpretation of data using appropriate experimental methodologies.
- Communicate Research Findings: Demonstrate proficiency in communicating research findings effectively through written reports, oral presentations, and visual aids, ensuring clarity, coherence, and scientific rigor.

Specialized Outcomes for Students Completing the Non-Thesis Track:

- **Evaluate and Synthesize**: Critically evaluate and synthesize relevant literature to formulate a comprehensive proposal for an independent laboratory project, integrating appropriate experimental design principles.
- **Leadership Transition and Quality Assurance**: Appraise the transition from scientist to leader, including leadership assessment, time management, communication, and delegation. Analyze and critique the key components of quality assurance, including the implementation of ISO 17025 and the discourse on the accreditation of forensic science laboratories.
- **Financial Management and Team Building**: Integrate financial management concepts such as revenue, expenses, assets, liability, appropriation, and fiscal year within the constraints of a forensic science laboratory. Compare, contrast, and formulate best practices for staff motivation, employee evaluation, conflict resolution, negotiations, problem-solving, decision-making, and team building.

Specialized Outcomes for Students Completing the Forensic Biology Concentration:

- **Evaluate and Synthesize Forensic Applications**: Evaluate the principles, instrumentation, and forensic applications of biological evidence analysis, including evidence collection and preservation, presumptive and confirmatory tests, DNA typing, and single source DNA profiling. Synthesize this knowledge to formulate an effective scheme for analyzing biological evidence found at a crime scene.
- **Analyze Biological Evidence**: Analyze the biological composition, origins, and significance of commonly encountered types of biological evidence such as blood, semen, and hair. Apply this understanding to differentiate between main theories and generate a comprehensive breakdown of several examples through individual presentations of research articles.
- **Apply Population Genetics Concepts**: Demonstrate a comprehensive understanding of population genetics concepts, including the recognition and explanation of techniques such as GWAS and Forensic DNA profiling statistics. Apply this knowledge to practical examples of population genetics usage and formulate results using various Population Genetics computer software on sample data.

Specialized Outcomes for Students Completing the Forensic Chemistry Concentration:

1. **Evaluate and Synthesize Knowledge on Substance Effects**: Critically evaluate the major effects of alcohol and drugs on the human body, and synthesize comprehensive reports on the legal issues surrounding these substances.
2. **Design and Conduct Research on Substance Analysis**: Formulate research questions in the field of forensic chemistry, design appropriate research methodologies, and conduct research using advanced analytical methods.
3. **Apply and Analyze Trace Evidence Techniques**: Apply principles, instrumentation, and forensic applications of various trace evidence analysis techniques, including chromatography, energy-induced methods, spectroscopy techniques, and mass spectrometry. Analyze the chemical composition, origins, and significance of commonly encountered types of trace evidence, and determine the appropriate analytical scheme for each type.

Geology

Broad Earth and Environmental Sciences Graduate Program Goals

Upon graduating, students with a graduate degree (M.S. in Geology or Ph.D. 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 M.S. 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 M.S. graduates. Number 1 applies to non-thesis option M.S. graduates.*

Student Learning Outcomes for the Ph.D. 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.

Mathematical Sciences

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.)

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.)

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 characteristics (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 M.S. 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 and the area of their selected minor.
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 Ph.D. 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 Ph.D. program. During the program, students write reports as part of their graduate courses and need to demonstrate English proficiency as Teaching Assistants in recitations and instructional laboratories. In addition, Ph.D. 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 Ph.D. 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 Ph.D. students to plan and design a research plan is evaluated at a Preliminary exam when, if successful, they are fully admitted into the Ph.D. program. Students in the Ph.D. 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 an Indiana University Ph.D. in Addiction Neuroscience on the IU Indianapolis 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 (M.S.) and Doctor of Philosophy (Ph.D.) in Applied Social and Organizational Psychology

Students graduating with an Indiana University degree majoring 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.

Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) in Clinical Psychology

Graduate students earning an Indiana University degree majoring in Clinical Psychology on the IU Indianapolis 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 evidence-based psychological 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.

Admission

All students entering the School of Science must have been officially admitted to the university by the IU Indianapolis 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 here.

Applicants should be aware that, under Indiana law, criminal convictions might result in ineligibility for admission to certain programs at IU Indianapolis. 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 IU Indianapolis must submit the international application for admission, which is available online from the IU Indianapolis Office of International Affairs. Additional information can be obtained at IU Indianapolis Office of International Affairs, 902 W. New York St., ES 2126 46202; phone (317) 274-7000; fax (317) 278-2213; email: oia@iu.edu.

Undergraduate Requirements

Beginning Students

Students entering IU Indianapolis 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 IU Indianapolis.
- 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 biology and chemistry)
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 chemistry, mathematics, or physics 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.

There are two paths to direct admission for incoming high school students:

1. You have a high school GPA of 3.3 and can provide evidence of readiness for the first math course in your respective major.
2. You have a high school GPA of 3.0 with minimum SAT scores of 1080 (530 math) OR minimum ACT scores of 21 composite and 21 math.*

*Physics applicants need minimum SAT scores (for tests completed prior to March 2016) of 550 math and 480 verbal/critical reading math OR minimum ACT scores of 24 math and 20 verbal. Completion of the writing section is required. For comparable SAT scores for an SAT exam completed after March 2016, admission is based on minimum SAT scores of 570 math and a combined reading/math score of 1110.

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 IU Indianapolis Schools and Indiana 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 IU Indianapolis campus student should file a record change online form. The form and information about the process may be found here.
- A student from another Indiana University campus, must make an official application through the IU Indianapolis Undergraduate Admissions Center using the Intercampus Transfer Application. Additional information is available here.

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 IU Indianapolis 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
- an official record of any AP test credit, military credit, PLTW credit, IB credit,or other college level credit earned while in high school
- 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 IU Indianapolis to Other Indiana University Campuses

Students transferring from IU Indianapolis to another Indiana University campus should consult the appropriate departments at that campus 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. Often, a course description and/or a course syllabus

are required to be reviewed by the corresponding IU Indianapolis department for consideration of applicability to a degree requirement.

Graduate and Doctoral Requirements

For Admission requirements please refer to the IU Graduate School Indianapolis.

Non-Degree Students

Undergraduate Non-Degree Program

Students who hold a bachelor's degree from IU Indianapolis or another university may register at IU Indianapolis 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 student 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 IU Indianapolis.

Graduate Non-Degree Program

Students who normally select the graduate non-degree classification are those whose intent is to take course work for personal enrichment. 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 IU Graduate School of Indianapolis here. Additional information can be obtained at the IU Graduate School of Indianapolis, University Library, Room UL 1170, 755 W. Michigan Street, Indianapolis, IN 46202; telephone (317) 274-1577.

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
- 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
Web: click here

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

Undergraduate Program Advisor: School of Science Advising Group

Graduate Program Advisors:

- James A. Marrs, Ph.D. (Pre-Professional Non-Thesis)
- Lata Balakrishnan, 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 IU Graduate School Indianapolis.

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-I 120 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-W 131 Reading, Writing and Inquiry (3 cr.)

A second writing course with ENG-W 131 as a prerequisite, e.g. ENG-W 150, ENG-W 230, ENG-W 231, ENG-W 270, ENG-W 320, or ENG-W 350.

Oral communication

COMM-R 110 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 (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 IU Indianapolis General Education Curriculum.

Area IIIC Life and Physical Sciences Competency

Physics Two semesters of basic physics (PHYS-P 201 / PHYS-P 202 or PHYS-I 152 / PHYS-I 251).

Chemistry Two semesters of Principles of Chemistry with laboratories (CHEM-C 105/CHEM-C 125 3/2 cr.; CHEM-C 106/CHEM-C 126 3/2 cr.), two semesters of organic chemistry lecture and one semester of laboratory (CHEM-C 341/CHEM-C 343, CHEM-C 342), plus prerequisite basic sequence or background to enter sequence above. The second laboratory in organic chemistry (CHEM-C 344) 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-I 159 or MATH-I 153 / MATH-I 154. (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-N 200, CSCI-N 201, CSCI-N 207, or CSCI-N 211 (other 300+ level courses may be used with permission).

Note: Computer Science CSCI-N 241 and CSCI-N 299 do not count in Area IIID, but may count as general electives.

Area IV Biology Major Requirements

Required Core Sequence

- BIOL-K 101 / BIOL-K 103 Concepts of Biology I and II (BIOL-K 102/BIOL-K 104 Honors)
- BIOL-K 322 Genetics and Molecular Biology
- BIOL-K 324 Cell Biology
- BIOL-K 341 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-K 101 / BIOL-K 103 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-K 493 will count as one laboratory course only if BIOL-K 490 is also taken.
- Capstone Experience. This requirement is met by taking either BIOL-K 493 Independent Research (1 cr.) or BIOL-K 490 Capstone (1 cr.) in the senior year. BIOL-K 493 cannot be used as both a third laboratory and as a capstone. BIOL-K 490 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 IU Indianapolis. 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 IU Indianapolis.

Areas/Electives

I. Molecular/Cellular Area

- Undergraduate Level
  - BIOL-K 338 Introductory Immunology
  - BIOL-K 360 Computational Biology
  - BIOL-K 384 Biochemistry
  - BIOL-K 416 Cellular and Molecular Neuroscience
  - BIOL-K 451 Neuropharmacology
  - BIOL-K 484 Cellular Biochemistry
  - BIOL-K 488 Endocrinology in Health and Disease
- Undergraduate and Graduate Level
  - BIOL-I 507 Principles of Molecular Biology
  - BIOL-I 512 Advanced Cell Biology
  - BIOL-I 516 Molecular Biology of Cancer
  - BIOL-I 544 Sensory Systems
  - BIOL-I 559 Endocrinology
  - BIOL-I 560 Neurodegenerative Diseases
  - BIOL-I 561 Immunology
  - BIOL-I 564 Molecular Genetics of Development
  - BIOL-I 574 Molecular and Cell Bone Biology

II. Organismal Area

- Undergraduate Level
  - BIOL-K 331 Developmental Biology
  - BIOL-K 350 Comparative Animal Physiology
  - BIOL-K 356 Microbiology
  - BIOL-K 411 Global Change Biology
  - FIS-I 440 Population Genetics
- Undergraduate and Graduate Level
  - BIOL-I 556 Physiology I
  - BIOL-I 557 Physiology II

Laboratory Courses (select 3)

- BIOL-K 323 Genetics and Molecular Biology Lab (BIOL-S 323 Honors)
- BIOL-K 325 Cell Biology Lab (BIOL-S 325 Honors)
- BIOL-K 333 Developmental Biology Lab
- BIOL-K 339 Immunology Lab
- BIOL-K 342 Principles of Ecology and Evolution Lab
- BIOL-K 357 Microbiology Lab (BIOL-S 357 Honors)
- BIOL-K 361 Computational Biology Lab
- BIOL-K 461 Cadaveric Human Anatomy (only 2 cr. count towards lab 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-I 120 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-W 131 or ENG-W 140 Reading, Writing and Inquiry (3 cr.)

The second semester of English composition may be satisfied with ENG-W 150, ENG-W 230, ENG-W 231, ENG-W 270, ENG-W 320, or ENG-W 350.

Oral Communication (3 cr.)

COMM-R 110 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 (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 IU Indianapolis General Education Curriculum.

Area IIIC Life and Physical Sciences Competency

Physics Two semesters of basic physics (PHYS-P 201 / PHYS-P 202 or PHYS-I 152 / PHYS-I 251).

Chemistry Two semesters of Principles of Chemistry with laboratories (CHEM-C 105/CHEM-C 125 3/2 cr.; CHEM-C 106/CHEM-C 126 3/2 cr.), two semesters of organic chemistry with laboratories (CHEM-C 341/CHEM-C 343 3/2 cr.; CHEM-C 342/CHEM-C 344 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-I 231 / MATH-I 232 or MATH-I 165 / MATH-I 166). 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-N 200, CSCI-N 201, CSCI-N 207, or CSCI-N 211 (other 300+ level courses may be used with approval).

Note: Computer Science CSCI-N 241 and CSCI-N 299 do not count in Area IIID, but may count as general electives.

Area IV Biology Requirements

Required Core Sequence

- BIOL-K 101 / BIOL-K 103 Concepts of Biology I and II (BIOL-K 102/BIOL-K 104 Honors)
- BIOL-K 322 Genetics and Molecular Biology
- BIOL-K 324 Cell Biology
- BIOL-K 341 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-K 101 / BIOL-K 103 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-K 493 will count as one laboratory course only if BIOL-K 490 is also taken.
- Capstone for the BS may be met with BIOL-K 493 Independent Research (2 to 3 credit hours) and BIOL-K 494 Senior Research Thesis (1 credit hour) or by taking the BIOL-K 490 Capstone (1 credit hour). The BIOL-K 493 / BIOL-K 494 option will consist of the completion BIOL-K 493 (research) and the preparation of a written report (BIOL-K 494) on the results of the research project. The title and nature of the BIOL-K 493 / BIOL-K 494 sequence is to be determined in consultation with the department research sponsor. A student may complete BIOL-K 493 in lieu of one of the required labs. If the student uses BIOL-K 493 for a lab, they must complete BIOL-K 490 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 IU Indianapolis. 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 IU Indianapolis.

Areas/Electives

I. Molecular/Cellular Area

- Undergraduate Level
  - BIOL-K 338 Introductory Immunology
  - BIOL-K 360 Computational Biology
  - BIOL-K 384 Biochemistry
  - BIOL-K 416 Cellular and Molecular Neuroscience
  - BIOL-K 451 Neuropharmacology
  - BIOL-K 484 Cellular Biochemistry
  - BIOL-K 488 Endocrinology in Health and Disease
- Undergraduate and Graduate Level
  - BIOL-I 507 Principles of Molecular Biology
  - BIOL-I 512 Advanced Cell Biology
  - BIOL-I 516 Molecular Biology of Cancer
  - BIOL-I 544 Sensory Systems
  - BIOL-I 559 Endocrinology
  - BIOL-I 560 Neurodegenerative Diseases
  - BIOL-I 561 Immunology
  - BIOL-I 564 Molecular Genetics of Development
  - BIOL-I 574 Molecular and Cell Bone Biology

II. Organismal Area

- Undergraduate Level
  - BIOL-K 331 Developmental Biology
  - BIOL-K 350 Comparative Animal Physiology
  - BIOL-K 356 Microbiology
  - BIOL-K 411 Global Change Biology
  - FIS-I 440 Population Genetics
- Undergraduate and Graduate Level
  - BIOL-I 556 Physiology I
  - BIOL-I 557 Physiology II

Laboratory Courses (select 4)

- BIOL-K 323 Genetics and Molecular Biology Lab (BIOL-S 323 Honors)
- BIOL-K 325 Cell Biology Lab (BIOL-S 325 Honors)
- BIOL-K 333 Developmental Biology Lab
- BIOL-K 339 Immunology Lab
- BIOL-K 342 Principles of Ecology and Evolution Lab
- BIOL-K 357 Microbiology Lab (BIOL-S 357 Honors)
- BIOL-K 361 Computational Biology Lab
- BIOL-N 461 Caderveric Human Anatomy (only 2 cr. count towards lab degree requirements)

Minor in Biology

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

- BIOL-K 101 Concepts of Biology I (5 cr.)
- BIOL-K 103 Concepts of Biology II (5 cr.)
- BIOL-K 322 Genetics and Molecular Biology (3 cr.)
- BIOL-K 324 Cell Biology (3 cr.)
- BIOL-K 341 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 IU Indianapolis. 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.

Doctoral Minors

The Department of Biology offers four Ph.D. minor programs that require 6 credit hours of selected course work. The doctoral minors are restricted to School of Science Ph.D. students. Course requirements are as follows:

Minor in Developmental Biology & Genetics

Take any 2 of the following courses (6 credit hours total needed):

- BIOL-I 564 Molecular Genetics of Development (3 cr.)
- BIOL-I 566 Developmental Biology (3 cr.)
- BIOL-I 573 Stem Cell Biology (3 cr.)
- FIS-I 560 Population Genetics (3 cr.)
- MGEN-Q 580 Basic Human Genetics (3 cr.)
- NSCI-I 560 Behavioral Genetics (3 cr.)
- NSCI-I 571 Developmental Neurobiology (3 cr.)
- PSY-I 535 Developmental Neuroscience (3 cr.)

Minor in Neurobiology

Take any 2 of the following courses (6 credit hours total needed):

- BIOL-I 569 Cellular Neurobiology (3 cr.)
- NSCI-K 451 Neuropharmacology (3 cr.)
- NSCI-I 559 Endocrinology (3 cr.)
- NSCI-I 560 Behavioral Genetics (3 cr.)
- NSCI -I 561 Immunology (3 cr.)
- PSY-I 545 Psychopharmacology (3 cr.)
- PSY-I 570 Drugs of Abuse (3 cr.)

Minor in Physiology

Required course:

- BIOL-I 556 (3 cr) Physiology I

And one of the following electives (for a total of 6 cr hours):

- BIOL-I 559 Endocrinology (3 cr)
- BIOL-I 561 Immunology (3 cr)
- BIOL-I 571 Developmental Neurobiology (3 cr)

Minor in Scientific Foundations

Take any 6 credit hours total from among the following courses:

- BIOL-I 507 Principles of Molecular Biology (3 cr.)
- BIOL-I 516 Advanced Cell Biology (3 cr.)
- BIOL-I 609 Scientific Research Bootcamp (1 cr.)
- CHEM-I 533 Introductory Biochemistry (3 cr.)
- FIS-I 540 Forensic Biology I (3 cr.)
- FIS-I 560 Population Genetics (3 cr.)
- FIS-N 570 Laboratory Project Design (2 cr.)
- GEOL-G 567 Medical Geology (3 cr.)
- GEOL-G 585 Environmental Geochemistry (3 cr.)
- GRDM-G 855 Experimental Design and Research Biostatistics (3 cr.)
- PBHL-B 561 Introduction to Biostatistics (3 cr.)
- PSY-I 518 Memory and Cognition (3 cr.)
- PSY-I 570 Drugs of Abuse (3 cr.)
- STAT-I 514 Design of Experiments (3 cr.)

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-I 120 Windows on Science	1
BIOL-K 101 Concepts of Biology I	5
CHEM-C 105 Principles of Chemistry I	3
CHEM-C 125 Experimental Chemistry I	2
MATH-I 153 College Algebra	3
Total	**14**
Second Semester	
BIOL-K 103 Concepts of Biology II	5
CHEM-C 106 Principles of Chemistry II	3
CHEM-C 126 Experimental Chemistry II	2
MATH-I 154 Trigonometry	3
ENG-W 131 Reading, Writing and Inquiry I	3
Total	**16**

Sophomore Year

Third Semester	
BIOL-K 322 Genetics and Molecular Biology	3
BIOL-K 323 Genetics and Molecular Biology Lab	2
CHEM-C 341 Organic Chemistry I	3
CHEM-C 343 Organic Chemistry Laboratory I	2
World Language Course (Cultural Understanding)	4
Elective Course	1
Total	**15**
Fourth Semester	

BIOL-K 324 Cell Biology	3
BIOL-K 325 Cell Biology Laboratory	2
CHEM-C 342 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-P 201 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-P 202 General Physics II	5
Social Sciences (choose from list)	3
Elective Course	3
Total	**16**

Senior Year

Seventh Semester	
BIOL-K 341 Principles of Ecology and Evolution	3
Arts and Humanities (choose from list)	3
Elective/Minor Course 300-level	3
Elective/Minor Course	6
Total	**15**
Eighth Semester	
BIOL-K 490 Capstone in Biology (or BIOL-K 493 Independent Research)	1
COMM-R 110 Fundamentals of Speech Comm	3
Elective/Minor Courses	11
Total	**15**

Bachelor of Science Sample Program (120 cr. required)

Freshman Year

First Semester	
SCI-I 120 Windows on Science	1
BIOL-K 101 Concepts of Biology I	5
CHEM-C 105 Principles of Chemistry I	3
CHEM-C 125 Experimental Chemistry I	2
MATH-I 231 Calculus for the Life Sciences I	3
Total	**14**
Second Semester	
BIOL-K 103 Concepts of Biology II	5
CHEM-C 106 Principles of Chemistry II	3
CHEM-C 126 Experimental Chemistry II	2
MATH-I 232 Calculus for the Life Sciences II	3
ENG-W 131 Reading, Writing and Inquiry I	3
Total	**16**

Sophomore Year

Third Semester	
BIOL-K 322 Genetics and Molecular Biology	3
BIOL-K 323 Genetics and Molecular Biology Laboratory	2
CHEM-C 341 Organic Chemistry I	3
CHEM-C 343 Organic Chemistry Laboratory I	2
Computer Programming (approved elective)	3
COMM-R 110 Fundamentals of Speech Comm	3
Total	**16**
Fourth Semester	
BIOL-K 324 Cell Biology	3
BIOL-K 325 Cell Biology Laboratory	2
CHEM-C 342 Organic Chemistry II	3
CHEM-C 344 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-P 201 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-P 202 General Physics II	5
Arts and Humanities/Social Sciences (choose from list)	3
BIOL-K 493 Independent Research	1
Total	**14**

Senior Year

Seventh Semester	
BIOL-K 341 Principles of Ecology and Evolution	3
BIOL-K 493 Independent Research	1
Cultural Understanding (choose from list)	3
Elective/Minor Courses	9
Total	**16**
Eighth Semester	
BIOL-K 493 Independent Research	1
BIOL-K 494 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-I 595 Special Assignments and BIOL-I 696 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-I 696.

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-I 595 and BIOL-I 696 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, developmental genetics, cell biology, membrane biochemistry and biophysics, plant physiological ecology, molecular biology, and genetics. 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 3.00 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 IU Indianapolis. Transfer credit is not accepted in the thesis option. Up to 12 hours of biology graduate credit taken at IU Indianapolis undergraduate 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 3.00 or higher. The final examination for thesis students will consist of a thesis defense, which will be done in conjunction with BIOL-I 696 Seminar.

All students (except for the pre-professional non-thesis students) are required to take BIOL-I 696 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 (HLC) 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% online, consortial program is taught by IU Bloomington, IU East, IU Indianapolis, 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, IU Indianapolis, 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 cr.)
- Molecular-cellular-level electives (6 cr.)

- Organismal-level electives (6 cr.)
- Capstone course (3 cr.)

Doctor of Philosophy

Doctor of Philosophy—Indiana University

The degree of Doctor of Philosophy (Ph.D.), the highest earned degree conferred by Indiana University, can be pursued in the Department of Biology at IU Indianapolis. 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 required core Biology courses and may include additional courses in the primary area of study. The plan will be appropriate to meet the needs of the student in a chosen field as determined by the advisory committee. All Ph.D. students must also complete a minor which is composed of at least 6 credit hours of coursework in a related area. The minor is chosen in consultation with the research committee. The plan will include the core and minor courses that the student is expected to complete, additional specific courses relevant to the field of research, language (if any) requirements, and 2 credit hours of BIOL-I 696 Seminar.

The department head and the Dean of the IU Graduate School Indianapolis, must approve the plan of study.

Qualifying 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 qualifying examination in order to advance to candidacy. The qualifying 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 qualifying examining committee. No examining committee shall have fewer than three faculty members.

If the student does not pass the qualifying examinations, a second meeting must be convened within 6 months. Should the qualifying 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.

Biotechnology Program

IU Indianapolis
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, IU Indianapolis 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 Indiana University 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-W 131 Reading, Writing and Inquiry (3 cr.) *(ENG 111 ITCC)*
- Second composition course (3 cr.)

Speech Communication (3 cr.)

- COMM-R 110 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 (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 IU Indianapolis General Education Curriculum.

Area IIIC Life and Physical Sciences Competency

Chemistry

Two semesters of Principles of Chemistry with laboratory:

- CHEM-C 105 / CHEM-C 125 Principles of Chemistry I with lab *(CHEM 105 ITCC)*
- CHEM-C 106 / CHEM-C 126 Principles of Chemistry II with lab *(CHEM 106 ITCC)*

Two semesters of organic chemistry lecture:

- CHEM-C 341/CHEM-C 343 Organic Chemistry Lecture/Lab I
- CHEM-C 342 Organic Chemistry Lecture II

Physics One semester of basic physics

- PHYS 101, ITCC **or** PHYS-I 218, IU Indianapolis

Area IIID Analytical Reasoning Competency

Course work through two semesters of calculus:

- MATH-I 231 / MATH-I 232 **or**
- MATH-I 165 / MATH-I 166

NOTE: Students may need to complete MATH 136 College Algebra and MATH 137 Trigonometry with Analytic Geometry 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-N 200, CSCI-N 201, CSCI-N 207 or CSCI-N 211.
A statistics course is required: STAT-I 301.

Area IV Biotechnology Requirements

Required courses

- BIOL-K 101 Concepts of Biology I (5 cr.)
- BIOL-K 384 Biological Chemistry (3 cr.) **or** CHEM-C 384 Biological Chemistry (3 cr.) **or** BIOL-K 484 Cellular Biochemistry (3 cr.)
- BIOL-K 322, BIOL-K 323, BIOL-K 324, BIOL-K 356, BIOL-K 338
- BIOL-K 357 or BIOL-K 339

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

IU Indianapolis
Science Building, LD 326
402 N. Blackford Street
Indianapolis, IN 46202-3274
Phone: (317) 274-6872, fax: (317) 274-4701
Web: click here

Department Chair: Partha Basu, Ph.D.

Department Advisors:

- Undergraduate Program Advisor: School of Science Advising Group
- Graduate Programs: Jingzhi Pu, 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 biochemistry 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 here.

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-C 100, CHEM-C 101, or CHEM-C 110, depending on their specific degree program. CHEM-C 100 and CHEM-C 110 are both nonmathematical introductions to chemistry, while CHEM-C 101 requires one semester of high school algebra. Students in programs that require two semesters of chemistry take either CHEM-C 101 / CHEM-C 121 with CHEM-C 110 / CHEM-C 115 or the CHEM-C 105 / CHEM-C 125 with CHEM-C 106 / CHEM-C 126 sequence. (See specific program for degree major.) The CHEM-C 105 / CHEM-C 125 with CHEM-C 106 / CHEM-C 126 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-C 105 should take CHEM-C 101 as a preparatory course. Credit for CHEM-C 101 cannot count toward the total credit hours needed for graduation if either of the following courses is taken: CHEM-C 105 or CHEM-C 106. Completion of CHEM-C 101 does not qualify a student for admission to CHEM-C 106.

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-I 120 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-W 150, ENG-W 230, ENG-W 231, ENG-W 270, ENG-W 320, or ENG-W 350.

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 IU Indianapolis General Education Curriculum.

Area IIIC Life and Physical Sciences Competency PHYS-P 201 and PHYS-P 202 (recommended PHYS-I 152 and PHYS-I 251). 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-I 231 and MATH-I 232 (recommended MATH-I 165 and MATH-I 166). One computer programming course is also required.

Note: Computer Science CSCI-N 100 level courses do not count for any credit toward any degree in the School of Science. Also, CSCI-N 241 and CSCI-N 299 do not count in Area IIID, but may count as general electives.

Area IV Chemistry Concentration Requirements CHEM-C 105, CHEM-C 125, CHEM-C 106, CHEM-C 126, CHEM-C 294, CHEM-C 310, CHEM-C 311, CHEM-C 325, CHEM-C 326, CHEM-C 341, CHEM-C 342, CHEM-C 343, CHEM-C 344, CHEM-C 360 (recommended CHEM-C 361), and CHEM-C 495. Recommended CHEM-C 384 or CHEM-C 484. 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-I 120 Windows on Science	1
CHEM-C 105 Principles of Chemistry I	3
CHEM-C 125 Experimental Chemistry I	2
MATH-I 231 Calculus for the Life Sciences I	3
ENG-W 131 Reading, Writing and Inquiry I	3
World Language	4
Total	**16**
Second Semester	
CHEM-C 106 Principles of Chemistry II	3
CHEM-C 126 Experimental Chemistry II	2
MATH-I 232 Calculus for the Life Sciences II	3
World Language	4
2nd Written communication course	3
Total	**15**

Sophomore Year

Third Semester	
CHEM-C 341 Organic Chemistry I	3
CHEM-C 343 Organic Chemistry Laboratory I	2
Life and Physical Science with lab (approved elective)	5
COMM-R 110 Fundamentals of Speech Communication	3
Arts and Humanities/Social Science (choose from list)	3
Total	**16**
Fourth Semester	
CHEM-C 342 Organic Chemistry II	3
CHEM-C 344 Organic Chemistry Laboratory II	2
CHEM-C 294 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-C 310 Analytical Chemistry Lecture	3
CHEM-C 311 Analytical Chemistry Lab	1
PHYS-P 201 General Physics I	5
Arts & Humanities or Social Sciences (choose from list)	3
Elective	3

Total	**15**
Sixth Semester	
CHEM-C 325 Intro to Instrumental Analysis	3
CHEM-C 326 Introduction to Instrumental Analysis Lab	2
Computer Programming (approved course)	3
PHYS-P 202 General Physics 2	5
Electives	3
Total	**16**

Senior Year

Seventh Semester	
Electives	15
Total	**15**
Eighth Semester	
CHEM-C 360 Elementary Physical Chemistry	3
CHEM-C 495 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-I 120 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-W 150, ENG-W 230, ENG-W 231, ENG-W 270, ENG-W 320, or ENG-W 350.

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 IU Indianapolis General Education Curriculum.

Area IIIC Life and Physical Sciences Competency PHYS-I 152, PHYS-I 251, 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-I 165, MATH-I 166, MATH-I 171, and MATH-I 261. One computer programming course is also required.

Note: Computer Science CSCI-N 100 level courses do not count for any credit toward any degree in the School of Science. Also, CSCI-N 241 and CSCI-N 299 do not count in Area IIID, but may count as general electives.

Area IV Chemistry Concentration Requirements CHEM-C 105, CHEM-C 125, CHEM-C 106, CHEM-C 126, CHEM-C 294, CHEM-C 310, CHEM-C 311, CHEM-C 341, CHEM-C 342, CHEM-C 343, CHEM-C 344, CHEM-C 361, CHEM-C 362, CHEM-C 363, CHEM-C 410, CHEM-C 411, CHEM-C 430, CHEM-C 435, CHEM-C 484 and CHEM-C 495. 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-C 409 (3 cr. min.), CHEM-C 309, CHEM-C 371, CHEM-C 372, CHEM-C 420, CHEM-C 475, CHEM-C 485, CHEM-C 488, CHEM-C 489, certain CHEM-C 496 topics courses (permission required), any graduate-level chemistry course (permission required), FIS-I 400, FIS-I 410, GEOL-G 406, or GEOL-G 483.

Degree Requirements (Biochemistry Option)

First-Year Experience Course Beginning freshmen and transfer students with fewer than 19 credit hours are required to take SCI-I 120 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-W 150, ENG-W 230, ENG-W 231, ENG-W 270, ENG-W 320, or ENG-W 350.

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-I 152, PHYS-I 251, BIOL-K 101, and BIOL-K 103. Beyond the introductory level, an additional 3 credit hours of biology should be chosen from one of the following: BIOL-K 324 Cell Biology, BIOL-K 356 Microbiology, or BIOL-K 322 Genetics and Molecular Biology.

Area IIID Analytical Reasoning Competency MATH-I 165, MATH-I 166, MATH-I 171, and MATH-I 261. One computer programming course is also required.

Note: Computer Science CSCI-N 100 level courses do not count for any credit toward any degree in the School of Science. Also, CSCI-N 241 and CSCI-N 299 do not count in Area IIID, but may count as general electives.

Area IV Chemistry Concentration Requirements CHEM-C 105, CHEM-C 125, CHEM-C 106, CHEM-C 126, CHEM-C 294, CHEM-C 310, CHEM-C 311, CHEM-C 341, CHEM-C 342, CHEM-C 343, CHEM-C 344, CHEM-C 361, CHEM-C 362, CHEM-C 363, CHEM-C 410, CHEM-C 411, CHEM-C 430, CHEM-C 435, CHEM-C 484, CHEM-C 485, CHEM-C 486, and CHEM-C 495. 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-C 409 (3 cr. min.), CHEM-C 309, CHEM-C 371, CHEM-C 372, CHEM-C 420, CHEM-C 475, CHEM-C 488, CHEM-C 489, certain CHEM-C 496 topics courses (permission required), any graduate-level chemistry course (permission required), FIS-I 400, FIS-I 410, GEOL-G 406, or GEOL-G 483.

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-I 120 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-W 150, ENG-W 230, ENG-W 231, ENG-W 270, ENG-W 320, or ENG-W 350.

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-I 152, PHYS-I 251, BIOL-K 101, and BIOL-K 103. Beyond the introductory level, an additional 3 credit hours of biology should be chosen from one of the following: BIOL-K 324 Cell Biology, BIOL-K 356 Microbiology, or BIOL-K 322 Genetics and Molecular Biology.

Area IIID Analytical Reasoning Competency MATH-I 165, MATH-I 166, MATH-I 171, and MATH-I 261. One computer programming course is also required.

Note: Computer Science CSCI-N 100 level courses do not count for any credit toward any degree in the School of Science. Also, CSCI-N 241 and CSCI-N 299 do not count in Area IIID, but may count as general electives.

Area IV Chemistry Concentration Requirements CHEM-C 105, CHEM-C 125, CHEM-C 106, CHEM-C 126, CHEM-C 294, CHEM-C 310, CHEM-C 311, CHEM-C 341, CHEM-C 342, CHEM-C 343, CHEM-C 344, CHEM-C 361, CHEM-C 362, CHEM-C 363, CHEM-C 410, CHEM-C 411, CHEM-C 430, CHEM-C 435, CHEM-C 484, CHEM-C 486, CHEM-C 488, CHEM-C 489, and CHEM-C 495. 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-C 105 Principles of Chemistry I	3
CHEM-C 125 Experimental Chemistry I	2
MATH-I 165 Analytic Geometry and Calculus I	4
Arts and Humanities/Social Sciences (choose from list)	3
ENG-W 131 Reading, Writing and Inquiry I	3
SCI-I 120 Windows on Science	1
Total	**16**
Second Semester	
CHEM-C 106 Principles of Chemistry II	3
CHEM-C 126 Experimental Chemistry II	2
MATH-I 166 Analytic Geometry and Calculus II	4
PHYS-I 152 Mechanics	4
2nd Written Communication Course	3
Total	**16**

Sophomore Year

Third Semester	
CHEM-C 341 Organic Chemistry I	3
CHEM-C 343 Organic Chemistry Laboratory I	2
MATH-I 171 Multidimensional Mathematics	3
Life and Physical Science (approved elective)	3
Arts & Humanities/Social Science (choose from list)	3
COMM-R 110 Fundamentals of Speech Communication	3
Total	**17**
Fourth Semester	
CHEM-C 342 Organic Chemistry II	3
CHEM-C 344 Organic Chemistry Laboratory II	2
CHEM-C 294 Cornerstone in Chemistry	1
PHYS-I 251 Heat, Electricity and Optics	5
MATH-I 261 Multivariate Calculus	4

Total	**15**

Junior Year

Fifth Semester	
CHEM-C 362 Physical Chemistry of Molecules	4
CHEM-C 310 Analytical Chemistry Lecture	3
CHEM-C 311 Analytical Chemistry Lab	1
Arts & Humanities/Social Science (choose from list)	3
Cultural Understanding (choose from list)	3
Total	**14**
Sixth Semester	
CHEM-C 361 Physical Chemistry of Bulk Matter	3
CHEM-C 363 Experimental Physical Chemistry	2
CHEM-C 484 Biomolecules and Catabolism	3
Computer Programming (approved course)	3
Elective	3
Total	**14**

Senior Year

Seventh Semester	
CHEM-C 410 Principles of Chemical Instrumentation	3
CHEM-C 411 Principles of Chemical Instrumentation Laboratory	2
Life and Physical Science (approved elective)	3
Advanced Chemical Elective	3
Electives	3
Total	**14**
Eighth Semester	
CHEM-C 430 Inorganic Chemistry	3
CHEM-C 435 Inorganic Chemistry Laboratory	1
CHEM-C 495 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-C 105 Principles of Chemistry I	3
CHEM-C 125 Experimental Chemistry I	2
BIOL-K 101 Concepts of Biology I	5
MATH-I 165 Analytic Geometry and Calculus I	4
SCI-I 120 Windows on Science	1
Total	**15**
Second Semester	
CHEM-C 106 Principles of Chemistry II	3
CHEM-C 126 Experimental Chemistry II	2
MATH-I 166 Analytic Geometry and Calculus II	4
BIOL-K 103 Concepts of Biology II	5
ENG-W 131 Reading, Writing and Inquiry I	3
Total	**17**

Sophomore Year

Third Semester	
CHEM-C 341 Organic Chemistry I	3
CHEM-C 343 Organic Chemistry Laboratory I	2
MATH-I 171 Multidimensional Mathematics	3
PHYS-I 152 Mechanics	4
2nd written communication course	3
Total	**15**
Fourth Semester	
CHEM-C 342 Organic Chemistry II	3
CHEM-C 344 Organic Chemistry Laboratory II	2
CHEM-C 294 Cornerstone in Chemistry	1
PHYS-I 251 Heat, Electricity and Optics	5
MATH-I 261 Multivariate Calculus	4
Total	**15**

Junior Year

Fifth Semester	
CHEM-C 362 Physical Chemistry of Molecules	4
CHEM-C 310 Analytical Chemistry Lecture	3
CHEM-C 311 Analytical Chemistry Lab	1
COMM-R 110 Fundamentals of Speech Communication	3

Arts and Humanities (choose from list)	3
Total	**14**
Sixth Semester	
CHEM-C 361 Physical Chemistry of Bulk Matter	3
CHEM-C 363 Experimental Physical Chemistry	2
CHEM-C 484 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-C 410 Principles of Chemical Instrumentation	3
CHEM-C 411 Principles of Chemical Instrumentation Lab	2
CHEM-C 485 Biosynthesis and Physiology	3
CHEM-C 486 Biological Chemistry Lab	2
Computer Programming (approved course)	3
Biology (approved elective)	3
Total	**16**
Eighth Semester	
CHEM-C 430 Inorganic Chemistry	3
CHEM-C 435 Inorganic Chemistry Laboratory	1
Advanced Chemistry Elective	3
Cultural Understanding (choose from list)	3
Elective	3
CHEM-C 495 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-C 105 Principles of Chemistry I	3
CHEM-C 125 Experimental Chemistry I	2
BIOL-K 101 Concepts of Biology I	5
MATH-I 165 Analytic Geometry and Calculus I	4
SCI-I 120 Windows on Science	1
Total	**15**
Second Semester	
CHEM-C 106 Principles of Chemistry II	3
CHEM-C 126 Experimental Chemistry II	2
MATH-I 166 Analytic Geometry and Calculus II	4
BIOL-K 103 Concepts of Biology II	5
ENG-W 131 Reading, Writing and Inquiry I	3
Total	**17**

Sophomore Year

Third Semester	
CHEM-C 341 Organic Chemistry I	3
CHEM-C 343 Organic Chemistry Laboratory I	2
MATH-I 171 Multidimensional Mathematics	3
PHYS-I 152 Mechanics	4
2nd written communication course	3
Total	**15**
Fourth Semester	
CHEM-C 342 Organic Chemistry II	3
CHEM-C 344 Organic Chemistry Laboratory II	2
CHEM-C 294 Cornerstone in Chemistry	1
PHYS-I 251 Heat, Electricity and Optics	5
MATH-I 261 Multivariate Calculus	4
Total	**15**

Junior Year

Fifth Semester	
CHEM-C 310 Analytical Chemistry Lecture	3
CHEM-C 311 Analytical Chemistry Lab	1
CHEM-C 362 Physical Chemistry of Molecules	4
COMM-R 110 Fundamentals of Speech Communication	3
Arts and Humanities/Social Sciences (choose from list)	3
Total	**14**

Sixth Semester	
CHEM-C 361 Physical Chemistry of Bulk Matter	3
CHEM-C 363 Experimental Physical Chemistry	2
CHEM-C 484 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-C 410 Principles of Chemical Instrumentation	3
CHEM-C 411 Principles of Chemical Instrumentation Laboratory	2
CHEM-C 486 Biological Chemistry Laboratory	2
CHEM-C 488 Introduction to Medicinal and Agricultural Chemistry	3
Computer Programming (approved course)	3
Biology (approved elective)	3
Total	**16**
Eighth Semester	
CHEM-C 430 Inorganic Chemistry	3
CHEM-C 435 Inorganic Chemistry Laboratory	1
CHEM-C 489 The Practice of Medicinal Chemistry	3
CHEM-C 495 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-C 360 and CHEM-C 361
- MATH-I 231 / MATH-I 232 or MATH-I 241 / MATH-I 242 and MATH-I 165 / MATH-I 166
- PHYS-P 201 / PHYS-P 202 or PHYS-I 218 / PHYS-I 219 and PHYS-I 152 / PHYS-I 251
- PHYS-I 100 or PHYS-I 200 and PHYS-P 201, PHYS-I 218, or PHYS-I 152

For example, if a student has earned credit in MATH-I 165 / MATH-I 166, the student will receive no credit for MATH-I 231 / MATH-I 232, 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-C 360 and approval of the departmental chairperson, credit will be granted for CHEM-C 361 and the student may proceed to CHEM-C 362.
- If a student has earned credit for the MATH-I 231 / MATH-I 232 sequence, the student will be placed in MATH-I 166. If the student passes MATH-I 166, the MATH-I 165 / MATH-I 166 requirement will be considered fulfilled. Credit will be granted for MATH-I 231 and MATH-I 166 only (7 credit hours). If the student does not pass MATH-I 166, the student must start with MATH-I 165.
- If a student has earned credit for MATH-I 231 only, the student must take the MATH-I 165 / MATH-I 166 sequence, and no credit will be allowed for MATH-I 231.
- If a student has earned credit for the PHYS-P 201 / PHYS-P 202 or PHYS-I 218 / PHYS-I 219 sequence, the student will be placed in PHYS-I 251. If the student passes PHYS-I 251, the PHYS-I 152 / PHYS-I 251 requirement will be considered fulfilled. Credit will be granted for PHYS-P 201 and PHYS-I 251 only (10 credit hours). If the student does not pass PHYS-I 251, the student must start with PHYS-I 152.
- If a student has earned credit for PHYS-P 201 or PHYS-I 218 only, the student must take the PHYS-I 152 / PHYS-I 251 sequence, and no credit will be allowed for PHYS-P 201 or PHYS-I 218.

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-C 105, CHEM-C 125, CHEM-C 106, CHEM-C 126, CHEM-C 341, CHEM-C 342, CHEM-C 343, and CHEM-C 310, or CHEM-C 360 or CHEM-C 484.

NOTE: MATH-I 232 and PHYS-P 202 or PHYS-I 251 are prerequisites for CHEM-C 360.

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 3.00 or higher (on a 4.00 scale) will be considered for admission as regular graduate students. Those with a GPA below 3.00 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, IU Indianapolis, 402 N. Blackford Street, Indianapolis, IN 46202-3272; phone (317) 274-6876; web. 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 IU Graduate Office Indianapolis, 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 an Indiana 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-I 599).

Ph.D. Program

The Ph.D. program is a full-time, thesis-based research program that culminates in an Indiana 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 Earth and Environmental Sciences

IU Indianapolis
Engineering, Science, and Technology Building, SL 118
723 W. Michigan Street
Indianapolis, IN 46202-5132
(317) 274-7484; fax (317) 274-7966
Web: click here

Department Chair: Kathy Licht, Ph.D.

Undergraduate Program Advisor: School of Science Advising Group

Graduate Program Advisor: Lin Li, 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. Earth Science considers the physical forces acting on the earth, the chemistry of its constituent materials, and the biology of its past inhabitants. Environmental Science 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 and Environmental 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 Climate Resilience, 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 and Environmental 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 IU Indianapolis Schools of Science, Liberal Arts, and Medicine.

Faculty and students of the Department of Earth and Environmental Sciences are actively engaged in basic and applied research. Specific research areas include biogeochemistry, biomineralization, geoscience education, 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

Degree Requirements

First-Year Experience Course Beginning freshmen and transfer students with less than 19 credit hours are required to take SCI-I 120 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-W 270, ENG-W 231, ENG-W 230 or ENG-W 350. GEOL-G 205 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 IU Indianapolis 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-C 105 / CHEM-C 125 and CHEM-C 106 / CHEM-C 126 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-I 153 / MATH-I 154 or MATH-I 159 and CSCI-N 207 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-N 100 level courses do not count for credit toward any degree in the School of Science. Also, CSCI-N 241 and CSCI-N 299 do not count in Area IIID, but may count as an elective.

Area IV Geology Concentration Requirements GEOL-G 110, GEOL-G 120, GEOL-G 205 (or 300-level or 400-level GEOL-G course if GEOL-G 205 is used as a second composition course), GEOL-G 335, GEOL-G 221, GEOL-G 222, GEOL-G 334, three 300-level or higher geology courses, and a capstone course (GEOL-G 420, GEOL-G 460, or GEOL-G 495). Thirty-nine (39) credit hours in GEOL-G course work required. Geology majors cannot earn credit for both GEOL-G 221/GEOL-G 222 and GEOL-G 306. 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-G 420, GEOL-G 460, or GEOL-G 495 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-I 120 Windows on Science	1
GEOL-G 110 Physical Geology	3
GEOL-G 120 Physical Geology Laboratory	1
CHEM-C 105 Principles of Chemistry I	3
CHEM-C 125 Experimental Chemistry I	2
ENG-W 131 Reading, Writing and Inquiry	3
MATH-I 153 College Algebra	3
Total	**16**
Second Semester	
CHEM-C 106 Principles of Chemistry II	3
CHEM-C 126 Experimental Chemistry II	2
MATH-I 154 Trigonometry	3
COMM-R 110 Fundamentals of Speech Communication	3
CSCI-N 207 or other approved computer course	3
Elective (GEOL-G 130 course suggested)	1
Total	**15**

Sophomore Year

Third Semester	
Second Composition Course (GEOL-G 205 recommended)	3
GEOL-G 221 Introductory Mineralogy	5
Approved Biology course with laboratory	5
Arts and Humanities (choose from list)	3
Total	**16**
Fourth Semester	
GEOL-G 335 Evolution of the Earth and Life	4
GEOL-G 222 Petrology	5
Approved Science course with laboratory	5
Elective (GEOL-G 130 recommended)	1
Total	**15**

Junior Year

Fifth Semester	
GEOL-G 300/GEOL-G 400 elective	3
GEOL-G 334 Principles of Sedimentation and Stratigraphy	5
Social Sciences Course (choose from list)	3
World Language Course	4
Total	**15**
Sixth Semester	
GEOL-G 300/GEOL-G 400 elective	3
Arts & Humanities or Social Sciences (choose from list)	3
World Language Course	4
Electives	5
Total	**15**

Senior Year

Seventh Semester	
GEOL-G 300/GEOL-G 400 electives	3
World Language Course	4
Elective	3
Elective	3
Elective	3
Total	**16**
Eighth Semester	
GEOL-G 300/GEOL-G 400 elective	3
Geology Capstone Course	3
Elective	3
Elective	3
Total	**12**

Bachelor of Science in Geology

Degree Requirements

First-Year Experience Course Beginning freshmen and transfer students with less than 19 credit hours are required to take SCI-I 120 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-W 270, ENG-W 231, ENG-W 230 or ENG-W 350. GEOL-G 205 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 IU Indianapolis General Education Curriculum.

Area IIIC Life and Physical Sciences Competency CHEM-C 105 / CHEM-C 125, CHEM-C 106 / CHEM-C 126; PHYS-P 201 / PHYS-P 202; BIOL-K 341 / BIOL-K 342; 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-I 231 / MATH-I 232; CSCI-N 207 or another CSCI course approved by the Department of Earth Sciences; and STAT-I 301 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-N 100 level courses do not count for credit toward any degree in the School of Science. Also, CSCI-N 241 and CSCI-N 299 do not count in Area IIID, but may count as an elective.

Area IV Geology Concentration Requirements GEOL-G 110, GEOL-G 120, GEOL-G 205 (or GEOL-G 300 level or GEOL-G 400 level course if GEOL-G 205 is used as a second composition course), GEOL-G 335, GEOL-G 221, GEOL-G 222, GEOL-G 334, GEOL-G 323, 12 credits of 300-level or 400-level geology courses, and GEOL-G 420 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-G 221/GEOL-G 222 and GEOL-G 306. 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-G 420 satisfies the School of Science capstone requirement.

Bachelor of Science Sample Program (120 cr. required)

Freshman Year	
First Semester	
SCI-I 120 Windows on Science	1
GEOL-G 110 Physical Geology/GEOL-G 120 Laboratory	4
ENG-W 131 Reading,Writing & Inquiry I	3
CHEM-C 105 Principles of Chemistry I	3
CHEM-C 125 Experimental Chemistry I	2
Arts & Humanities Course (choose from list)	3
Total	**16**
Second Semester	
COMM-R 110 Fundamentals of Speech Communication	3
CHEM-C 106 Principles of Chemistry II	3
CHEM-C 126 Experimental Chemistry II	2
MATH-I 231 Calculus for the Life Sciences I	3
CSCI-N 207 or other approved computer course	3
Total	**14**

Sophomore Year	
Third Semester	
Second Composition Course (GEOL-G 205 recommended)	3
GEOL-G 221 Introductory Mineralogy	5
MATH-I 232 Calculus for the Life Sciences II	3
Social Sciences Course (choose from list)	3
Total	**14**
Fourth Semester	
PHYS-P 201 General Physics I	5
GEOL-G 222 Introductory Petrology	5
GEOL-G 335 Evolution of Earth and Life	4
STAT-I 301 Elementary Statistical Methods	3
Total	**17**

Junior Year	
Fifth Semester	
PHYS-P 202 General Physics II	5
GEOL-G 323 Structural Geology	5
GEOL-G 334 Sedimentology and Stratigraphy	5
Total	**15**
Sixth Semester	
BIOL-K 341 Ecology and Evolution Lecture/BIOL-K 342 Laboratory	5
GEOL-G 300/GEOL-G 400 elective	3

300-400 level Science or Geography course	3
Elective	3
Total	**14**

Senior Year	
Seventh Semester	
GEOL-G 300/GEOL-G 400 elective	3
GEOL-G 300/GEOL-G 400 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-G 300/GEOL-G 400 elective	3
GEOL-G 300/GEOL-G 400 elective	3
300-400 level Science or Geography course	3
Elective	3
GEOL-G 420 Regional Geology Field Trip (Summer)	3
Total	**15**

Minors

Minor in Climate Resilience

The minor in climate resilience is highly interdisciplinary, drawing on coursework offered in the Schools of Science, Arts, Public Health, SPEA, and Health & Human Services. The minor includes courses that introduce students to the Earth-Climate system, climate dynamics, and human dimensions of climate change. Students will also select a higher-level proficiency course in the area of their interest and complete a proficiency course about climate change and society.

The undergraduate minor in climate resilience requires 15 credit hours, with an overall grade point average of 2.00 (C) and with no grade less than a C, distributed as follows:

Earth-Climate system courses: 3 credits from the following list
*GEOL-G 107 Earth and our Environment (3 cr.)
*GEOL-G 110 How the Earth Works (3 cr.)
*GEOL-G 115 Oceanography (3 cr.)
*GEOG-G 114 The Greenhouse Effect and Global Warming (1 cr.)
*GEOG-G 108 Physical Systems of the Environment (2 cr.)

Climate dynamics courses: 3 credits from the following list
GEOG-G 303 Weather and Climate (3 cr.)
GEOL-G 185 Global Environmental Change (3 cr.)

Human dimensions of climate resilience: 3 credits from the following list
*SPEA-V 222 Principles of Sustainability (3 cr.)
*GEOL-G 132 Environmental Issues and Solutions (3 cr.)

Area proficiency courses: 3 credits from the following list
ANTH-B 468 Bioarcheology (3 cr.)
BIO-K 411 Global Change Biology (3 cr.)
CHEM-C 420 Environmental Chemistry (3 cr.)
GEOG-G 208 Environment and Society (3 cr.)
GEOG-G 310 Human Impact on the Environment (3 cr.)
GEOG-G 315 Environmental Conservation (3 cr.)
GEOL-G 410 Undergraduate Research in Geology (3 cr.)
GEOL-G 436 Earth Observation from Space (3 cr.)
GEOL-G 457 Paleoclimatology (3 cr.)
GEOL-G 460 Internship in Geology (3 cr.)
GEOL-G 488 Global Cycles (3 cr.)
GEOL-G 495 Senior Thesis in Geology (3 cr.)
PBHL-A 435 Energy, Climate Change, Resilience, and Health (3 cr.)
PBHL-A 445 Global Environmental Health and Sustainable Development (3 cr.)
PHIL-P 237 Environmental Ethics (3 cr.)
SPEA-V 310 Environmental Justice (3 cr.)
SPEA-V 311 Natural Resources and Environmental Policy (3 cr.)
SPEA-E 476 Environmental Law and Regulation (3 cr.)
TESM-T 207 Tourism Policy and Sustainability (3 cr.)

Proficiency course on climate resilience:
GEOL-G 477 - Climate Change and Society (3 cr.)

*Courses that apply to the IU Indianapolis General Education requirement.

At least 9 credit hours of the minor must be taken at IU Indianapolis (this does not include transfer credit, AP, or CLEP credit). Prerequisites to the minor courses are not included but are required in order to complete the minor. In addition, recommended courses include one year of college chemistry and at least one course in college algebra.

Minor in Geology

The undergraduate minor in geology requires 18 credit hours, with an overall grade point average of 2.00 (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-G 110 (3 cr.), GEOL-G 120 (1 cr.), GEOL-G 335 (4 cr.), and GEOL-G 221 (4 cr.) or GEOL-G 306 (4 cr.).
- Students must complete an additional 6 credit hours minimum, including two of the following courses: GEOL-G 222 (4 cr.), GEOL-G 304 (3 cr.), GEOL-G 334 (4 cr.), GEOL-G 406 (3 cr.), GEOL-G 415 (3 cr.), GEOL-G 430 (4 cr.), GEOL-G 451 (3 cr.), or another 400-level geology course with departmental approval.

At least 9 credit hours of the minor must be taken at IU Indianapolis (this does not include transfer credit, AP, or CLEP credit). 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-G 406, GEOL-G 483, GEOL-G 486, and GEOL-G 488.

A maximum of two courses/course sequences may be chosen from the following: CHEM-C 310/CHEM-C 311, CHEM-C 341, CHEM-C 360, CHEM-C 361, CHEM-C 410/CHEM-C 411, BIOL-K 411.

At least 9 credit hours of the minor must be taken at IU Indianapolis (this does not include transfer credit, AP, or CLEP credit). 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 IU Indianapolis (this does not include transfer credit, AP, or CLEP credit).

- GEOL-G 107 (3 cr.)
- GEOL-G 117 (1 cr.)
- GEOL-G 115 or GEOL-G 132 (3 cr.)
- GEOL-G 306 (4 cr.)
- Choose one (3 cr.) SPEA-V 222, SPEA-V 311, GEOG-G 303, PBHL-A 435, SPEA-E 476
- Choose one (2-3 cr.): GEOL-G 436, GEOL-G 477, GEOL-G 467, GEOL-G 415, or GEOL-G 420 British Virgin Islands Experiential Field Study

At least 9 credit hours of the minor must be taken at IU Indianapolis (this does not include transfer credit, AP, or CLEP credit). 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 and Environmental 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 environmental science or geology, including a summer field course, and a minimum of a B (3.00) grade point average in geoscience courses. 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 M.S. degree options are available.

The **thesis option** requires 30 credit hours of total course work. Of the 30 credit hours, 21 to 24 are non-research course work and 6 to 9 are GEOL-G 810 Research credits. 1 credit of colloquium is required and all students are required to take the class "1st Year Graduate Student Seminar" (3 cr.). At least 6, but no more than 9 credits of GEOL-G 810 Research credits shall be counted toward the 30 total credit hours for the M.S. thesis option. 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 GEOL-G 700 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 GEOL-G 810 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 GEOL-G 700 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 and Environmental Sciences for both the thesis and non-thesis options.

M.S. Degree Option	In Department Credit Hours	Outside of Department Credit Hours	GEOL-G 810 Research Credit Hours	GEOL-G 700 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 (3.00) 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 M.S. 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 and Environmental 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 3.00 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-G 700 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-G 690 Advanced Geology Seminar (3 cr.), is taken with a faculty member in the Earth and Environmental 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 not 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 and Environmental Sciences and the minor advisor (who must be outside the Department of Earth and Environmental 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 and Environmental Sciences faculty with an external member. If not an IU-affiliated faculty, that external member must be approved by the University Graduate School Indianapolis. 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, "1st Year Graduate Student Seminar (3 cr.)." 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 (3.00) average.

Environmental Science Program

IU Indianapolis
Engineering, Science, and Technology Building, SL 118
723 W. Michigan Street
Indianapolis, IN 46202-5132
Phone: (317) 274-7484; fax: (317) 274-7966
Web: click here

- **Director:** Kathy Licht, 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 and Environmental 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.

Selection of a particular concentration should be made in consultation with the academic and concentration advisors.

- Bachelor of Science in Environmental Science
- Minor in Environmental Science

Bachelor of Science in Environmental Science

Degree Requirements

First-Year Experience Course Beginning freshmen and transfer students with fewer than 19 credit hours are required to take SCI-I 120 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-BE 499 Sustainability - Thriving Communities, Thriving Planet, which includes SCI-I 120, GEOL-G 107, and SPEA-V 222.

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-W 270, ENG-W 231, ENG-W 230 or ENG-W 350. GEOL-G 205 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-BE 499, Sustainability TLC, SPEA-V 222 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 IU Indianapolis General Education Curriculum.

Area IIIC Life and Physical Sciences Competency (26 cr.) BIOL-K 341 / BIOL-K 342, CHEM-C 105/CHEM-C 125 / CHEM-C 106/CHEM-C 126, and PHYS-P 201 / PHYS-P 202. No grade below C- will be accepted in any of these courses.

Area IIID Analytical Reasoning Competency (12 cr.) MATH-I 231 / MATH-I 232 or MATH-I 165 / MATH-I 166, CSCI-N 207 or another CSCI course approved by the Department of Earth and Environmental Sciences; and STAT-I 301, SPEA-K 300, or a course in statistics approved by the Department of Earth and Environmental Sciences. No grade below C- will be accepted in any of these courses.

Note: Computer Science CSCI-N 100 level courses do not count for credit toward any degree in the School of Science. Also, CSCI-N 241 and CSCI-N 299 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-G 107 / GEOL-G 117 Environmental Geology Lecture and Laboratory
- GEOL-G 205 Reporting Skills in Geoscience (or 300+ GEOL, PBHL, SPEA, or GEOG with approval if GEOL-G 205 is used as the second composition course.

- GEOG-G 208 Environment & Society or PBHL-A 115 Environment and Human Health
- PBHL-P 237 Environmental Ethics
- GEOG-G 303 Weather and Climate
- GEOL-G 306 Earth Materials
- GEOL-G 406 Introduction to Geochemistry
- GEOL-G 436 Earth Observation from Space
- GEOL-G 477 Climate Change and Society
- GEOG-G 315 Environmental Conservation or SPEA-V 311 Natural Resources and Environmental Policy
- HIST-A 410 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-G 334 Sedimentology and Stratigraphy
- GEOL-G 430 Principles of Hydrology
- One GEOL-G 300 or higher course

One (1) concentration elective course, chosen from the following:

- GEOL-G 483 Isotope Geochemistry
- GEOL-G 486 Soil Biogeochemistry
- BIOL-K 411 Global Change Biology
- GEOL-G 415 Geomorphology
- Other applicable topic courses as approved by advisor

One (1) capstone course, chosen from the following:

- GEOL-G 420 Regional Geology Field Trip
- GEOL-G 460 Internship
- GEOL-G 467 GeoHealth: When our Health Collides with our Environment
- GEOL-G 488 Global Cycles
- GEOL-G 495 Senior Thesis
- Or another GEOL-G, GEOG-G, or SPEA-V class with department approval

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-G 336 Environmental Remote Sensing
- GEOL-G 338 Introduction to GIS
- GEOG-G 337 Computer Cartography and Graphics or GEOL-G 415 Geomorphology
- Two (2) courses chosen from:
  - GEOG-G 436 Advanced Remote Sensing
  - GEOG-G 438 Advanced Geographic Information Science
  - GEOL-G 487 Remote Sensing of Global Change
  - GEOG-G 311 Research Methods in Geography
- One capstone course, chosen from the following:
  - GEOL-G 420 Regional Geology Field Trip
  - GEOG-G 439 GIS and Environmental Analysis
  - GEOL-G 460 Internship
  - GEOL-G 495 Senior Thesis
  - Or another GEOL-G, GEOG-G, or SPEA-V class with department approval

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-A 316 Environmental Health Science
- SPEA-E 476 Environmental Law and Regulation
- One (1) course in Spatial Analysis, chosen from the following:
  - GEOG-G 338 Introduction to GIS
  - GEOG-G 438 Advanced GIS
  - GEOG-G 439 GIS and Environmental Analysis
  - PBHL-A 441 Public Health Applications of GIS
- Two (2) concentration elective courses, chosen from the following:
  - GEOG-G 315 Environmental Conservation
  - PBHL-A 415 Explosions, Collapses, and Toxic Spills
  - PBHL-A 430 eWaste, Toxic Materials and Conflict Minerals
  - PBHL-A 435 Energy, Climate Change, Resilience and Health
  - PBHL-A 445 Global Health and Sustainable Development
  - SPEA-V 310 Environmental Justice
  - SPEA-V 311 Natural Resources and Environmental Policy
- One (1) capstone course, chosen from the following:
  - GEOL-G 420 Regional Geology Field Trip
  - GEOL-G 460 Internship
  - GEOL-G 467 GeoHealth: When our Health Collides with our Environment
  - GEOL-G 488 Global Cycles
  - GEOL-G 495 Senior Thesis
  - Or another GEOL-G, GEOG-G, or SPEA-V class with department approval

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 cr. required)

Sample Plan of Study

- **Freshman Year**

First Semester	
SCI-BE 499 Sustainability TLC (GEOL-G 107, SPEA-V 222, SCI-I 120)	7
GEOL-G 117 Laboratory: Earth and Our Environment	1
CHEM-C 105 Principles of Chemistry I/CHEM-C 125 Experimental Chemistry	5
ENG-W 131 Reading, Writing and Inquiry	3
1 credit elective	1
Total	**17**
Second Semester	
CHEM-C 106 Principles of Chemistry II/CHEM-C 126 Experimental Chemistry II	5
GEOG-G 208 Environment & Society or PBHL-A 115 Environment & Human Health	3
Calculus I	3
COMM-R 110 Fundamentals of Speech Communication	3
Cultural Understanding Course	3
Total	**17**

Sophomore Year

Third Semester	
GEOL-G 205 Reporting Skills in Geoscience (as 2nd composition course)	3
PBHL-P 237 Environmental Ethics	3
Calculus II	3
CSCI-N 207 Data Analysis Using Spreadsheets	3
GEOG-G 303 Weather and Climate	3
Total	**15**
Fourth Semester	
GEOL-G 306 Earth Materials	4
PHYS-P 201 General 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-G 334 Sedimentology and Stratigraphy	5
BIOL-K 341 Principles of Ecology and Evolution Lecture	3
BIOL-K 342 Principles of Ecology and Evolution Lab	2
PHYS-P 202 General Physics 2	5
1 credit elective	1
Total	**16**
Sixth Semester	
GEOL-G 477 Climate and Society	3
CSCI-N 207 Data Analysis Using Spreadsheets	3
GEOG-G 315 Environmental Conservation or SPEA-V 311 Natural Resources and Environmental Policy	3
Upper Level GEOL, GEOG, SPEA, or PBHL elective (replace GEOL-G 205 as 2nd composition)	3
Total	**12**

Senior Year - EARTH AND WATER RESOURCES CONCENTRATION

Seventh Semester	
STAT-I 301 or SPEA-K 300 Statistics	3
GEOL-G 430 Hydrology	3
GEOL-G 436 Earth Observation from Space	3
GEOL-G 486 Soil Biogeochemistry	3
Elective	3

Total	**15**
Eighth Semester	
Concentration Elective	3
Concentration Capstone	3
HIST-A 410 American Environmental History	3
Electives	6
Total	**15**

Junior Year - REMOTE SENSING CONCENTRATION

Fifth Semester	
BIOL-K 341 Principles of Ecology & Evolution Lecture	3
BIOL-K 342 Principles of Ecology & Evolution Lab	2
PHYS-P 202 General Physics 2	5
GEOG-G 338 Introduction to GIS	3
GEOG-G 336 Introduction to Remote Sensing	3
Total	**16**
Sixth Semester	
CSCI-N 207 Data Analysis Using Spreadsheets	3
GEOL-G 477 Climate and Society	3
GEOG-G 315 Environmental Conservation or SPEA-V 311 Natural Resources and Environmental Policy	3
GEOG-G 337 Computer Cartography or GEOL-G 415 Geomorphology	3
Total	**12**

Senior Year - REMOTE SENSING CONCENTRATION

Seventh Semester	
STAT-I 301 or SPEA-K 300 Statistics	3
GEOL-G 406 Geochemistry	3
GEOL-G 436 Earth Observation from Space	3
Electives	6
Total	**15**
Eighth Semester	
Concentration Elective	3
Concentration Capstone	3
HIST-A 410 American Environmental History	3
Upper Level GEOL, GEOG, SPEA, or PBHL elective (replace GEOL-G 205 as 2nd composition)	3
Elective	3
Total	**15**

Junior Year - ENVIRONMENTAL MANAGEMENT CONCENTRATION

Fifth Semester	
BIOL-K 341 Principles of Ecology and Evolution Lecture	3
BIOL-K 342 Principles of Ecology and Evolution Lab	2
PHYS-P 202 General Physics 2	5
SPEA-E 476 Environmental Law and Regulation	3
PBHL-A 316 Environmental Health Science	3
Total	**16**
Sixth Semester	
CSCI-N 207 Data Analysis Using Spreadsheets	3
GEOL-G 477 Climate and Society	3
GEOG-G 315 Environmental Conservation or SPEA-V 311 Natural Resources and Environmental Policy	3
Concentration Elective	3
Total	**14**

Senior Year - ENVIRONMENTAL MANAGEMENT CONCENTRATION

Seventh Semester	
STAT-I 301 or SPEA-K 300 Statistics	3
Concentration Elective (Spatial Analysis)	3
GEOL-G 436 Earth Observation from Space	3
GEOL-G 406 Geochemistry	3
Elective	3

Total	**15**
Eighth Semester	
Concentration Elective	3
Concentration Capstone	3
HIST-A 410 American Environmental History	3
Upper Level GEOL, GEOG, SPEA, or PBHL elective (replace GEOL-G 205 as 2nd composition)	3
Elective	3
Total	**15**

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.

- GEOL-G 107 (3 cr.)
- GEOL-G 117 (1 cr.)
- GEOL-G 115 or GEOL-G 132 (3 cr.)
- GEOL-G 306 (4 cr.)
- Choose one (3 cr.) SPEA-V 222, SPEA-V 311, GEOG-G 303, PBHL-A 435, SPEA-E 476
- Choose one (2-3 cr.): GEOL-G 436, GEOL-G 477, GEOL-G 467, GEOL-G 415, or GEOL-G 420 British Virgin Islands Experiential Field Study

At least 9 credits must be completed at IU Indianapolis (this does not include transfer credit, AP, or CLEP credit). In addition, recommended courses include one year of college chemistry and at least one course in college algebra.

Forensic and Investigative Sciences Program

IU Indianapolis
Science Building, LD 326
402 N. Blackford Street
Indianapolis, IN 46202-3274
Phone: (317) 274-6882; fax: (317) 274-4701
Web: click here

- **Director:** Gina M. Londino-Smolar, Ed.D.
- **Undergraduate 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, the first forensic science degree program in Indiana began at IUPUI. 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, biology, and microscopy, 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 or graduate program, please contact: forsci@iu.edu or 317-274-6882.

- 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-I 120 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-W 131 Reading, Writing and Inquiry
- The second semester of English composition may be satisfied only by ENG-W 270, ENG-W 231, or ENG-W 230.

Oral Communication (3 cr.)

A minimum grade of C must be obtained.

- COMM-R 110 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 IU Indianapolis General Education Curriculum.

Area IIIC Life and Physical Sciences Competency (20 cr.)

- *Physics:* Two semesters of basic physics: PHYS-P 201 General Physics I (5 cr.) and PHYS-P 202 General Physics II (5 cr.)
  - *PHYS-I 152 and PHYS-I 251 are acceptable substitutes.*
- *Chemistry:* Two semesters of introductory college chemistry with a laboratory: CHEM-C 105 Principles of Chemistry I (3 cr.) / CHEM-C 125 Experimental Chemistry I (2 cr.) and CHEM-C 106 Principles of Chemistry II (3 cr.) / CHEM-C 126 Experimental Chemistry II (2 cr.)

Area IIID Analytical Reasoning Competency (9 cr.)

- *Mathematics:* MATH-I 231 Calculus for the Life Sciences I (3 cr.) and MATH-I 232 Calculus for the Life Sciences II (3 cr.)
  - *MATH-I 165 and MATH-I 166 are acceptable substitutes.*
  - *Students pursuing a B.S. in Chemistry must take MATH-I 165 and MATH-I 166.*
- *Computer Programming:* Choose one course from the following: CSCI-N 200, CSCI-N 201, CSCI-N 207 recommended), CSCI-N 211, or CSCI-N 301 (all are 3 cr.)

Note: Computer Science CSCI-N 100 level courses do not count for credit toward any degree in the School of Science. Also, CSCI-N 241 and CSCI-N 299 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-I 205 Concepts of Forensic Science I (3 cr.)
- FIS-I 206 Concepts of Forensic Science II (3 cr.)
- FIS-I 300 Forensic Microscopy (1 cr.)
- FIS-I 301 Forensic Microscopy Lab (2 cr.)
- FIS-I 305 Professional Issues in Forensic Science (3 cr.)
- FIS-I 415 Forensic Science and the Law (3 cr.)
- FIS-I 380 Forensic Science Professional Capstone I (Spring) (1 cr.)
- FIS-I 480 Forensic Science Capstone II (Fall) (1 cr.)

B) Required biology courses (10 cr.) A minimum grade of C- is required in both of these courses.

- BIOL-K 101 Concepts of Biology I (5 cr.)
- BIOL-K 103 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-C 341 Organic Chemistry Lectures I (3 cr.)
- CHEM-C 343 Organic Chemistry Laboratory I (2 cr.)
- CHEM-C 342 Organic Chemistry Lectures II (3 cr.)
- CHEM-C 344 Organic Chemistry Laboratory II (2 cr.)

D) Required statistics course (3 cr.) A minimum grade of C- is required in this course.

- STAT-I 301 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 of the Biology courses.

- - BIOL-K 322 Genetics and Molecular Biology (3 cr.)
  - BIOL-K 323 Genetics and Molecular Biology Laboratory (Fall) (2 cr.)
  - BIOL-K 324 Cell Biology (3 cr.)
  - BIOL-K 325 Cell Biology Laboratory (Spring) (2 cr.)
  - BIOL-K 384 Biological Chemistry (3 cr.)
  - FIS-I 420 Forensic Biology (Fall) (3 cr.)
  - FIS-I 421 Forensic Biology Laboratory (Fall) (1 cr.)
  - FIS-I 430 Forensic Genetics (Spring) (3 cr.)
  - FIS-I 431 Forensic Biology Capstone III (Spring) (1 cr.)
  - FIS-I 440 Population Genetics (Spring) (3 cr.)

F) Advanced Specialization Courses: Refer to the list below (9 cr. minimum)

Forensic Biology Concentration Advanced Specialization Course List

- ANTH-B 426 Human Osteology (3 cr.)
- ANTH-B 468 Bioarchaeology (3 cr.)
- ANTH-B 474 Forensic Anthropology, Archaeology & Taphonomy (3 cr.)
- BIOL-K 331 Developmental Biology (3 cr.)
- BIOL-K 333 Developmental Biology Laboratory (2 cr.)
- BIOL-K 338 Intro Immunology (3 cr.)
- BIOL-K 339 Immunology Laboratory (2 cr.)

- BIOL-K 341 Principles of Ecology & Evolution (Fall & even numbered Springs) (3 cr.)
- BIOL-K 342 Principles of Ecology & Evolution Laboratory (Fall) (2 cr.)
- BIOL-K 356 Microbiology (3 cr.)
- BIOL-K 357 Microbiology Laboratory (2 cr.)
- BIOL-N 217 Human Physiology (5 cr.)
- BIOL-N 261 Human Anatomy (5 cr.)
- CHEM-C 310 Analytical Chemistry (3 cr.)
- CHEM-C 311 Analytical Chemistry Laboratory (1 cr.)
- CHEM-C 360 Elementary Physical Chemistry (3 cr.)
- CHEM-C 325 Introduction to Chemistry Instrumentation (Spring) (3 cr.)
- CHEM-C 326 Introduction to Chemistry Instrumentation Lab (Spring) (2 cr.)
- CHEM-C 430 Inorganic Chemistry (3 cr.)
- CHEM-C 435 Inorganic Chemistry Laboratory (1 cr.)
- CHEM-C 485 Biosynthesis and Physiology (3 cr.)
- CHEM-C 486 Biological Chemistry Laboratory (2 cr.)
- FIS-I 400 Forensic Chemistry I (Fall) (3 cr.)
- FIS-I 401 Forensic Chemistry Laboratory I (Fall) (1 cr.)
- FIS-I 410 Forensic Chemistry II (Spring) (3 cr.)
- FIS-I 411 Forensic Chemistry Capstone III (Spring) (1 cr.)
- FIS-I 450 Forensic Science Research (1-4 cr.)
- FIS-I 495 Forensic Science Internship (0-5 cr.)
- FIS-I 496 Special Topics in Forensic Science (credit hours vary - repeatable with different topics)
- SPEA-J 260 Topics in Criminal Justice (1 cr.) (ONLY approved topics, including: 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-C 310 Analytical Chemistry (3 cr.)
  - CHEM-C 311 Analytical Chemistry Laboratory (1 cr.)
  - CHEM-C 325 Introduction to Chemistry Instrumentation (Spring) (3 cr.)
  - CHEM-C 326 Introduction to Chemistry Instrumentation Lab (Spring) (2 cr.)
    - CHEM-C 410 / CHEM-C 411 are acceptable substitutes for students pursuing a B.S. in Chemistry.
  - CHEM-C 360 Elementary Physical Chemistry (Spring) (3 cr.)
    - CHEM-C 362 is an acceptable substitute for students pursuing a B.S. in Chemistry.
  - FIS-I 400 Forensic Chemistry I (Fall) (3 cr.)
  - FIS-I 401 Forensic Chemistry I Lab (Fall) (1 cr.)
  - FIS-I 410 Forensic Chemistry II (Spring) (3 cr.)
  - FIS-I 411 Forensic Chemistry 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-B 426 Human Osteology (3 cr.)
- ANTH-B 468 Bioarchaeology (3 cr.)
- ANTH-B 474 Forensic Anthropology, Archaeology & Taphonomy (3 cr.)
- BIOL-K 322 Genetics and Molecular Biology (3 cr.)
- BIOL-K 323 Genetics and Molecular Biology Laboratory (Fall) (2 cr.)
- BIOL-K 324 Cell Biology (3 cr.)
- BIOL-K 325 Cell Biology Laboratory (Spring) (2 cr.)
- BIOL-K 331 Developmental Biology (3 cr.)
- BIOL-K 333 Developmental Biology Laboratory (1 cr.)
- BIOL-K 338 Intro Immunology (3 cr.)
- BIOL-K 339 Immunology Laboratory (2 cr.)
- BIOL-K 341 Principles of Ecology & Evolution (Fall and even numbered Springs) (3 cr.)
- BIOL-K 342 Principles of Ecology & Evolution Laboratory (Fall) (2 cr.)
- BIOL-K 356 Microbiology (3 cr.)
- BIOL-K 357 Microbiology Laboratory (2 cr.)
- BIOL-K 384 Biological Chemistry (3 cr.)
- BIOL-K 484 Cellular Biochemistry (3 cr.)
- BIOL-N 217 Human Physiology (5 cr.)
- BIOL-N 261 Human Anatomy (5 cr.)
- CHEM-C 430 Inorganic Chemistry (3 cr.)
- CHEM-C 435 Inorganic Chemistry Laboratory (2 cr.)
- CHEM-C 384 Biochemistry (3 cr.)
- CHEM-C 485 Biosynthesis and Physiology (3 cr.)
- CHEM-C 486 Biological Chemistry Laboratory (2 cr.)
- FIS-I 420 Forensic Biology I (Fall) (3 cr.)
- FIS-I 421 Forensic Biology I Laboratory (Fall) (1 cr.)
- FIS-I 430 Forensic Biology II (Spring) (3 cr.)
- FIS-I 431 Forensic Biology Capstone III (Spring) (1 cr.)
- FIS-I 440 Population Genetics (Spring) (3 cr.)
- FIS-I 450 Forensic Science Research (1-4 cr.)
- FIS-I 495 Forensic Science Internship (0-5 cr.)
- FIS-I 496 Special Topics in Forensic Science (credit hours vary - repeatable with different topics)
- SPEA-J 260 Topics in Criminal Justice (1 cr.) (ONLY approved topics, including: Death Investigation, Investigating Post Blast Crime Scene, 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-C 101 and CHEM-C 105
- MATH-I 231 and MATH-I 165
- MATH-I 232 and MATH-I 166
- PHYS-P 201 and PHYS-I 152

- PHYS-P 202 and PHYS-I 251

For example, if a student has earned credit for MATH-I 165 / MATH-I 166, the student will receive no credit for MATH-I 231 / MATH-I 232, 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-K 101 Concepts of Biology I	5
CHEM-C 105 Principles of Chemistry I	3
CHEM-C 125 Experimental Chemistry I	2
MATH-I 231 Calculus for the Life Sciences I	3
FIS-I 205 Concepts of Forensic Science I	3
SCI-I 120 Windows on Science	1
Total	**17**
Second Semester	
BIOL-K 103 Concepts of Biology II	5
CHEM-C 106 Principles of Chemistry II	3
CHEM-C 126 Experimental Chemistry II	2
MATH-I 232 Calculus for the Life Sciences II	3
FIS-I 206 Concepts of Forensic Science II	3
Total	**16**

Sophomore Year

Third Semester	
ENG-W 131 Reading, Writing and Inquiry	3
BIOL-K 322 Genetics and Molecular Biology	3
BIOL-K 323 Genetics and Molecular Biology Lab (Fall only)	2
CHEM-C 341 Organic Chemistry I	3
CHEM-C 343 Organic Chemistry Laboratory I	2
Cultural Understanding (choose from list)	3
Total	**16**
Fourth Semester	
COMM-R 110 Fundamentals of Speech Communication	3
CHEM-C 342 Organic Chemistry II	3
CHEM-C 344 Organic Chemistry Laboratory II	2
BIOL-K 324 Cell Biology	3
BIOL-K 325 Cell Biology Laboratory (Spring only)	2
FIS-I 305 Professional Issues Forensic Science	3
Total	**16**

Junior Year

Fifth Semester	
BIOL-K 384 Biological Chemistry	3
PHYS-P 201 General Physics I	5
2nd Written Communication Course	3
FIS-I 415 Forensic Science and the Law	3
Total	**14**
Sixth Semester	
FIS-I 300 Forensic Microscopy Lecture	1
FIS-I 301 Forensic Microscopy Lab	2
Advanced Science Elective	3
PHYS-P 202 General Physics II	5
FIS-I 380 Forensic Science Professional Capstone I (Spring only)	1
STAT-I 301 Elementary Statistical Methods 1	3
Total	**15**

Senior Year

Seventh Semester	
FIS-I 420 Forensic Biology I (Fall only)	3
FIS-I 421 Forensic Biology I Laboratory (Fall only)	1
FIS-I 480 Forensic Science Capstone II (Fall only)	1
Computer Programming (CSCI-N 207 recommended)	3
Advanced Science Elective	3
Arts and Humanities/Social Sciences (choose from list)	3
Total	**14**
Eighth Semester	

FIS-I 430 Forensic Genetics (Spring only)	3
FIS-I 431 Forensic Biology Capstone III (Laboratory Spring only)	1
Arts and Humanities/Social Sciences (choose from list)	6
FIS-I 440 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-K 101 Concepts of Biology I	5
CHEM-C 105 Principles of Chemistry I	3
CHEM-C 125 Experimental Chemistry I	2
MATH-I 231 Calculus for the Life Sciences	3
FIS-I 205 Concepts of Forensic Science I	3
SCI-I 120 Windows on Science	1
Total	**17**
Second Semester	
BIOL-K 103 Concepts of Biology II	5
CHEM-C 106 Principles of Chemistry II	3
CHEM-C 126 Experimental Chemistry II	2
MATH-I 232 Calculus for the Life Sciences II	3
FIS-I 206 Concepts of Forensic Science II	3
Total	**16**

Sophomore Year

Third Semester	
CHEM-C 341 Organic Chemistry I	3
CHEM-C 343 Organic Chemistry Laboratory I	2
PHYS-P 201 General Physics I	5
ENG-W 131 Reading, Writing and Inquiry	3
Cultural Understanding (choose from list)	3
Total	**16**
Fourth Semester	
CHEM-C 342 Organic Chemistry II	3
CHEM-C 344 Organic Chemistry Laboratory II	2
PHYS-P 202 General Physics II	5
FIS-I 305 Professional Issues in Forensic Science	3
COMM-R 110 Fundamentals of Speech Communication	3
Total	**16**

Junior Year

Fifth Semester	
Computer Programming (CSCI-N 207 recommended)	3
CHEM-C 310 Analytical Chemistry Lecture	3
CHEM-C 311 Analytical Chemistry Lab	1
FIS-I 300 Forensic Microscopy Lecture	1
FIS-I 301 Forensic Microscopy Lab	2
Advanced Science Elective	3
2nd written communication course	3
Total	**16**
Sixth Semester	
CHEM-C 325 Intro to Chemistry Instrumentation (Spring only)	3
CHEM-C 326 Intro to Chemistry Instrumentation Lab (Spring only)	2
STAT-I 301 Elementary Statistical Methods	3
Arts and Humanities/Social Science (choose from list)	3
FIS-I 380 Forensic Science Professional Capstone (Spring only)	1
Advanced Science Elective	3
Total	**15**

Senior Year

Seventh Semester	
FIS-I 400 Forensic Chemistry I (Fall only)	3
FIS-I 401 Forensic Chemistry I Lab (Fall only)	1
FIS-I 415 Forensic Science and the Law	3
FIS-I 480 Forensic Science Capstone II	1
Advanced Science Elective	3

Arts and Humanities/Social Sciences (choose from list)	3
Total	**14**
Eighth Semester	
FIS-I 410 Forensic Chemistry II (Spring only)	3
FIS-I 411 Forensic Chemistry Capstone III (Laboratory Spring only)	1
Advanced Science Electives	3
CHEM-C 360 Introductory Physical Chemistry (Spring only)	3
Arts and Humanities/Social Sciences (choose from list	3
Total	**13**

Minors in Forensic and Investigative Sciences

Undergraduate Minor

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-N 100 Investigating Forensic Science Lecture (1 cr.)
- FIS-N 101 Investigating Forensic Science Lab (2 cr.)
- FIS-I 205 Concepts of Forensic Science I (3 cr.)
- FIS-I 206 Concepts of Forensic Science II (3 cr.)*
- FIS-I 305 Professional Issues in Forensic Science (3 cr.)**
- FIS-I 415 Forensic Science and the Law (3 cr.)**

*P: FIS-I 205 and CHEM-C 101 or CHEM-C 105 or FIS-N 101

**P: FIS-I 205 and FIS-I 206

Choose 3 credit hours from the following courses:

- FIS-I 300 Microscopy Lecture (1 cr.) (P: FIS-I 205 and FIS-I 206)
- FIS-I 440 Population Genetics (3 cr.) (P: BIOL-K 322, BIOL-K 323, and STAT-I 301)
- FIS-I 496 Special Topics in Forensic Science (credits vary - repeatable under different topics)
- SPEA-J 303 Evidence (3 cr.) (P: SPEA-J 101)
- SPEA-J 320 Criminal Investigation (3 cr.) (P: SPEA-J 101)

Doctoral Minor in Forensic Science

The Forensic and Investigative Sciences Program offers a Ph.D. minor program in forensic science that requires 6 credit hours of selected course work. The minor provides basic knowledge of the application of science to the forensic science system via graduate coursework in either a chemistry or biological background. The doctoral minors are restricted to School of Science Ph.D. students.

Course requirements are as follows:

Required Courses (Two courses: 3 credit hours)

- FIS-I 500 Crime Scene Investigation and Quality Assurance (2 cr.)
- FIS-I 505 Overview of Forensic Biology (1 cr.) this is meant for chemistry focused students to get an overview of forensic biology concepts
- OR
- FIS-I 515 Overview of Forensic Chemistry (1 cr.) this is meant for biology focused students to get an overview of forensic chemistry concepts

Elective Courses include (Total 3 credit hours):

- FIS-I 510 Advanced Forensic Microscopy Lecture (1 cr.)
- FIS-I 540 Forensic Biology (3 cr.)
- FIS-I 560 Population Genetics (3 cr.)
- FIS-I 520 Forensic Chemistry I (3 cr.)
- FIS-I 530 Forensic Chemistry II (3 cr.)
- FIS-N 570 Design of a Research Project (2 cr.)
- FIS-I 550 Forensic Science and the Law (3 cr.)

PLEASE NOTE:

- No grade lower than B (e.g., B-) 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 IU Indianapolis.
- The doctoral minors are restricted to School of Science Ph.D. students.

Graduate Program

Master of Science in Forensic Science

Description

The M.S. Program in Forensic Science, which awards an Indiana 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 18 credit hours of course work and 12 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)."

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 **December 15** prior to 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, 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 December 15 deadline. You will be notified by mid-February 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)."

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 October 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-I 500 Crime Scene Investigation and Quality Assurance (2 cr.)
2. FIS-I 510 Forensic Microscopy Lecture (1 cr.)
3. FIS-I 511 Forensic Microscopy Lab (2 cr.)
4. FIS-I 550 Forensic Science and the Law (3 cr.)
5. FIS-I 590 Forensic Science Seminar (1 cr.)

Students in the forensic chemistry concentration (thesis and non-thesis) must take the following courses:

1. FIS-I 505 Overview of Forensic Biology (1 cr.)
2. FIS-I 520 Forensic Chemistry (3 cr.)

3. FIS-I 521 Forensic Chemistry I Lab (1 cr.)
4. FIS-I 530 Forensic Chemistry II (3 cr.)
5. FIS-I 531 Forensic Chemistry II Lab (1 cr.)

Students in the forensic biology concentration (thesis and non-thesis) must take the following courses:

1. FIS-I 515 Overview of Forensic Chemistry (1 cr.)
2. FIS-I 540 Forensic Biology I Lecture (3 cr.)
3. FIS-I 541 Forensic Biology I Lab (2 cr.)
4. FIS-I 560 Population Genetics (3 cr.)

Thesis students must take the following courses:

1. FIS-I 698 Thesis Research (9 cr.)

Non-thesis students must take the following courses:

1. FIS-N 570 Laboratory Project Design (2 cr.)
2. FIS-N 580 Forensic Science Laboratory Management (2 cr.)
3. Electives approved by department (8 cr.). This may include up to 6 credits of internship and/or research. A student may also take courses in other concentrations as part of these 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, 9 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 IU Indianapolis. Thesis research done in conjunction with a crime lab must be approved by the student's thesis director at IU Indianapolis.

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, IU Indianapolis 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, IU Indianapolis
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, Ph.D.
- **Program Advisor** Joseph L. Thompson

The purpose of the Bachelor of Science (B.S.) in Interdisciplinary Studies Program is to provide an opportunity for IU Indianapolis 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 IU Indianapolis Honors College, the IU Indianapolis Center for Research and Learning, the Consortium for Urban Education to include relevant courses taught through other Indianapolis colleges and universities, or may include specialized service learning experiences in consultation with the IU Indianapolis 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-W 131, a introductory major 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 and academic advisor.

The interdisciplinary major will comprise 40-45 credit hours of regular courses from at least two disciplines and culminate with a 3-hour 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 completed at IU Indianapolis 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-I 120 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-W 131 Elementary Composition I
- Second Composition Course that has ENG-W 131 as a prerequisite, e.g. ENG-W 270, ENG-W 230, ENG-W 231, ENG-W 320, or ENG-W 350

Speech Communication (3 cr.)

- COMM-R 110 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 IU Indianapolis General Education Curriculum.

Area IIIC Life and Physical Sciences Competency

See the School of Science requirements under “Undergraduate Programs” in this bulletin. Four (4) lecture 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 college 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-N 100 level courses not count for credit toward any degree in the School of Science. Also, CSCI-N 241 and CSCI-N 299 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

IU Indianapolis
Science Building, LD 270
402 N. Blackford Street
Indianapolis, IN 46202-3216
Phone: (317) 274-6918; fax: (317) 274-3460
Web: click here

Department Chair: Jeffrey X. Watt, Ph.D.

Department Associate Chair: Daniel Ramras, Ph.D.

Undergraduate Program Advisor: School of Science Advising Group

Graduate Advisors:
- Graduate Director: Roland Roeder, Ph.D.
- Graduate Advisor: Lisa Hastings-Smith

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

Undergraduate Degree Programs

The department offers the Indiana University Bachelor of Science degree in mathematics with options in pure mathematics, applied mathematics, actuarial science (in person or online option), applied statistics (in person or online option) and secondary school teaching.

Graduate degrees offered include the Indiana University Master of Science, with concentrations in Pure Mathematics, Applied Mathematics, Mathematics Education, Applied Statistics, and the Indiana University Doctor of Philosophy in mathematics with all requirements completed on the IU Indianapolis 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 IU Indianapolis 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-W230, or ENG-W350.

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 IU Indianapolis 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-I100, PHYS-I200, PHYS-I218, and PHYS-I219, 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-I165 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 (2.00) 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 (2.00) 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, applied statistics, 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, the Applied Mathematics Option, or the Applied Statistics 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.).

In addition to the in-person degrees offered, two online Indiana University degrees can also be completed through the Department of Mathematical Sciences.

1. The IU Online BS in Actuarial Science is an Indiana University degree that offers instruction in mathematics, actuarial mathematics, probability and statistics, finance, statistical modeling, data analysis, and software application. More information can be found here.

2. The IU Online BS in Applied Statistics is an Indiana University degree that offers instructions in solving problems in calculus, linear algebra, and calculus-based probability using statistical methods and modeling. More information can be found here.

Degree Requirements

Major Requirements

IU Online Actuarial Science Option

With this option, students will study the key concepts of insurance, risk management, and interest theory. Solve conceptual and computational problems. Learn to price-risk to determine premiums, analyze data, determine suitable models and parameter values, and provide measures of confidence. Calculate present and accumulated values for various streams of cash flow.

Please contact the academic advisor for program-specific requirements.

IU Online Applied Statistics Option

With this option, students will study differentiation, integration, infinite series, properties of univariate and multivariate random variables, and discrete and continuous distributions. Students also study:

- Statistical methods and theory
- Design of studies and exploratory data analysis
- Statistical modeling and computation
- Data analytics communication

Please contact the academic advisor for program-specific 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-I 152 (or a more advanced physics course).

The Area IV major requirements are as follows:

1. Core curriculum: MATH-I 165, MATH-I 166, MATH-I 171, MATH-I 261, MATH-I 366, and MATH-I 351
2. MATH-I 300 Logic & Foundations of Algebra
3. MATH-I 321 Elementary Topology
4. MATH-I 444 Foundations of Analysis I
5. MATH-I 453 Beginning Abstract Algebra
6. Nine (9) credit hours in the required advanced electives listed, and one additional advanced mathematics or statistics elective to be selected from 3-credit MATH courses numbered 300 and above or STAT courses numbered above 351 (STAT-I 416 is recommended). *500 level courses require departmental approval
7. Minimum of two credit hours of MATH-I 492 Capstone Experience

- MATH-I 425 Elements of Complex Analysis OR MATH-I 445 Foundations of Analysis II
- MATH-I 454 Galois Theory OR MATH-I 456 Theory of Numbers
- MATH-I 462 Elementary Differential Geometry OR MATH-I 571 Elementary Topology

Pure Mathematics Option Sample Program (120 credits required)

Freshman Year

First Semester	
MATH-I 165 Analytic Geometry and Calculus I	4
MATH-I 171 Multidimensional Mathematics	3
SCI-I 120 Windows on Science	1
ENG-W 131 Reading, Writing and Inquiry	3
World Language	4
Total	**15**
Second Semester	
MATH-I 166 Analytic Geometry and Calculus II	4
CSCI-C 200 Intro to Computers and Programming	4
COMM-R 110 Fundamentals of Speech Communication	3
Life and Physical Science (approved elective)	3
World Language	4
Total	**18**

Sophomore Year

Third Semester	
MATH-I 261 Multivariate Calculus	4
PHYS-I 152 Mechanics	4
2nd Written Communication Course	3
MATH-I 300 Logic & Foundations of Algebra	3
Secondary Area elective	3
Total	**17**
Fourth Semester	
MATH-I 366 Differential Equations	3
MATH-I 351 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-I 444 Foundations of Analysis I	3
Advanced MATH/STAT elective	3
Arts and Humanities elective(choose from list)	3
Secondary Area electives	6
Total	**15**
Sixth Semester	
MATH-I 321 Elementary Topology	3
Advanced MATH/STAT elective	3
Life and Physical Sciences (approved elective)	3
Secondary Area electives	6
Total	**15**

Senior Year

Seventh Semester	
MATH-I 453 Beginning Abstract Algebra	3
Arts & Humanities/Social Science (choose from list)	3
General electives	7
Total	**13**
Eighth Semester	
Advanced MATH/STAT elective	3
Advanced MATH/STAT elective	3

General elective	3
MATH-I 492 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-I 152 and PHYS-I 251 (or more advanced physics courses).

The Area IV major requirements are as follows:

1. Core curriculum: MATH-I 165, MATH-I 166, MATH-I 171, MATH-I 261, MATH-I 366, MATH-I 300, and MATH-I 351
2. MATH-I 414 Numerical Methods
3. Mathematical modeling: MATH-I 426 Introduction to Applied Mathematics and either MATH-I 421 Linear Programming and Optimization Techniques or MATH-I 423 Discrete Modeling
4. MATH-I 444 Foundations of Analysis I
5. Nine (9) additional credit hours selected from MATH-I 276 and 3-credit mathematics courses at the 300 level or above and statistics courses numbered 350 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-I 444 and MATH-I 445. Also, MATH-I 300 is a recommended advanced elective to be taken as a prerequisite for MATH-I 444.
7. Minimum of two credit hours of MATH-I 492 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-I 520 and MATH-I 522
- *Biomathematics: Biomathematics course and STAT-I 350 or higher
- Foundations of Analysis: MATH-I 444 and MATH-I 445
- Complex Analysis and Differential Equations: MATH-I 425 and MATH-I 520
- Abstract Algebra: MATH-I 453 and MATH-I 454
- Algebra and Number Theory: MATH-I 456 and MATH-I 453
- Linear Algebra: MATH-I 351 and MATH-I 353 or MATH-I 354
- Differential Geometry: MATH-I 462 and MATH-I 562
- *Probability and Statistics: Two statistical-type courses at the STAT-I 350 level or higher, with advisor's approval. STAT-I 416 and STAT-I 417, STAT-I 350 and STAT-I 414, or STAT-I 511 and STAT-I 512 recommended.
- *Theoretical computer science: CSCI-C 241 and CSCI-B 401

Applied Mathematics Option Sample Program (120 credits required)

Freshman Year

First Semester	
MATH-I 165 Analytic Geometry and Calculus I	4
MATH-I 171 Multidimensional Mathematics	3
SCI-I 120 Windows on Science	1
ENG-W 131 Reading, Writing and Inquiry	3
World Language	4
Total	**15**
Second Semester	
MATH-I 166 Analytic Geometry and Calculus II	4
CSCI-C 200 Intro to Computers and Programming	4
COMM-R 110 Fundamentals of Speech Communication	3
Life and Physical Science (approved elective)	3
World Language	4
Total	**18**

Sophomore Year

Third Semester	
MATH-I 261 Multivariate Calculus	4
MATH-I 300 Logic & Foundations/Algebra	3
PHYS-I 152 Mechanics	4
2nd Written Communication Course	3
Secondary area elective	3
Total	**17**
Fourth Semester	
MATH-I 366 Differential Equations (beginning Fall 2024)	3

MATH-I 351 Elementary Linear Algebra	3
PHYS-I 251 Heat, Electricity, and Optics	5
Secondary area elective	3
Total	**14**

Junior Year

Fifth Semester	
MATH-I 444 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-I 426 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-I 414 Numerical Methods	3
MATH-I 421 Linear Programming and Opt. Tech. or MATH-I 423 Discrete Modeling	3
Social Sciences (choose from list)	3
General elective	3
Total	**12**
Eighth Semester	
MATH-I 492 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-I 152 (or a more advanced physics course).

The Area IV major requirements are as follows:

1. Core Curriculum: MATH-I 165, MATH-I 166, MATH-I 171, MATH-I 261, MATH-I 266, and MATH-I 351
2. ECON-E 201 or ECON-S 201, ECON-E 202 or ECON-S 202, ECON-E 305, ECON-E 321, ECON-E 322
3. BUS-A 200, BUS-F 300, BUS-F 305
4. MATH-I 373 Mathematical Finance
5. Mathematical Modeling: MATH-I 426 Introduction to Applied Mathematics and Modeling or MATH-I 421 Linear Programming and Optimization Techniques or MATH-I 423 Discrete Modeling
6. STAT-I 416 Probability and STAT-I 417 Statistical Theory
7. Actuarial Models: STAT-I 472 and STAT-I 473
8. Two credit hour or three credit hour STAT elective at the 300 level or above (not STAT-I 301, STAT-I 350, or STAT-S 351) Suggested course: STAT-I 512 or STAT-I 371 (Prep for Actuarial Exam 1)
9. Three credit hour MATH or STAT course selected from STAT-I 421, STAT-I 433, STAT-I 512, or STAT-I 522.
10. Two or three credit hours of MATH-I 492 Capstone Experience

Actuarial Science Option Sample Program (120 credits required)

Freshman Year

First Semester	
MATH-I 165 Analytic Geometry and Calculus I	4
MATH-I 171 Multidimensional Mathematics	3
SCI-I 120 Windows on Science	1
ENG-W 131 Reading, Writing and Inquiry	3
World Language	4
Total	**15**
Second Semester	
MATH-I 166 Analytic Geometry and Calculus II	4
Arts and Humanities (choose from list)	3

COMM-R 110 Fundamentals of Speech Communication	3
Life and Physical Science (approved elective)	3
World Language	4
Total	**17**

Sophomore Year

Third Semester	
MATH-I 261 Multivariate Calculus	4
Life and Physical Science (approved elective)	3
MATH-I 373 Financial Mathematics	3
ECON-S 201 Intro to Microeconomics: Honors	3
BUS-A 200 Foundations of Accounting	3
Total	**16**
Fourth Semester	
MATH-I 351 Elementary Linear Algebra	3
MATH-I 266 Ordinary Differential Equations	3
PHYS-I 152 Mechanics	4
ECON-E 202 Intro to Macroeconomics	3
2nd Written Communication Course	3
Total	**16**

Junior Year

Fifth Semester	
STAT-I 416 Probability	3
ECON-E 305 Money and Banking	3
BUS-F 300 Introduction to Finance	3
CSCI-C 200 Intro to Computers and Programming	4
Social Sciences (choose from list)	3
Total	**16**
Sixth Semester	
STAT-I 371 Prep for Exam P/1	2
STAT-I 417 Statistical Theory	3
STAT-I 472 Actuarial Models 1	3
Arts and Humanities/Social Sciences (choose from list)	3
BUS-F 305 Intermediate Finance	3
Total	**14**

Senior Year

Seventh Semester	
STAT-I 473 Actuarial Models II	3
ECON-E 321 Intermed. Microeconomic Theory	3
MATH-I 421 Linear Prog. and Optim. Tech. or MATH-I 423 Discrete Modeling	3
STAT-I 512 Regression Analysis or STAT-I 421 Modern Statistical Methods	3
Elective or MATH-I 390 (Topics)	1
Total	**13**
Eighth Semester	
MATH-I 492 Capstone Experience	3
ECON-E 322 Intermediate Macroeconomic Theory	3
Life and Physical Science (approved elective)	3
General elective	4
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-I 165, MATH-I 166, MATH-I 171, MATH-I 261, MATH-I 266, MATH-I 351.
2. Math Major Concentration: STAT-I 416, STAT-I 417, STAT-I 421, STAT-I 512
3. Twelve (12) additional credit hours of Advanced Electives, consisting of: MATH-I 414; one of MATH-I 421 or MATH-I 423 or MATH-I 426; one of STAT-I 414 or STAT-I 433 or STAT-I 522 or STAT-I 524; and one additional 3-credit advanced MATH or STAT course. Please contact the academic advisor for options.
4. Secondary area of concentration selected by student.
5. Two or three credit hours of MATH-I 492 Capstone Experience

Freshman Year

First Semester	
MATH-I 165 Analytic Geometry and Calculus I	4
MATH-I 171 Multidimensional Mathematics	3
SCI-I 120 Windows on Science	1

ENG-W 131 Reading, Writing and Inquiry	3
World Language	4
Total	**15**
Second Semester	
MATH-I 166 Analytic Geometry and Calculus II	4
CSCI-C 200 Intro to Computers and Programming	4
COMM-R 110 Fundamentals of Speech Communication	3
Life and Physical Science (approved elective)	3
World Language	4
Total	**18**

Sophomore Year

Third Semester	
MATH-I 261 Multivariate Calculus	4
Courses for concentration or minor	6
2nd Written Communication Course	3
General elective	3
Total	**16**
Fourth Semester	
MATH-I 351 Elementary Linear Algebra	3
MATH-I 266 Ordinary Differential Equations	3
PHYS-I 152 Mechanics	4
Arts and Humanities (choose from list)	3
Course for concentration or minor	3
Total	**16**

Junior Year

Fifth Semester	
STAT-I 416 Probability	3
MATH-I 414 Numerical Methods	3
Mathematics or Statistics elective	3
Courses for concentration or minor	3
Social Sciences (choose from list)	3
Total	**15**
Sixth Semester	
STAT-I 417 Statistical Theory	3
STAT-I 421 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-I 512 Applied Regression Analysis	3
MATH-I 421 Linear Prog. & Opt. Techniques or MATH-I 423 Discrete Modeling	3
Course for concentration or minor	3
General electives	4
Total	**13**
Eighth Semester	
MATH-I 492 Capstone Experience	3
STAT-I 414 Intro to Design of Experiments or STAT-I 433 Intro to Nonparametric Statistics	3
Course for concentration or minor	3
Life and Physical Science (approved elective)	3
General elective	1
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-I 152 (or a more advanced physics course).

The Area IV major requirements are as follows:

1. Core curriculum: MATH-I 165, MATH-I 166, MATH-I 171, MATH-I 261, MATH-I 266, and MATH-I 351
2. MATH-I 276 Discrete Math
3. MATH-I 300 Logic and the Foundations of Algebra
4. MATH-I 453 Abstract Algebra
5. MATH-I 463 Intermediate Euclidean Geometry for Secondary Teachers
6. Probability and Statistics: STAT-I 350
7. MATH-I 583 History of Elementary Mathematics

8. EDUC-M 457 Methods of Teaching Senior High/ Junior High/Middle School Mathematics

Secondary School Teaching Option Sample Program (124 credits required)

Freshman Year

First Semester	
MATH-I 165 Analytic Geometry and Calculus I	4
MATH-I 171 Multidimensional Mathematics	3
SCI-I 120 Windows on Science	1
ENG-W 131 Reading, Writing and Inquiry	3
World Language	4
Total	**15**
Second Semester	
MATH-I 166 Analytic Geometry and Calculus II	4
MATH-I 276 Discrete Mathematics	3
COMM-R 110 Fundamentals of Speech Communication	3
2nd Written Communication Course	3
World Language	4
Total	**17**

Sophomore Year

Third Semester	
MATH-I 261 Multivariate Calculus	4
MATH-I 300 Logic and the Foundations of Algebra	3
EDUC-H 341 American Culture and Education	3
PSY-B 110 Introduction to Psychology	3
CSCI-C 200 Intro to Computers and Programming	4
Total	**17**
Fourth Semester	
MATH-I 266 Ordinary Differential Equations	3
MATH-I 351 Elementary Linear Algebra	3
MATH-I 583 History of Mathematics	3
PHYS-I 152 Mechanics	4
Arts and Humanities (choose from list)	3
Total	**16**

Junior Year

Education Block IIA3	
Fifth Semester	
Block I-Diversity & Learning, Content Area Literacy, Field Exp.	10
Life and Physical Science (approved electives)	6
Total	**16**
Sixth Semester	
MATH-I 463 Intermediate Euclidean Geometry for Secondary Teachers	3
Education Block IIA	7
Education Block IIB-EDUC-M 457 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-I 453 Abstract Algebra	3
STAT-I 350 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-I 152, PHYS-I 251, CHEM-C 105, and CHEM-C 106.

The Area IV major requirements are as follows:

1. Core curriculum: MATH-I 165, MATH-I 166, MATH-I 171, MATH-I 261, MATH-I 266, and MATH-I 351
2. MATH-I 300 Logic and the Foundations of Algebra
3. MATH-I 414 Numerical Methods
4. MATH-I 426 Introduction to Applied Mathematics
5. MATH-I 444 Foundations of Analysis I
6. Twelve (12) additional credit hours: three credit hours selected from MATH-I3 53/MATH-I 354/ MATH-I 453; three credit hours selected from mathematics courses at the 300 level or above and statistics courses numbered 350 or higher; three additional credit hours from mathematics or statistics, or from physics courses numbered three hundred or above; and PHYS-I 442

7. Students planning on attending graduate school in mathematics or physics are advised to take MATH-I 445 and MATH-I 453.
8. The double major in mathematics and physics also requires the following additional courses in physics: PHYS-I 299, PHYS-I 310, PHYS-I 330, PHYS-I 342, PHYS-I 353, PHYS-I 400, PHYS-I 401, PHYS-I 418.
9. Laboratory courses CHEM-C 125 and CHEM-C 126
10. Minimum of two credit hours of PHYS-I 490 Capstone Experience

Math-Physics Double Major Option Sample Program (123 credits required)

Freshman Year

First Semester	
MATH-I 165 Analytic Geometry and Calculus I	4
MATH-I 171 Multidimensional Mathematics	3
SCI-I 120 Windows on Science	1
ENG-W 131 Reading, Writing and Inquiry	3
CHEM-C 105/CHEM-C 125 Principles of Chemistry I Lecture/Lab	5
Total	**16**
Second Semester	
MATH-I 166 Analytic Geometry and Calculus II	4
COMM-R 110 Fundamentals of Speech Communication	3
PHYS-I 152 Mechanics	4
CHEM-C 106/CHEM-C 126 Principles of Chemistry II Lecture/Lab	5
Total	**16**

Sophomore Year

Third Semester	
MATH-I 261 Multivariate Calculus	4
MATH-I 300 Logic and the Foundations of Algebra	3
PHYS-I 251 Heat, Electricity & Optics	5
PHYS-I 299 Intro to Computational Physics	2
2nd Written Communication Course	3
Total	**17**
Fourth Semester	
MATH-I 266 Ordinary Differential Equations	3
MATH-I 351/MATH-I 511 Elementary Linear Algebra	3
PHYS-I 342 Modern Physics	3
CSCI-C 200 Intro to Computers and Programming	4
Social Science (choose from list)	3
Total	**16**

Junior Year

Fifth Semester	
MATH-I 444 Foundations of Analysis I	3
MATH-I 453 or MATH/STAT Elective	3
PHYS-I 310 Intermediate Mechanics	4
Arts and Humanities (Choose from List)	3
World Language	4
Total	**17**
Sixth Semester	
MATH-I 353/MATH-I 354 or MATH/STAT Elective	3
MATH-I 426 Intro to Applied Math/Modeling	3
PHYS-I 330 Intermediate Electricity & Magnetism	3
PHYS-I 353 Electronics Laboratory	2
World Language	4
Total	**15**

Senior Year

Seventh Semester	
MATH-I 414 Numerical Methods	3
PHYS-I 400 Physical Optics	3
PHYS-I 401 Physical Optics Laboratory	2
PHYS-I 442 Quantum Mechanics	3
Arts and Humanities or Social Science	3
Total	**14**
Eighth Semester	
PHYS-I 490 (Capstone)	3
PHYS-I 418 Thermal and Statistical Physics	3
MATH/STAT/PHYS elective	3
General elective	3
Total	**12**

Undergraduate and Graduate Minors in Mathematical Sciences

Undergraduate Minor

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-I 165, MATH-I 166, MATH-I 171, and MATH-I 261 (15 cr.)
2. Two additional courses (3 credit hours each) selected from mathematics courses numbered MATH-I 266 or higher or from statistics courses numbered STAT-I 350 or higher
3. Nine (9) credit hours of the minor must be completed at IU Indianapolis.
4. The grade in each course submitted for the minor must be C (2.00) 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.

Doctoral Minors

Minor in Mathematical Sciences:

This minor is intended for students who are doing their Ph.D. in departments other than Mathematical Sciences. The doctoral minors are restricted to School of Science Ph.D. students.

Requirements

A student must pass any two 3 credit 500 level MATH or STAT courses.

Minor in Algebra and Discrete Mathematics:

This minor is intended for students who are doing their Ph.D. in the Department of Mathematical Sciences and who are not specializing in the area of Algebra and Discrete Mathematics.

Requirements

A student must pass two of the following 3-credit courses:
MATH-I 518 Advanced Discrete Mathematics
MATH-I 574 Mathematical Physics I
MATH-I 674 Mathematical Physics II

Minor in Applied Mathematics:

This minor is intended for students who are doing their Ph.D. in the Department of Mathematical Sciences and who are not specializing in the area of Applied Mathematics.

Requirements

A student must pass two of the following 3-credit courses:

MATH-I 514 Numerical Analysis
MATH-I 520 Boundary Val. Problems and Differential Equations
MATH-I 522 Qual. Theory of Differential Equations
MATH-I 526 Principles of Mathematical Modeling
MATH-I 535 Theoretical Mechanics
MATH-I 552 Applied Computational Methods II
MATH-I 555 Introduction to Biomathematics
MATH-I 578 Mathematical Modeling of Physical Systems I
MATH-I 588 Mathematical Modeling of Physical Systems II

Minor in Geometry and Topology:

This minor is intended for students who are doing their Ph.D. in the Department of Mathematical Sciences and who are not specializing in the area of Geometry and Topology.

Requirements

A student must pass two of the following 3-credit courses:

MATH-I 562 Intro to Diff. Geometry and Topology
MATH-I 563 Advanced Geometry
MATH-I 571 Elementary Topology
MATH-I 572 Intro. to Algebraic Topology
MATH-I 567 Dynamical Systems I
MATH-I 667 Dynamical Systems II
MATH-I 672 Algebraic Topology I
MATH-I 673 Algebraic Topology II

Minor in Mathematical Analysis:

This minor is intended for students who are doing their Ph.D. in the Department of Mathematical Sciences and who are not specializing in the area of Mathematical Analysis.

Requirements

A student must pass two of the following 3-credit courses:

MATH-I 520 Boundary Val. Problems Differential Equations
MATH-I 523 Intro to Partial Differential Equations
MATH-I 531 Functions of a Complex Var. II
MATH-I 545 Principles of Analysis II
MATH-I 546 Intro to Functional Analysis
MATH-I 574 Mathematical Physics I
MATH-I 646 Functional Analysis
MATH-I 674 Mathematical Physics II

Minor in Statistics:

This minor is intended for students who are doing their Ph.D. in the Department of Mathematical Sciences and who are not specializing in the area of Statistics.

Requirements

A student must pass two of the following 3-credit courses:

STAT-I 512 Applied Regression Analysis
STAT-I 513 Statistical Quality Control
STAT-I 514 Design of Experiments
STAT-I 519 Introduction to Probability
STAT-I 520 Time Series and Applications
STAT-I 521 Statistical Computing
STAT-I 522 Sampling and Survey Techniques
STAT-I 523 Categorical Data Analysis
STAT-I 524 Applied Multivariate Analysis
STAT-I 525 Generalized Linear Model
STAT-I 528 Mathematical Statistics I

STAT-I 529 Bayesian Statistics and Applied Decision Theory
STAT-I 532 Elements of Stochastic Processes
STAT-I 533 Nonparametric Statistics
STAT-I 536 Introduction to Survival Analysis
STAT-I 619 Probability Theory
STAT-I 628 Advanced Statistical Inference

Graduate Programs

The Department of Mathematical Sciences offers graduate training leading to an Indiana 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 IU Indianapolis, the department also administers and offers an Indiana University Ph.D. in Biostatistics. Requirements for both Ph.D. programs are completed entirely on the IU Indianapolis 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

Details about the admission requirements are available at the section of this bulletin dedicated to graduate admissions in Mathematics (click below). This includes information about prerequisite coursework and degrees.

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.)

Transfer Credit

The Department of Mathematical Sciences may accept by transfer a maximum of 12 credit hours of graduate credit from an approved institution to an M.S. degree. A maximum of 12 credit hours in excess of undergraduate degree requirements from approved institutions may be applied to a Ph.D. degree if the applicant has not completed a master's degree; up to 30 credit hours of an awarded master's degree from an approved institution may apply to a Ph.D. degree. Transfer credit must be approved by the student's faculty advisor and the Graduate Committee.

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 IU Indianapolis 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.

A thesis option is available for both tracks, in which the 3-credit research course MATH-I 698 replaces at least one and up to three of the courses in the student's plan of study.

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-I 512, STAT-I 514, STAT-I 519, STAT-I 524, and STAT-I 528.

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-I 505), a course in analysis (MATH-I 547 or MATH-I 504), a course in geometry (MATH-I 561 or MATH-I 563), a course in probability (STAT-I 516), and a course in statistics (STAT-I 517).

A thesis option is available in which the 3-credit research course MATH-I 698 replaces at least one and up to three of the courses in the student's plan of study.

Master of Science in Computational Data Science

The objective of the Master of Science in Computational Data Science 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 consists of computer science courses from the IU Indianapolis Luddy School of Informatics, Computing, and Engineering and statistics courses from the IU Indianapolis School of Science Department of Mathematical Sciences. The curriculum requires 30 credits in total that can be completed in three semesters.

The 15 credits of core courses include 9 credits in Computer Science and 6 credits in Statistics. Electives comprise 12 credits, of which 6 credits must be chosen from Computer Science and 6 credits from Statistics. A 3-credit capstone course in Statistics or Computer Science is also required.

Successful completion of the program requires a minimum plan of study GPA of 3.00, the minimum grade in any course is C and the maximum number of courses with grades of C or C+ is two.

Core Courses:
(course number pending) Introduction to Data Science
CSCI-B 555 Machine Learning
CSCI-B 565 Data Mining
STAT-I 512 Applied Regression Analysis
STAT-I 529 Applied Decision Theory and Bayesian Analysis

Elective courses:
CSCI-B 503 Algorithm Design and Analysis
CSCI-B 561 Advanced Database Concepts
CSCI-P 558 Deep Learning
CSCI-P 573 Introduction to Scientific Computing
CSCI-P 583 Data Visualization
STAT-I 514 Design of Experiments
STAT-I 520 Time Series and Applications
STAT-I 521 Statistical Computing
STAT-I 523 Categorical Data Analysis
STAT-I 524 Applied Multivariate Analysis
STAT-I 525 Generalized Linear Models
STAT-I 536 Introduction to Survival Analysis
Capstone Course:
(course number pending) M.S. Capstone Project in Data Science
STAT-I 598 Topics in Statistical Methods

The course sequence is crucial for successful completion of this program. Students should consult with the departmental advisor.

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 MATH-I 544 Real Analysis or MATH-I 553 Abstract Algebra. 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 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 IU Indianapolis, the Department of Mathematical Sciences offers graduate training leading to a Ph.D. in Biostatistics from Indiana University, with all requirements completed on the IU Indianapolis 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-I 519, STAT-I 525, STAT-I 528, STAT-I 536, and PBHL-B 574.
- 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) 274-2846
Web: click here

- **Director** Teri L. Belecky-Adams, Ph.D.
- **Associate Director** Bethany S. Neal-Beliveau, Ph.D.
- **Undergraduate Program Advisor:** School of Science Advising Group

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 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
- Bachelor of Science 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-I 120 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-W 231 (or ENG-W 230, ENG-W 270 / ENG-W 150, ENG-W 320, or ENG-W 350).

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 (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 Social Sciences Competency: 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. NOTE: PSY-B 110 (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 (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 IU Indianapolis General Education Curriculum.

Area IIIC Life and Physical Sciences Competency (19-20 cr.)

The following courses are required:

CHEM-C 105 Principles of Chemistry I (3 cr.) and CHEM-C 125 Experimental Chemistry I (2 cr.)

CHEM-C 106 Principles of Chemistry II (3 cr.) and CHEM-C 126 Experimental Chemistry II (2 cr.)

CHEM-C 341 Organic Chemistry Lectures I (3 cr.) and CHEM-C 343 Organic Chemistry Laboratory I (2 cr.)

One of the following courses or course sequences is required:

CHEM-C 342 Organic Chemistry Lectures I (3 cr.) and CHEM-C 344 Organic Chemistry Laboratory I (2 cr.)

PHYS-I 152 Mechanics (4 cr.) **OR** PHYS-P 201 General Physics I (5 cr.) **OR** PHYS-I 218 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-I 231 / MATH-I 232 Calculus for the Life Sciences I and II (3 cr./3 cr.)

MATH-I 165 / MATH-I 166 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-N 200 Principles of Computer Science (3 cr.) **OR** CSCI-N 201 Programming Concepts (3 cr.) **OR** CSCI-N 207 Data Analysis Using Spreadsheets (3 cr.) **OR** CSCI-N 211 Introduction to Databases (3 cr.)

Note: Computer Science CSCI-N 241 and CSCI-N 299 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-K 101 Concepts of Biology I (5 cr.)
- BIOL-K 103 Concepts of Biology II (5 cr.) (P: BIOL-K 101)
- BIOL-K 324 Cell Biology (3 cr.) (P: BIOL-K 103 and CHEM-C 106)
- NSCI-K 416 or BIOL-K 416 Cellular & Molecular Neuroscience (3 cr.) (P: BIOL-K 324)
- PSY-B 110 Introduction to Psychology (3 cr.)
- NSCI-B 201 or PSY-B 201 Foundations in Neuroscience (3 cr.) (P: PSY-B 110 or BIOL-K 101)
- NSCI-B 301 or PSY-B 301 Systems Neuroscience (3 cr.) (P: PSY-B 201)

B. Statistical Research Methods(3 cr.)

- PSY-B 305 Statistics (3 cr.) (P: Math credit in School of Science and PSY-B 110)

  OR
- STAT-I 350 Introduction to Statistics (3 cr.) (P: MATH-I 166)

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-C 342 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-C 344, PHYS-I 152, and PHYS-P 201. This is not a complete list of courses that could count in more than one Area.

Biology Electives Course List

- BIOL-K 322 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-K 103 and CHEM-C 106)
- BIOL-K 331 Developmental Biology (3 cr.) (P: BIOL-K 103 and BIOL-K 322)
- BIOL-K 338 Introductory Immunology (3 cr.) (P: BIOL-K 103, BIOL-K 322, BIOL-K 324, CHEM-C 106)
- BIOL-K 384 Biological Chemistry (3 cr.) (P: BIOL-K 322 or BIOL-K 324 and CHEM-C 341)
- NSCI-K 451 or BIOL-K 451 Neuropharmacology (3 cr.) (P: BIOL-K 324)
- BIOL-K 484 Cellular Biochemistry (3 cr.) (P: BIOL-K 322 and CHEM-C 342, P or C: BIOL-K 324)
- NSCI-K 488 or BIOL-K 488 Endocrinology in Health and Disease (3 cr.) (P: BIOL-K 324 and BIOL-K 322 or approved equivalents)
- BIOL-N 461 Cadaveric Human Anatomy (only 3 cr. can count here, the other 2 in the lab requirement) (P: BIOL-N 261 or permission of instructor)
- NSCI-I 544 or BIOL-I 544 Sensory Systems (3 cr.) (P: BIOL-K 324)
- NSCI-I 559 or BIOL-I 559 Endocrinology (3 cr.)
- NSCI-I 560 or BIOL-I 560 Clinical and Molecular Aspects of Neurodegenerative Diseases (3 cr.)
- NSCI-I 561 or BIOL-I 561 Immunology (3 cr.)
- BIOL-I 568 Regenerative Biology and Medicine (3 cr.)
- NSCI-I 571 or BIOL-I 571 Developmental Neurobiology (3 cr.) (Not offered every semester)

Psychology Electives Course List

- PSY-B 334 Perception (3 cr.) (P: PSY-B 110)
- PSY-B 340 Cognition (3 cr.) (P: PSY-B 110)
- PSY-B 344 Learning (3 cr.) (P: PSY-B 110)
- PSY-B 356 Motivation (3 cr.) (P: PSY-B 110)
- PSY-B 365 Health Psychology (3 cr.) (P: PSY-B 110)
- PSY-B 380 Abnormal Psychology (3 cr.) (P: PSY-B 110)
- NSCI-B 394 or PSY-B 394 Drugs and Behavior (3 cr.) (P: PSY-B 110)
- NSCI-B 398 or PSY-B 398 Brain Mechanisms of Behavior (3 cr.) (P: PSY-B 301)
- NSCI-I 535 or PSY-I 535 Clinical Neuroscience (3 cr.)
- PSY-I 545 Psychopharmacology (3 cr.)
- PSY-I 560 Behavioral Genetics (3 cr.)

Chemistry/Physics Electives Course List

- CHEM-C 342 Organic Chemistry II (3 cr.) (If used in Area IIIC, then the course cannot apply to the Area IV Part C requirement.)
- CHEM-C 371 Chemical Informatics I (1 cr.)
- CHEM-C 372 Chemical Informatics II: Molecular Modeling (2 cr.)
- CHEM-C 484 Biomolecules and Catabolism (3 cr.)
- CHEM-C 485 Biosynthesis and Physiology (3 cr.)
- PHYS-I 152 Mechanics (4 cr.) (If used in Area IIIC, then the course cannot apply to the Area IV Part C requirement.)
- PHYS-I 251 Heat, Electricity and Optics (5 cr.)

- PHYS-P 201 General Physics I (5 cr.) (If used in Area IIIC, then the course cannot apply to the Area IV Part C requirement.)
- PHYS-P 202 General Physics II (5 cr.)
- PHYS-I 219 General Physics II (4 cr.)
- PHYS-I 585 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-K 323 Genetics and Molecular Biology Laboratory (2 cr.)
- BIOL-K 325 Cell Biology Laboratory (2 cr.)
- BIOL-K 333 Developmental Biology Laboratory (1 cr.)
- BIOL-K 339 Immunology Laboratory (2 cr.)
- NSCI-K 417 Neuroanatomy Lab (2 cr.) (P: NSCI-B 301 or NSCI-K 416)
- CHEM-C 344 Organic Chemistry Laboratory II (2 cr.) (If used in Area IIIC, then the course cannot apply to the Area IV Part C requirement.)
- CHEM-C 486 Biological Chemistry Laboratory (2 cr.)
- BIOL-N 461 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-K 493 Independent Research (minimally 2 cr.) and BIOL-K 494 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-B 499 Capstone Honors Research (2 semesters - Fall and Spring - and requires application due in Spring semester before the Fall semester starts)

  OR

- NSCI-N 490 Capstone Library Research (one semester; by application only)

  OR

- NSCI-N 491 Capstone Lab in Behavioral Neuroscience (Spring semester only)

  OR

- NSCI-N 492 Capstone in Computational Neuroscience (Fall semester only)

  OR

- NSCI-N 493 Capstone Independent Laboratory Research (minimally 3 credits over two semesters; Fall and Spring semesters only; consent of instructor required)

  OR

- NSCI-N 494 Capstone Teaching Practicum Neuroscience (Fall and Spring semesters only; consent of instructor required)

  OR

- NSCI-N 496 Clinical Experiential Neuroscience Capstone

  OR

- CHEM-C 494 Intro to Capstone in Chemistry (1 cr.) (junior standing) and CHEM-C 495 Capstone in Chemistry (1 cr.) (senior standing). Requires permission from the instructor and independent project advisor.

  OR

- MATH-I 492 Capstone Experience

  OR

- PHYS-I 490 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-I 120 Windows on Science	1
BIOL-K 101 Concepts of Biology I	5
MATH-I 231 Calculus for Life Science I	3
PSY-B 110 Introduction to Psychology	3
ENG-W 131 Reading, Writing and Inquiry	3
Total	**15**
Second Semester	
COMM-R 110 Fundamentals of Speech Communication	3
BIOL-K 103 Concepts of Biology II	5
MATH-I 232 Calculus for Life Science II	3
CHEM-C 105 Principles of Chemistry I	3
CHEM-C 125 Experimental Chemistry I	2
Total	**16**

Sophomore Year

Third Semester	
CHEM-C 106 Principles of Chemistry II	3

CHEM-C 126 Experimental Chemistry II	2
2nd Written Communications Course	3
CSCI-N 207 Data Analysis Using Spreadsheets	3
NSCI-B 201 Foundations of Neuroscience	3
Arts & Humanities (choose from list)	3
Total	**17**
Fourth Semester	
BIOL-K 324 Cell Biology	3
CHEM-C 341 Organic Chemistry I Lecture	3
CHEM-C 343 Organic Chemistry I Laboratory	2
NSCI-B 301 Systems Neuroscience	3
Social Science (choose from list)	3
Cultural Understanding (choose from list)	3
Total	**17**

Junior Year

Fifth Semester	
NSCI-K 416 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	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 an 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 201 Foundations of Neuroscience (3 cr.) P: PSY-B 110 or BIOL-K 101
- NSCI-B 301 Systems Neuroscience (3 cr.) P: NSCI-B 201
- NSCI-K 416 / BIOL-K 416 Cellular and Molecular Neuroscience (3 cr.) P: BIOL-K 324

2 Neuroscience elective courses:

One course from the Biology Elective Course List (3 cr.)

- BIOL-K 322 Genetics and Molecular Biology P: BIOL-K 103 & CHEM-C 106 (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-K 331 Developmental Biology P: BIOL-K 103 & BIOL-K 322
- BIOL-K 338 Introductory Immunology P: BIOL-K 103 & CHEM-C 106
- BIOL-K 384 Cellular Biochemistry P: CHEM-C 341 and BIOL-K 324 or BIOL-K 322
- BIOL-K 417 Neuroanatomy P: BIOL-K 416 or PSY-B 301
- BIOL-K 451 Neuropharmacology P: BIOL-K 324
- BIOL-K 483 Biological Chemistry P: CHEM-C 342
- NSCI-I 559 / BIOL-I 559 Endocrinology P: BIOL-I 556 or equivalent & CHEM-C 342
- BIOL-I 568 Regenerative Biology and Medicine P: BIOL-K 324 or BIOL-K 331 or a biochemistry course

- NSCI-I 571 / BIOL-I 571 Developmental Neurobiology P: consent of instructor (Not offered every semester.)

One course from the Psychology Elective Course List (3 cr.)

- PSY-B 334 Perception P: see below*
- PSY-B 340 Cognition P: PSY-B 110
- PSY-B 344 Learning P: see below*
- PSY-B 356 Motivation P: see below*
- PSY-B 365 Health Psychology P: see below*
- PSY-B 380 Abnormal Psychology P: see below*
- NSCI-B 394 / PSY-B 394 Drugs and Behavior P: see below*
- PSY-I 535 Developmental Neuroscience
- NSCI-I 545 / PSY-I 545 Psychopharmacology**
- NSCI-I 560 / PSY-I 560 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, neuroscience advisor, or call the science peer advisors at 317-274-6765.

Department of Psychology

IU Indianapolis
Science Building, LD 124
402 N. Blackford Street
Indianapolis, IN 46202-3275
Phone: (317) 274-6947; fax: (317) 274-6756
Web: click here

Department Chair: Stephen L. Boehm II, Ph.D.

Program Directors:

- Graduate Programs:
  - Jesse Stewart, Ph.D. (Director of Graduate Studies)
  - Cristine Czachowski, Ph.D. (Addiction Neuroscience)
  - Jane Williams, Ph.D. (Applied Social and Organizational Psychology; Industrial/ Organizational Psychology)
  - Melissa Cyders, Ph.D. (Clinical Psychology)
- Undergraduate Program:
  - Debora Herold, 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 detect light energy and generate neural signals, 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. 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 psychology (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-I 120 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-I 120, but are strongly urged to take PSY-B 303 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-W 131 Reading, Writing, and Inquiry I
- Second semester of English composition (ENG-W 231 is recommended.)
- COMM-R 110 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 Cultural 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 IU Indianapolis 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 your academic advisor or the School of Science Peer Advising 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-M 118 Finite Mathematics and CSCI-N 207 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 college algebra and trigonometry (total of 6 credit hours). In addition, one 3-cr. computer programming course is required. MATH-M 118 Finite Mathematics, MATH-M 119 Brief Survey of Calculus, and CSCI-N 207 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 your academic advisor or the School of Science Peer Advising 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 IU Indianapolis 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-B 110 Introduction to Psychology
- PSY-B 203 Ethics and Diversity in Psychology
- PSY-B 303 Career Planning for Psychology Majors

Research Methods Sequence (Two courses, one labs; 9 credit hours)

- PSY-B 305 Statistics (P: MATH-M 118 or other upper-level mathematics course)
- PSY-B 311 Research Methods in Psychology (P: PSY-B 305)

- PSY-B 312 Research Methods Lab in Psychology (P: PSY-B 305)

Psychology Foundation Courses (Four courses, 12 credit hours)

- PSY-B 310 Lifespan Development
- PSY-B 320 Behavioral Neuroscience*
- PSY-B 340 Cognition
- PSY-B 370 Social Psychology

*Students earning a double major in Psychology and Neuroscience or a minor in Neuroscience must replace PSY-B 320 with the NSCI-B 201/NSCI-B 301 sequence. Students will not receive credit for both PSY-B 320 and NSCI-B 301.

Psychology Content Courses (three courses; 9 credit hours)

Select three of the following courses:

- PSY-B 307 Tests and Measurement
- PSY-B 322 Introduction to Clinical Psychology
- PSY-B 334 Perception
- PSY-B 344 Learning
- PSY-B 346 Theories of Personality
- PSY-B 356 Motivation
- PSY-B 358 Introduction to Industrial/Organizational Psychology
- PSY-B 360 Child and Adolescent Psychology
- PSY-B 365 Health Psychology
- PSY-B 376 The Psychology of Women
- PSY-B 380 Abnormal Psychology
- PSY-B 385 Positive Psychology
- PSY-B 386 Introduction to Counseling
- PSY-B 394 Drugs and Behavior
- PSY-B 396 Alcoholism and Drug Abuse

Capstone (One course; 3 credit hours)

Select one of the following courses:

- PSY-B 433 Capstone Laboratory in Psychology
- PSY-B 454 Capstone Seminar in Psychology
- PSY-B 499 Capstone Honors Research*

*PSY-B 499 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 (including PSY-B 305 Statistics and PSY-B 311/PSY-B 312 Research Methods and Lab). 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. 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 here. 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-I 120 Windows on Science	1
PSY-B 110 Introduction to Psychology	3
ENG-W 131 Reading, Writing and Inquiry I	3
World Language (Cultural Understanding)	4
MATH-M 118 Finite Mathematics*	3
Total	**14**
Second Semester	
PSY-B 203 Ethics and Diversity in Psychology	3
COMM-R 110 Fundamentals of Speech Communication	3
World Language**	4
Life and Physical Sciences (choose from approved list)***	3
Arts and Humanities (choose from list)	3
Total	**16**

Sophomore Year

Third Semester	
PSY-B 303 Career Planning Psychology Majors	1
PSY-B 305 Statistics	3
Psychology Foundations course (choose from approved list)	3
ENG-W 231 Professional Writing Skills	3
Life and Physical Sciences (choose from approved list)	4
Total	**14**
Fourth Semester	

PSY-B 311 Research Methods in Psychology	3
PSY-B 312 Research Methods Lab	3
Psychology Foundations Course (choose from approved list)	3
CSCI-N 207 Data Analysis Using Spreadsheets	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/minor 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-M 118 must complete one or more lower-level math classes to develop the skills necessary to perform well in MATH-M 118. 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 School of Science Peer Advising Office for the approved list.

Bachelor of Science Sample Program (120 cr. required)

Freshman Year

First Semester	
SCI-I 120 Windows on Science	1
PSY-B 110 Introduction to Psychology	3
ENG-W 131 Reading, Writing and Inquiry I	3
MATH-M 119 Brief Survey of Calculus 1*	3
Life and Physical Science (choose from approved list)**	4
Total	**14**
Second Semester	
PSY-B 203 Ethics and Diversity in Psychology	3
COMM-R 110 Fundamentals of Speech Communication	3
Arts and Humanities (choose from list)	3
MATH-M 118 Finite Mathematics*	3
Life and Physical Science (choose from approved list)	3
Total	**15**

Sophomore Year

Third Semester	
PSY-B 303 Career Planning Psychology Majors	1
PSY-B 305 Statistics	3
Psychology Foundations course (choose from approved list)	3
ENG-W 231 Professional Writing Skills	3
CSCI-N 207 Data Analysis Using Spreadsheets	3
Total	**13**
Fourth Semester	
PSY-B 311 Research Methods in Psychology	3
PSY-B 312 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/experiential 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-M 118/MATH-M 119 must complete one or more lower-level math courses to develop the skills necessary to perform well in MATH-M 118/MATH-M 119. 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 School of Science Peer Advising Office for the approved list.

Undergraduate and Graduate Minors in Psychology

Undergraduate 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 coursework. Course requirements are as follows:

Required Courses (Four courses: 12 credit hours)

- PSY-B 365 Health Psychology
- PSY-B 320 Behavioral Neuroscience*
- PSY-B 370 Social Psychology
- PSY-B 380 Abnormal Psychology

*The NSCI-B 201/NSCI-B 301 sequence will count in lieu of PSY-B 320.

Elective Courses (One course; 3 credit hours)

Select one course from the following:

- PSY-B 203 Ethics and Diversity in Psychology
- PSY-B 310 Lifespan Development
- PSY-B 386 Introduction to Counseling
- PSY-B 394 Drugs and Behavior
- PSY-B 396 Alcoholism and Drug Abuse
- SOC-R 321 Women and Health
- SOC-R 381 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 IU Indianapolis.
- 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-B 110 Intro to Psychology 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 coursework. Interested students should obtain information from the School of Science Peer Advising Office. Course requirements are as follows:

Psychology Foundation Courses (Two courses; 6 credit hours)

Select two courses from the following:

- PSY-B 310 Lifespan Development
- PSY-B 320 Behavioral Neuroscience*
- PSY-B 340 Cognition

- PSY-B 370 Social Psychology

*The NSCI-B 201/NSCI-B 301 sequence will count in lieu of PSY-B 320.
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-B 203 Ethics and Diversity in Psychology
- PSY-B 307 Tests and Measurement
- PSY-B 322 Introduction to Clinical Psychology
- PSY-B 334 Perception
- PSY-B 344 Learning
- PSY-B 346 Theories of Personality
- PSY-B 356 Motivation
- PSY-B 358 Introduction to Industrial/Organizational Psychology
- PSY-B 360 Child and Adolescent Psychology
- PSY-B 365 Health Psychology
- PSY-B 375 Psychology and Law
- PSY-B 376 The Psychology of Women
- PSY-B 380 Abnormal Psychology
- PSY-B 385 Positive Psychology
- PSY-B 386 Introduction to Counseling
- PSY-B 394 Drugs and Behavior
- PSY-B 396 Alcoholism and Drug Abuse

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 IU Indianapolis.
- 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-B 110 Intro to Psychology or equivalent is a prerequisite for upper-level psychology courses.

Doctoral Minors

Minor in Diversity Science

The Department of Psychology offers a Ph.D. minor program in diversity science that requires 6 credit hours of selected course work. Course requirements are as follows:

Required Courses (Two courses: 6 credit hours)

- PSY-I 579 Foundations of Diversity Science
- PSY-I 580 Translational Science & Health Equity Interventions

PLEASE NOTE:

- No grade lower than B is acceptable for any course in the minor (e.g., B- is not acceptable.)
- A minimum of 6 credit hours in the minor must be completed at IU Indianapolis.
- Students pursuing a Ph.D. degree from a Department of Psychology program can earn a minor in Diversity Science.
- Students pursuing a Ph.D. degree from a program outside of the Department of Psychology can earn a minor in Diversity Science.
- The doctoral minor is restricted to School of Science Ph.D. students.

Minor in Psychology of Teaching

The Department of Psychology offers a Ph.D. minor program in the psychology of teaching that requires 6 credit hours of selected course work. Course requirements are as follows:

Required Courses (Two courses: 6 credit hours)

- PSY-I 595 Seminar in Teaching Psychology
- PSY-I 596 Advanced Seminar in the Psychology of Teaching

PLEASE NOTE:

- No grade lower than B is acceptable for any course in the minor (e.g., B- is not acceptable.)
- A minimum of 6 credit hours in the minor must be completed at IU Indianapolis.
- Students pursuing a Ph.D. degree from a Department of Psychology program can earn a minor in Psychology of Teaching.
- Students pursuing a Ph.D. degree from a program outside of the Department of Psychology can earn a minor in Psychology of Teaching.
- The doctoral minor is restricted to School of Science Ph.D. students.

Minor in Statistics for Social and Behavioral Sciences

The Department of Psychology offers a Ph.D. minor program in statistics for social and behavioral sciences that requires 6 credit hours of selected course work. Course requirements are as follows:

Required Courses (Two courses: 6 credit hours)

- PSY-I 600 Statistical Inference
- PSY-I 601 Correlation and Experimental Design

PLEASE NOTE:

- No grade lower than B is acceptable for any course in the minor (e.g., B- is not acceptable.)
- A minimum of 6 credit hours in the minor must be completed at IU Indianapolis.
- Students pursuing a Ph.D. degree from a Department of Psychology program cannot earn a minor in Statistics for Social and Behavioral Sciences, as the courses for this minor are already required for their Ph.D. degree.
- Students pursuing a Ph.D. degree from a program outside of the Department of Psychology can earn a minor in Statistics for Social and Behavioral Sciences.

- The doctoral minor is restricted to School of Science Ph.D. students.

Psi Chi: The International Honor Society in Psychology

To become a member of Psi Chi, an undergraduate psychology major must have completed at least 36 credit hours, earned at least 9 credit hours in psychology courses, and possess an overall GPA of 3.30 and a GPA of 3.50 in psychology classes. Transfer students must have completed at least 12 of the 36 credit hours and 9 psychology credit hours at IU Indianapolis. 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 Indiana University Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degree programs. 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 typically 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 research and/or teaching 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 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 industrial/organizational 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. 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 industrial/organizational psychology or related subdisciplines 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 evidence-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 disabilities and illness; develop and assess theoretical models that attempt to understand how behavior, health, and illness interact; and develop and evaluate treatment approaches. As practitioners, we assess individuals and their environment, plan and implement psychosocial interventions, and monitor their progress over time. The program emphasizes the acquisition of the methods, theories, and knowledge of behavioral science along with the practitioner skills of clinical psychology. As a program, we offer specialization training in three areas within clinical psychology: clinical health psychology, diversity science, and dual diagnosis (i.e., severe mental illness/psychiatric rehabilitation and substance use). Within these areas, there is a strong emphasis on research, and the program adheres to a clinical science model of training. Graduates of the Program will be qualified to assume positions as academics, evaluators, researchers, trainers, planners,

consultants, and direct clinical service providers. Full-time study and a minimum of 90 credit hours (post-baccalaureate) are required, and it is expected that it will take six to seven years to complete the program. The program includes a diverse training in psychology, including a psychology core, statistics and measurement, ethics and diversity, clinical psychology internships and practica, and an empirical thesis and doctoral dissertation.

Financial Support

Financial support for eligible graduate students at both the M.S. and Ph.D. levels is available through teaching and research assistantships and fellowships. Full assistantships require 20 hours of work per week and include salary, full tuition remission, and health insurance.

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, or neuroscience) are encouraged to apply, although other degrees along with appropriate coursework 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

A bachelor’s degree from an accredited institution is required. Admission to the Ph.D. Program is competitive and only under unusual circumstances will students be considered for admission if they do not meet the following minimum standards: (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 the field of clinical psychology. Prior research experience is strongly recommended. 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 research methods, statistics, and abnormal psychology 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).

Admission Information

Students are admitted only for Fall enrollment, and the deadline for receipt of application materials is specific to each graduate program:

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

Students interested in information about admission to graduate programs in psychology should visit the Psychology Department webpage here for information on admission requirements and application instructions. Questions may be emailed to the graduate program coordinator at gradpsy@iu.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 one of the Ph.D. programs. Transfer hours will be accepted only if they are appropriate and judged acceptable by the student’s plan-of-study committee.

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 IU Graduate School Indianapolis 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, 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 research in the areas of clinical psychology, industrial/organizational psychology, and social psychology. Separate animal quarters and modern laboratories are also available to support research in neuroscience. Internship and practicum sites are available at the Indiana University School of Medicine/Indiana University Health and numerous other organizations in the Indianapolis metropolitan area.

Research Interests of Faculty

Major research interests of faculty include social psychology, industrial/organizational psychology, diversity science, measurement theory and development, program planning and evaluation, clinical psychology, health psychology/behavioral medicine, 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 of Psychology.

Department of Physics

IU Indianapolis
Science Building, LD 154
402 N. Blackford Street
Indianapolis, IN 46202-3273
Phone: (317) 274-6900; fax: (317) 274-2393
Web: click here

Department Chair: Ricardo S. Decca, Ph.D.

Department Advisors:

- Undergraduate Programs: Rebecca Burris, MSW
- 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 Indiana University. In addition, the department offers courses in physics and astronomy for nonmajors. The department also offers graduate courses that lead to an Indiana University Master of Science and an Indiana University Ph.D. degree.

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 Indiana University Center for Space Symmetries, the Center for Quantum Technologies 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-I490.

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-I140: Focused short courses for students in all majors.
- PHYS-I100: For students in allied health, business, and liberal arts (a traditional survey course).
- PHYS-I200: For students in education, SPEA, and liberal arts (a nontraditional course).
- PHYS-I218 / PHYS-I219: A noncalculus sequence for technology students.
- PHYS-P201 / PHYS-P202: A noncalculus sequence for preprofessional students.
- PHYS-I152 / PHYS-I251 / PHYS-I342: For students in science and mathematics requiring a calculus-based sequence.

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-I 120 Windows on Science (1 cr.) or an equivalent first-year experience course.

Area I English Composition and Communication Competency

ENG-W 131 or ENG-W 140 Reading Writing and Inquiry (3 cr.) with a grade of C (2.00) or higher.

The second semester of English composition may be satisfied with ENG-W 230, ENG-W 231, ENG-W 250, ENG-W 270, ENG-W 331 or ENG-W 350 with a grade of C (2.00) or higher.

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 and the dual major Physics-Math degree.

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 IU Indianapolis 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-C 105/CHEM-C 125 and CHEM-C 106/CHEM-C 126 with laboratory or their approved equivalent.

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-I 165, MATH-I 166, MATH-I 171, MATH-I 261 and MATH-I 266 and two (2) additional courses beyond MATH-I 266.

The computer programming requirement (3 - 4 cr.) of the School of Science may be satisfied with CSCI-C 200, CSCI-C 304 or any higher-level CSCI course (with advisor or department approval). Students with significant programming experience may request authorization to satisfy this requirement with other courses.

Note: Computer Science CSCI-N 241 and CSCI-N 299 do not count in Area IIID, but may count as a general elective.

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; and a B.S. dual accelerated major in physics and mathematics.

Students pursuing the traditional program must complete PHYS-I 152, PHYS-I 251, PHYS-I 299, PHYS-I 300, PHYS-I 310, PHYS-I 330, PHYS-I 342, PHYS-I 353, PHYS-I 400, PHYS-I 401, PHYS-I 418, PHYS-I 442, and PHYS-I 490. These students must complete 6 hours of mathematics above the level of MATH-I 266 in courses approved by the Department of Physics.

Students pursuing the biophysics option must complete: Introductory course sequence PHYS-P 201 or PHYS-I 152, PHYS-P 202 or PHYS-I 251, PHYS-I 299, PHYS-I 310, PHYS-I 330, PHYS-I 342, PHYS-I 353, PHYS-I 442, PHYS-I 585, and PHYS-I4 90 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-I 266.

Students pursuing the teaching option must complete: PHYS-I 152, PHYS-I 251, PHYS-I 300, PHYS-I 310, PHYS-I 330, PHYS-I 342, PHYS-I 353, and PHYS-I 490. 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-I 266 in courses approved by the Department of Physics.

Students pursuing the program in physics and mathematical sciences must complete PHYS-I 152, PHYS-I 251, PHYS-I 299, PHYS-I 310, PHYS-I 330, PHYS-I 342, PHYS-I 353, PHYS-I 400, PHYS-I 401, PHYS-I 418 and PHYS-I 442. Students must complete the MATH sequence up to MATH-I 266 and MATH-I 351, MATH-I 300, MATH-I 414, MATH-I 426 and MATH-I 444. Additionally, students must take twelve (12) additional credit hours: three credit hours selected from MATH-I 353/MATH-I 354/MATH-I 453; three credit hours selected from mathematics courses at the 300 level or above and statistics courses numbered 350 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.

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-I 120 Windows on Science (1 cr.) or an equivalent first-year experience course.

Area I English Composition and Communication Competency

Written Communication (6 cr.)

ENG-W 131 or ENG-W 140 Reading Writing and Inquiry (3 cr.) with a grade of C (2.0) or higher.

The second semester of English composition may be satisfied with ENG-W 230, ENG-W 231, ENG-W 250, ENG-W 270, ENG-W 331 or ENG-W 350 with a grade of C (2.0) or higher.

Speech Communication Competency

COMM-R 110 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 (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 IU Indianapolis General Education Curriculum.

Area IIIC Life and Physical Sciences Competency

Chemistry Courses

Complete CHEM-C 105/CHEM-C 125 (5 credits) and CHEM-C 106/CHEM-C 126 (5 credits) with a grade of C- or better in each course.

Science Electives

Complete two additional approved courses in biology, chemistry, forensic science, or geology (6 credits).

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 (27 credits)

Required Math courses

Complete MATH-I 165, MATH-I 166, MATH-I 171, MATH-I 261, and MATH-I 266 with a grade of C- or higher in each course.

Math Electives

Complete an additional 6 credits of mathematics beyond MATH-I 266. Please consult your advisor for approved courses.

Computer Programming course

The computer programming requirement (3-4 cr.) of the School of Science may be satisfied with CSCI-C 200, CSCI-C 304 or any higher-level CSCI course (with advisor or department approval). Students with significant programming experience may request authorization to satisfy this requirement with other courses.

Note: Computer Science CSCI-N 241 and CSCI-N 299 do not count in Area IIID, but may count as a general elective.

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 Major Requirements

Physics: A minimum of 40 credit hours of physics is required. No grade below C- is acceptable for courses within the major subject.

Introductory:

- PHYS-I 152 Mechanics (4 cr.)
- PHYS-I 251 Heat, Electricity & Optics (5 cr.)
- PHYS-I 299 Introduction to Computational Physics (2 cr.)

Intermediate/Advanced:

- PHYS-I 300 Introduction to Elementary Mathematical Physics (3 cr.)
- PHYS-I 310 Intermediate Mechanics (4 cr.)
- PHYS-I 330 Intermediate Electricity & Magnetism (3 cr.)
- PHYS-I 342 Modern Physics (3 cr.)
- PHYS-I 353 Advanced Physics Laboratory I: Modern Physics and Electronics (2 cr.)
- PHYS-I 400 Physical Optics (3 cr.)
- PHYS-I 401 Advanced Physics Laboratory II Modern Optics (2 cr.)
- PHYS-I 416 Honors Thermal & Statistical Physics (4 cr.) or PHYS-I 418 Thermal & Statistical Physics (3 cr.)
- PHYS-I 442 Quantum Mechanics (3 cr.)
- PHYS-I 490 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 IU Indianapolis

campus. Residence of at least two semesters on the IU Indianapolis 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-I 120 Windows on Science (1 cr.) or an equivalent first-year experience course.

Area I English Composition and Communication Competency

Written Communication (6 cr.)

ENG-W 131 or ENG-W 140 Reading Writing and Inquiry (3 cr.) with a grade of C (2.0) or higher.

The second semester of English composition may be satisfied with ENG-W 230, ENG-W 231, ENG-W 250, ENG-W 270, ENG-W 331 or ENG-W 350 with a grade of C (2.0) or higher.

Speech Communication Competency

COMM-R 110 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: **For the Biophysics Concentration students must complete PSY-B 110 Introduction to Psychology and SOC-R 100 Introduction to Sociology**. 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.

The additional required course from A&H / SS is satisfied with one of the courses above under Social Sciences.

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 IU Indianapolis 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-I 165, MATH-I 166, MATH-I 171, MATH-I 261, and MATH-I 266.

The computer programming requirement (3-4 cr.) of the School of Science may be satisfied with CSCI-C 200, CSCI-C 304 or any higher-level CSCI course (with advisor or department approval). Students with significant programming experience may request authorization to satisfy this requirement with other courses.

Note: Computer Science CSCI-N 241 and CSCI-N 299 do not count in Area IIID, but may count as a general elective.

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 (Biophysics) Concentration Requirements

Chemistry: A minimum of 21 credit hours is required.

Introductory:

- CHEM-C 105 Principles of Chemistry I (3 cr.)
- CHEM-C 125 Experimental Chemistry I (2 cr.)
- CHEM-C 106 Principles of Chemistry II (3 cr.)
- CHEM-C 126 Experimental Chemistry II (2 cr.)

Intermediate:

- CHEM-C 341 Organic Chemistry I (3 cr.)
- CHEM-C 343 Organic Chemistry I Laboratory (2 cr.)
- CHEM-C 342 Organic Chemistry II (3 cr.)
- CHEM-C 360 Elementary Physical Chemistry (3 cr.) - OR - CHEM-C 361 Physical Chemistry of Bulk Matter (3 cr.)

CHEM-C 344 Organic Chemistry II (3 cr.) is not required, but is recommended.

Biology: A minimum of 13 credit hours of biology is required.

Introductory:

- BIOL-K 101 Concepts of Biology I (5 cr.)
- BIOL-K 103 Concepts of Biology II (5 cr.)

Advanced:

- BIOL-K 384 Biochemistry (3 cr.) (P: BIOL-K 322 or BIOL-K 324) -OR-
- CHEM-C 484 Biomolecules and Catabolism (3 cr.) (P: CHEM-C 342)

Physics: A minimum of 32 credit hours of physics is required.

Introductory:

- PHYS-P 201 General Physics I (5 cr.) and PHYS-P 202 General Physics II (5 cr.) -OR-
- PHYS-I 152 Mechanics (4 cr.) and PHYS-I 251 Heat, Electricity & Optics (5 cr.)

- PHYS-I 299 Introduction to Computational Physics (2 cr.)

Intermediate/Advanced:

- PHYS-I 310 Intermediate Mechanics (4 cr.)
- PHYS-I 330 Intermediate Electricity & Magnetism (3 cr.)
- PHYS-I 342 Modern Physics (3 cr.)
- PHYS-I 353 Electronics Laboratory (2 cr.)
- PHYS-I 442 Quantum Mechanics (3 cr.)
- PHYS-I 585 Introduction to Molecular Biophysics (3 cr.)
- PHYS-I 490 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 IU Indianapolis campus. Residence of at least two semesters on the IU Indianapolis 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-I 120 Windows on Science (1 cr.) or an equivalent first-year experience course.

Area I English Composition and Communication Competency

ENG-W 131 or ENG-W 140 Reading Writing and Inquiry (3 cr.) with a grade of C (2.00) or higher.

The second semester of English composition may be satisfied with ENG-W 230, ENG-W 231, ENG-W 250, ENG-W 270, ENG-W 331 or ENG-W 350 with a grade of C (2.00) or higher.

Area II World Language Competency

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 IU Indianapolis General Education Curriculum.

Area IIIC Life and Physical and Sciences Competency

Courses taken to satisfy the Area IIIC requirements must include PHYS-I 152, PHYS-I 251, CHEM-C 105, and CHEM-C 106.

Area IIID Analytical Reasoning Competency (21 credits)

Courses taken to satisfy the Area IIID requirements must include MATH-I 165, MATH-I 166, MATH-I 171, MATH-I261, and MATH-I 266.

The computer programming requirement (3 cr.) of the School of Science will be satisfied with CSCI-C 200.

Note: Computer Science CSCI-N 241 and CSCI-N 299 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-I 299, PHYS-I 310, PHYS-I 330, PHYS-I 342, PHYS-I 353, PHYS-I 400, PHYS-I 401, PHYS-I 418.
2. The calculus sequence: MATH-I 165, MATH-I 166, MATH-I 171, MATH-I 261, MATH-I 266, and MATH-I 351.
3. Additional math requirements: MATH-I 300, MATH-I 414, MATH-I 426, MATH-I 444.
4. Twelve (12) additional credit hours: three credit hours selected from MATH-I 353/MATH-I 354/ MATH-I 453; three credit hours selected from mathematics courses at the 300 level or above and statistics courses numbered 350 or higher; three additional credit hours from mathematics or statistics, or from physics courses numbered three hundred or above; and PHYS -I 442.
5. Students planning on attending graduate school in mathematics or physics are advised to take MATH-I 445, MATH-I 453, and PHYS-I 442.
6. Laboratory courses CHEM-C 125 and CHEM-C 126.
7. Minimum of two credit hours of PHYS-I 490 Capstone Experience.

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-C 105 Principles of Chemistry I	3
CHEM-C 125 Experimental Chemistry I	2
MATH-I 165 Analytic Geometry and Calculus I	4

MATH-I 171 Multidimensional Mathematics	3
ENG-W 131 Reading, Writing and Inquiry	3
SCI-I 120 Windows on Science	1
Total	**16**
Second Semester	
PHYS-I 152 Mechanics	4
CHEM-C 106 Principles of Chemistry II	3
CHEM-C 126 Experimental Chemistry II	2
MATH-I 166 Analytic Geometry and Calculus II	4
COMM-R 110 Fundamentals of Speech Communication	3
Total	**16**

Sophomore Year

Third Semester	
PHYS-I 251 Heat, Electricity & Optics	5
PHYS-I 299 Intro to Computational Physics	2
MATH-I 261 Multivariate Calculus	4
CSCI-C 200 Intro to Computers and Programming	4
Arts & Humanities (choose from list)	3
Total	**18**
Fourth Semester	
PHYS-I 300 Intro. to Elem. Math Physics	3
PHYS-I 342 Modern Physics	3
MATH-I 266 Ordinary Differential Equations	3
2nd Written Communication Course	3
Social Sciences (choose from list)	3
Total	**15**

Junior Year

Fifth Semester	
PHYS-I 310 Intermediate Mechanics	4
MATH Course (MATH-I 351 or MATH-I 511)*	3
Arts & Humanities/Social Sciences (choose from list)	3
Cultural Understanding (choose from list)	3
Elective	3
Total	**16**
Sixth Semester	
PHYS-I 330 Intermediate Electricity and Magnetism	3
PHYS-I 353 Electronics Laboratory	2
MATH Course Above 266 (MATH-I 351 or MATH-I 511)*	3
Life and Physical Science (approved elective)	3
Elective	3
Total	**14**

Senior Year

Seventh Semester	
PHYS-I 400 Physical Optics	3
PHYS-I 401 Physical Optics Laboratory	2
PHYS-I 442 Quantum Mechanics	3
Life and Physical Science (approved elective)	3
Elective	2
Total	**13**
Eighth Semester	
PHYS-I 418 Thermal & Statistical Physics	3
PHYS-I 490 Capstone Experience	3
Electives	6
Total	**12**

*MATH-I 351 Elem. Linear Algebra or MATH-I 511 Linear Algebra with Applications is strongly encouraged.

Biophysics Option Sample Program (minimum 120 cr. required)

Freshman Year

First Semester	
CHEM-C 105 Principles of Chemistry I	3
CHEM-C 125 Experimental Chemistry I	2
MATH-I 165 Analytic Geometry and Calculus I	4
ENG-W 131 Reading, Writing and Inquiry	3
COMM-R 110 Fundamentals of Speech Communication	3
SCI-I 120 Windows on Science	1
Total	**16**
Second Semester	
PHYS-P 201 General Physics I or PHYS-I 152 Mechanics	4-5

CHEM-C 106 Principles of Chemistry II	3
CHEM-C 126 Experimental Chemistry II	2
MATH-I 166 Analytic Geometry and Calculus II	4
MATH-I 171 Multidimensional Mathematics	3
Total	**16-17**

Sophomore Year

Third Semester	
PHYS-P 202 General Physics II or PHYS-I 251 Heat, Electricity & Optics	5
CHEM-C 341 Organic Chemistry I	3
CHEM-C 343 Organic Chemistry Laboratory I	2
MATH-I 261 Multivariate Calculus	4
PHYS-I 299 Intro to Computational Physics	2
Total	**16**
Fourth Semester	
BIOL-K 101 Concepts of Biology I	5
CHEM-C 342 Organic Chemistry II	3
CHEM-C 344 Organic Chemistry Laboratory II (recommended, not required)	2
PHYS-I 342 Modern Physics	3
PHYS-I 353 Electronics Laboratory	2
MATH-I 266 Ordinary Differential Equations	3
Total	**18**

Junior Year

Fifth Semester	
BIOL-K 103 Concepts of Biology II	5
PHYS-I 310 Intermediate Mechanics	4
Cultural Understanding (choose from list)	3
PSY-B 110 Introduction to Psychology	3
Total	**15**
Sixth Semester	
PHYS-I 330 Interm. Electricity & Magnetism	3
CHEM-C 360 Intro. Physical Chemistry or CHEM-C 361 Physical Chem Bulk Matter	3
SOC-R 100 Introduction to Sociology	3
ENG-W 270 Argumentative Writing	3
Total	**12**

Senior Year

Seventh Semester	
CHEM-C 484 Biomolecules and Catabolism	3
PHYS-I 442 Quantum Mechanics	3
PHYS-I 585 Intro to Molecular Biophysics	3
PHYS-I 490 Capstone Experience	3
Elective	3
Total	**15**
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-C 105 Principles of Chemistry I	3
CHEM-C 125 Experimental Chemistry I	2
MATH-I 165 Analytic Geometry and Calculus I	4
MATH-I 171 Multidimensional Mathematics	3
ENG-W 131 Reading, Writing and Inquiry	3
SCI-I 120 Windows on Science	1
Total	**16**
Second Semester	
PHYS-I 152 Mechanics	4
CHEM-C 106 Principles of Chemistry II	3
CHEM-C 126 Experimental Chemistry II	2
MATH-I 166 Analytic Geometry and Calculus II	4
COMM-R 110 Fundamentals of Speech Communication	3

Total	**16**

Sophomore Year

Third Semester	
PHYS-I 251 Heat, Electricity & Optics	5
MATH-I 261 Multivariate Calculus	4
MATH-I 300 Logic & Foundations of Algebra	3
PHYS-I 299 Intro to Computational Physics	2
2nd Written Communication Course	3
Total	**17**
Fourth Semester	
MATH-I 266 Ordinary Differential Equations	3
MATH-I 351/MATH-I 511 Elementary Linear Algebra	3
PHYS-I 342 Modern Physics	3
CSCI-C 200 Intro to Computers and Programming	4
Social Science (choose from list)	3
Total	**16**

Junior Year

Fifth Semester	
PHYS-I 310 Intermediate Mechanics	4
MATH-I 444 Foundations of Analysis I	3
MATH-I 453 or MATH STAT Elective	3
Arts & Humanities (choose from list)	3
World Language	4
Total	**17**
Sixth Semester	
PHYS-I 330 Interm. Electricity & Magnetism	3
PHYS-I 353 Adv. Physics Laboratory I	2
MATH-I 353/MATH-I 354 or MATH/STAT Elective	3
MATH-I 426 Intro. to Applied Math/Modeling	3
World Language	4
Total	**15**

Senior Year

Seventh Semester	
PHYS-I 442 Quantum Mechanics	3
PHYS-I 400 Physical Optics	3
PHYS-I 401 Physical Optics Laboratory	2
MATH-I 414 Numerical Methods	3
Arts & Humanities or Social Science (choose from list)	3
Total	**14**
Eighth Semester	
PHYS-I 418 Thermal & Statistical Physics	3
PHYS-I 490 Capstone	3
MATH/STAT/PHYS Elective	3
General Elective	3
Total	**12**

Minor in Astronomy and Minor in Physics

Astronomy Minor

The minor in astronomy is designed to enhance and broaden the student's knowledge of science. In particular, it provides an exposure to numerous elements of a STEM curriculum. The minor will benefit those students who are interested in learning the core elements of astronomy. This naturally includes an exposure to critical thinking, high-level problem-solving skills, and mathematics. In addition, it will be advantageous to those that intend to pursue careers benefiting from knowledge of astronomy, including: science teachers, technical journalism, computer programming, artificial intelligence, instrumentation, science writing, and careers in the aerospace industry.

- AST-A 100 The Solar System (3 cr.) (Fall semester)
- AST-A 105 Stars & Galaxies (3 cr.) (Spring semester)
- AST-A 205 Quasars, Pulsars, & Black Holes (3 cr.) (Fall semester)
- AST-A 250 General Astronomy (3 cr.) (P: AST-A 100 and AST-A 105 and MATH-I 231 or MATH-I 165) (Fall semester)
- AST-A 330 Introduction to Astrophysics (3 cr.) (P: AST-A 205 and AST-A 250 and PHYS-I 152 or PHYS-P 201 and two semesters of calculus MATH-I 231 / MATH-I 232 or MATH-I 165 / MATH-I 166) (Spring semester)
- AST-A 380 Cosmology (3 cr.) (P: AST-A 250 and AST-A 250 and PHYS-I 152 or PHYS-P 201 and two semesters of calculus MATH-I 231 / MATH-I 232 or MATH-I 165 / MATH-I 166) (Spring semester)

Residency:

Correspondence courses may not be used to fulfill requirements for the minor.

Grades:
No grade below C- (1.70) is acceptable for a course in the minor. A overall minimum grade point average of C (2.00) is required in the minor.

Physics Minor

- PHYS-I 152 (4 cr.) and PHYS-I 251 (5 cr.) introductory physics sequence
- PHYS-I 299 Intro to Computational Physics (2 cr.)
- PHYS-I 342 Modern Physics (3 cr.)
- Six (6) more credit hours chosen from PHYS-I 300, PHYS-I 310, PHYS-I 330, PHYS-I 400, PHYS-I 418, PHYS-I 442 or other courses approved by the department/advisor.

Residency:
Correspondence courses may not be used to fulfill requirements for the minor.

Grades:
No grade below C (2.00) is acceptable for a course in the minor. A minimum overall grade point average of C (2.00) is required in the minor.

Graduate Programs

Graduate Program

The Department of Physics offers graduate programs leading to Indiana 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 3.00 (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, IU Indianapolis 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 IU Indianapolis 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-I 510, PHYS-I 517, PHYS-I 530, and PHYS-I 550 or equivalent) with a 3.00 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 IU Indianapolis. 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-I 698 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-I 590 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-I 600 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 2.80.

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-I 617 Statistical Mechanics; PHYS-I 630 Advanced Theory of Electricity and Magnetism; PHYS-I 660 Quantum Mechanics I; PHYS-I 661 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 IU Indianapolis. 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.

All students pursuing a Ph.D. in Physics also need to earn a minor in a sub-discipline different than the main area of research. The available options are Biophysics, Mathematical Physics, Molecular Physics, or Quantum Science.

Departments & Centers

- PREPs Careers
- Teaching Certification
- Pre-Professional Programs
- Honors Program
- Undergraduate Research
- Bachelor to MD

Pre-Professional Pathways

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 pre-professional advisor in the PREPs Office (if enrolled in a School of Science degree program; if not, see the health professions advisor in the Health and Life Sciences Advising Center).

Post-baccalaureate students may choose to take prerequisite courses through the School of Science for entry into professional health programs. These students should consult with the pre-professional advisor for help with the admission process and course selection.

Professional health programs generally require specific prerequisite courses, a strong GPA, and in many cases and entrance exam. Due to application timelines for prerequisite course completion, pre-professional students may complete degree and prerequisite course requirements in ways that deviate from the degree map. Students are strongly encouraged to plan their academic schedule in consultation with both their academic advisor and pre-professional advisor.

In addition, relevant experience including shadowing in the field, volunteering and leadership activities, undergraduate research, and paid clinical experience may be required. Students should see a pre-professional advisor to discuss opportunities and resources to build professional development skills.

Prerequisite Coursework

Each professional health program may require specific prerequisite coursework of their applicants. Science and math prerequisites are generally required to be of the level required for a science major's degree. Each program's Admissions Office is responsible for determining what coursework is required and whether individual courses completed will be accepted, including whether the program accepts AP, IB, or community college coursework. Students are encouraged to consult with the programs of their choice prior to applying for confirmation.

The courses listed below represent the prerequisite courses for most programs in the field. Students should consult the programs to which they plan to apply for any school-specific requirements not listed below.

Pre-Anesthesiologist Assistant

Course Requirement	IU Indianapolis Course
One year introductory biology with labs	BIOL-K 101 (or BIOL-K 102) and BIOL-K 103
One year introductory chemistry with labs	CHEM-C 105, CHEM-C 106, CHEM-C 125, and CHEM-C 126
One year organic chemistry with labs	CHEM-C 341, CHEM-C 342, CHEM-C 343, and CHEM-C 344
One year general physics with labs	PHYS-P 201 and PHYS-P 202 or PHYS-I 152 and PHYS-I 251
One semester human anatomy with lab	BIOL-N 261
One semester human physiology with lab	BIOL-N 217
One semester biochemistry	BIOL-K 384 or CHEM-C 484
One semester calculus	MATH-I 231 or MATH-I 165
One semester statistics (including descriptive and inferential)	STAT-I 301 or STAT-I 350 or PSY-B 305 or BIOL-L 337
Two semesters of English composition	ENG-W 131 and ENG-W 230 or ENG-W 231 or ENG-W 270

Pre-Dentistry

Course Requirement	IU Indianapolis Course
One year introductory biology with labs	BIOL-K 101 (or BIOL-K 102) and BIOL-K 103
One year introductory chemistry with labs	CHEM-C 105, CHEM-C 106, CHEM-C 125, and CHEM-C 126
One year organic chemistry with labs	CHEM-C 341, CHEM-C 342, CHEM-C 343, and CHEM-C 344
One year general physics with labs	PHYS-P 201 and PHYS-P 202 or PHYS-I 152 and PHYS-I 251
One semester human anatomy with lab	BIOL-N 261
One semester human physiology with lab	BIOL-N 217
One semester biochemistry	BIOL-K 384 or CHEM-C 484
One semester microbiology	BIOL-K 356
Two semesters of English composition	ENG-W 131 and ENG-W 230 or ENG-W 231 or ENG-W 270
One semester introductory behavioral sciences	PSY-B 110

Pre-Genetic Counseling

Course Requirement	IU Indianapolis Course
One year introductory biology with labs	BIOL-K 101 (or BIOL-K 102) and BIOL-K 103
One year introductory chemistry with labs	CHEM-C 105, CHEM-C 106, CHEM-C 125, and CHEM-C 126
One semester organic chemistry with lab	CHEM-C 341 and CHEM-C 343
One year general physics with labs	PHYS-P 201 and PHYS-P 202 or PHYS-I 152 and PHYS-I 251
One semester genetics	BIOL-K 322
One semester biochemistry	BIOL-K 384 or CHEM-C 484
One semester statistics (including descriptive and inferential)	STAT-I 301 or STAT-I 350 or PSY-B 305 or BIOL-L 337
One semester introductory behavioral sciences	PSY-B 110

Pre-Medicine

Course Requirement	IU Indianapolis Course
One year introductory biology with labs	BIOL-K 101 (or BIOL-K 102) and BIOL-K 103
One year introductory chemistry with labs	CHEM-C 105, CHEM-C 106, CHEM-C 125, and CHEM-C 126
One year organic chemistry with labs	CHEM-C 341, CHEM-C 342, CHEM-C 343, and CHEM-C 344
One year general physics with labs	PHYS-P 201 and PHYS-P 202 or PHYS-I 152 and PHYS-I 251
One semester biochemistry	BIOL-K 384 or CHEM-C 484
One semester statistics (including descriptive and inferential)	STAT-I 301 or STAT-I 350 or PSY-B 305 or BIOL-L 337
Two semesters of English composition	ENG-W 131 and

	ENG-W 230 or ENG-W 231 or ENG-W 270
One semester introductory behavioral sciences	PSY-B 110
One semester introductory social sciences	SOC-R 100

Pre-Occupational Therapy

Course Requirement	IU Indianapolis Course
One semester human anatomy with labs	BIOL-N 261
One semester human physiology with labs	BIOL-N 217
One semester statistics (including descriptive and inferential)	STAT-I 301 or STAT-I 350 or PSY-B 305 or BIOL-L 337
One semester introductory behavioral sciences	PSY-B 110
One semester lifespan human development	PSY-B 310
One semester abnormal psychology	PSY-B 380
One semester introductory social sciences	SOC-R 100
One semester medical terminology	HIM-M 330 or CLAS-C 210 or MHHS-M 325 or RADI-R 108

Pre-Optometry

Course Requirement	IU Indianapolis Course
One year introductory biology with labs	BIOL-K 101 (or BIOL-K 102) and BIOL-K 103
One year introductory chemistry with labs	CHEM-C 105, CHEM-C 106, CHEM-C 125, and CHEM-C 126
One semester organic chemistry with lab	CHEM-C 341 and CHEM-C 343
One year general physics with labs	PHYS-P 201 and PHYS-P 202 or PHYS-I 152 and PHYS-I 251
One semester microbiology with lab	BIOL-K 356 and BIOL-K 357
One semester biochemistry	BIOL-K 384 or CHEM-C 484
One semester calculus	MATH-I 231 or MATH-I 165
One semester statistics (including descriptive and inferential)	STAT-I 301 or STAT-I 350 or PSY-B 305 or BIOL-L 337
Two semesters of English composition	ENG-W 131 and ENG-W 230 or ENG-W 231 or ENG-W 270
One semester introductory behavioral sciences	PSY-B 110

Pre-Pharmacy

Course Requirement	IU Indianapolis Course
One year introductory biology with labs	BIOL-K 101 (or BIOL-K 102) and BIOL-K 103
One year introductory chemistry with labs	CHEM-C 105, CHEM-C 106, CHEM-C 125, and CHEM-C 126
One year organic chemistry with labs	CHEM-C 341, CHEM-C 342, CHEM-C 343, and CHEM-C 344
One semester general physics with lab	PHYS-P 201 and PHYS-P 202 or PHYS-I 152 and PHYS-I 251
One semester human anatomy with lab	BIOL-N 261
One semester human physiology with lab	BIOL-N 217
One semester upper-level biology (genetics, molecular biology, cell biology, or immunology)	BIOL-K 322 or BIOL-K 324 or BIOL-K 338
One semester microbiology with lab	BIOL-K 356 and BIOL-K 357
One semester biochemistry	BIOL-K 384 or CHEM-C 484
One semester calculus	MATH-I 231 or MATH-I 165
One semester statistics (including descriptive and inferential)	STAT-I 301 or STAT-I 350 or PSY-B 305 or BIOL-L 337
Two semesters of English composition	ENG-W 131 and ENG-W 230 or ENG-W 231 or ENG-W 270
One semester introductory social or behavioral sciences	PSY-B 110 or SOC-R 100
One semester speech communication	COMM-R 110
One semester economics	ECON-E 201 or ECON-E 202 or ECON-E 101

Pre-Physical Therapy

Course Requirement	IU Indianapolis Course
One semester introductory biology with lab	BIOL-K 101 (or BIOL-K 102)
One year introductory chemistry with labs	CHEM-C 105, CHEM-C 106, CHEM-C 125, and CHEM-C 126
One year general physics with labs	PHYS-P 201 and PHYS-P 202 or PHYS-I 152 and PHYS-I 251
One semester human anatomy with lab	BIOL-N 261
One semester human physiology with lab	BIOL-N 217
One semester statistics (including descriptive and inferential)	STAT-I 301 or STAT-I 350 or PSY-B 305 or BIOL-L 337
One semester introductory behavioral sciences	PSY-B 110
One semester lifespan human development	PSY-B 310
One semester medical terminology	HIM-M 330 or CLAS-C 210 or MHHS-M 325 or RADI-R 108

Pre-Physician Assistant

Course Requirement	IU Indianapolis Course
One year introductory biology with labs	BIOL-K 101 (or BIOL-K 102) and BIOL-K 103
One year introductory chemistry with labs	CHEM-C 105, CHEM-C 106, CHEM-C 125, and CHEM-C 126
One semester organic chemistry with lab	CHEM-C 341 and CHEM-C 343
One semester human anatomy with lab	BIOL-N 261
One semester human physiology with lab	BIOL-N 217
One semester upper-level biology (genetics, molecular biology, cell biology, or immunology)	BIOL-K 322 or BIOL-K 324 or BIOL-K 338
One semester microbiology with lab	BIOL-K 356 and BIOL-K 357
One semester calculus	MATH-I 231 or MATH-I 165
One semester statistics (including descriptive and inferential)	STAT-I 301 or STAT-I 350 or PSY-B 305 or BIOL-L 337
One semester introductory behavioral sciences	PSY-B 110
One semester additional social or behavioral sciences	SOC-R 100 or any PSY-B course
One semester medical terminology	HIM-M 330 or CLAS-C 210 or MHHS-M 325 or RADI-R 108

Pre-Veterinary Medicine

Course Requirement	IU Indianapolis Course
One year introductory biology with labs	BIOL-K 101 (or BIOL-K 102) and BIOL-K 103
One year introductory chemistry with labs	CHEM-C 105, CHEM-C 106, CHEM-C 125, and CHEM-C 126
One year organic chemistry with labs	CHEM-C 341, CHEM-C 342, CHEM-C 343, and CHEM-C 344
One year general physics with labs	PHYS-P 201 and PHYS-P 202 or PHYS-I 152 and PHYS-I 251
One semester genetics	BIOL-K 322
One semester microbiology with lab	BIOL-K 356 and BIOL-K 357
One semester biochemistry	BIOL-K 384 or CHEM-C 484
One semester statistics (including descriptive and inferential)	STAT-I 301 or STAT-I 350 or PSY-B 305 or BIOL-L 337
One semester speech communication	COMM-R 110
Three semesters humanities or social sciences	varies

IU Indianapolis Honors College and Science Honors

The IU Indianapolis Honors College is open to students not directly admitted as freshmen. Continuing science students with an overall grade point average (GPA) of 3.50 after their first full academic year of work can apply. Entering freshmen applicants 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 Program. 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 3.50 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-H 398 or HON-H 499), 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. HON-H 200 Introduction to Honors is required of all new Honors College students.

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 3.30 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 3.30 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 IU Indianapolis Honors College, 0124 University Library, 755 W. Michigan Street, Indianapolis, IN 46202-5164; phone (317) 274-2660; web.

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 here.

Jaime Sperandio
Director
Office of Pre-Professional and Career Preparation (PREPs)
Email: jsperan@iu.edu

Hailey Allen
Assistant Director
Employer & Career Services
Email: haimorg@iu.edu

Anna Jessen
Assistant Director
Pre-Professional Advising
Email: anjessen@iu.edu

Undergraduate Research Experiences

IU Indianapolis has established undergraduate research experiences to encourage and recognize undergraduates who participate in research projects with faculty in the school.

Undergraduate research experiences enable students to develop important problem-solving skills and experience for their future career. Students will expand their professional network, present their work at national and international events, and have the opportunity to have their work published.

Further information about undergraduate research opportunities may be found here.

Teaching Certification

Becoming a Licensed Teacher

Top quality science and mathematics teachers are in high demand, and the IU School of Education at IU Indianapolis 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. Science majors typically complete their bachelor's degree in science and then enter the Transition to Teaching Program 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 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.

The *Transition to Teaching* program enables students to earn Rules 2002 Indiana Teacher Licenses. 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 website and meet with School of Education advisors regularly.

Bachelor's to MD (B/MD) Pathway to Medicine Program

The B/MD Pathway to Medicine program is a conditional acceptance program for IU Indianapolis School of Science students to the IU School of Medicine. Incoming freshmen with a minimum unweighted high school GPA of 3.70 and a minimum combined math and verbal SAT score of 1400 (with a minimum 670 math) or a minimum ACT score of 30 are invited to apply.

Students accepted into the B/MD Pathway to Medicine program may choose to study any of the following degree programs:

- Biology (B.S. or B.A.)
- Chemistry (B.S. or B.A.)
- Forensic & Investigative Sciences (B.S.)
- Neuroscience (B.S.)
- Physics (B.S.)
- Psychology (B.S. only)

Upon admission to the B/MD program, students will be assigned an academic advisor in the School of Science and a B/MD program advisor in the School of Science Pre-Professional & Career Preparation (PREPs) Office.

Academic Tracks

Students will complete one of two academic tracks listed below. Students should consult with their B/MD advisor regarding academic plans and timeline for each track.

4+4 Track: This is the traditional pathway. Students will complete four years of undergraduate education in the School of Science and then four years of medical education in the IU School of Medicine. Students will earn one of the bachelor's degrees listed above from IU Indianapolis upon completion of their undergraduate education. Students must complete all requirements for matriculation into the IU School of Medicine and apply after their third year of undergraduate studies.

3+4 Track: This is the accelerated pathway. Students will complete all general education core requirements, medical school prerequisite coursework for IU School of Medicine, and most degree requirements in three years at the School of Science. Students will then complete four years of medical education in the IU School of Medicine. After successful completion of the first year of medical education, students will earn a Bachelor of Science in Interdisciplinary Studies from IU Indianapolis. Students must complete all requirements for matriculation into the IU School of Medicine and apply after their second year of undergraduate studies.

Program Requirements

Each student in the baccalaureate stage of the B/MD program will be reviewed at the end of each academic year for promotion to the next year in the program by the Program Promotions and Mentoring Committee. To remain in good standing in the B/MD program, students must maintain minimum cumulative and science GPAs as calculated by the American Medical College Application Service® (AMCAS®).

End of Baccalaureate Year	3+4 Track	4+4 Track
1	3.50	3.40
2	3.60	3.50
3	3.70	3.60
4	N/A	3.70

At the end of the first year in the B/MD program, students recommended for promotion to the second year will complete an interview with the IU School of Medicine MD Admissions Committee. The Committee will determine if students are promoted to the second year of the program.

Students who have been dismissed from the B/MD program will remain enrolled in their degree program at the School of Science and will be eligible to apply to the IU School of Medicine as any other IU Indianapolis student.

Admission to the IU School of Medicine

To be eligible for admission to the IU School of Medicine, students in the B/MD program must complete the following prerequisite courses:

- One year of general and organic chemistry, physics, and biology—each with lab
- One semester of biochemistry
- One semester of social science
- One semester of behavioral science

Students must complete the MCAT exam no later than September of the year prior to beginning the IU School of Medicine with a minimum composite score of 512 and no individual sub-score below 125.

Students must complete a minimum of 40 hours of approved volunteer clinical service (medical service learning and clinical shadowing) no later than October 31 of the year prior to beginning the IU School of Medicine. Clinical experiences will be approved by the School of Science B/MD advisor.

Students must complete the AMCAS® application by no later than September 1 of the year prior to beginning the IU School of Medicine.

Students who meet these requirements and are approved to matriculate into the MD will be required to make a binding commitment by October 31 of the year prior to beginning the IU School of Medicine. Campus assignments for IU School of Medicine will be as for the Early Decision Program based on academic metrics.

Courses