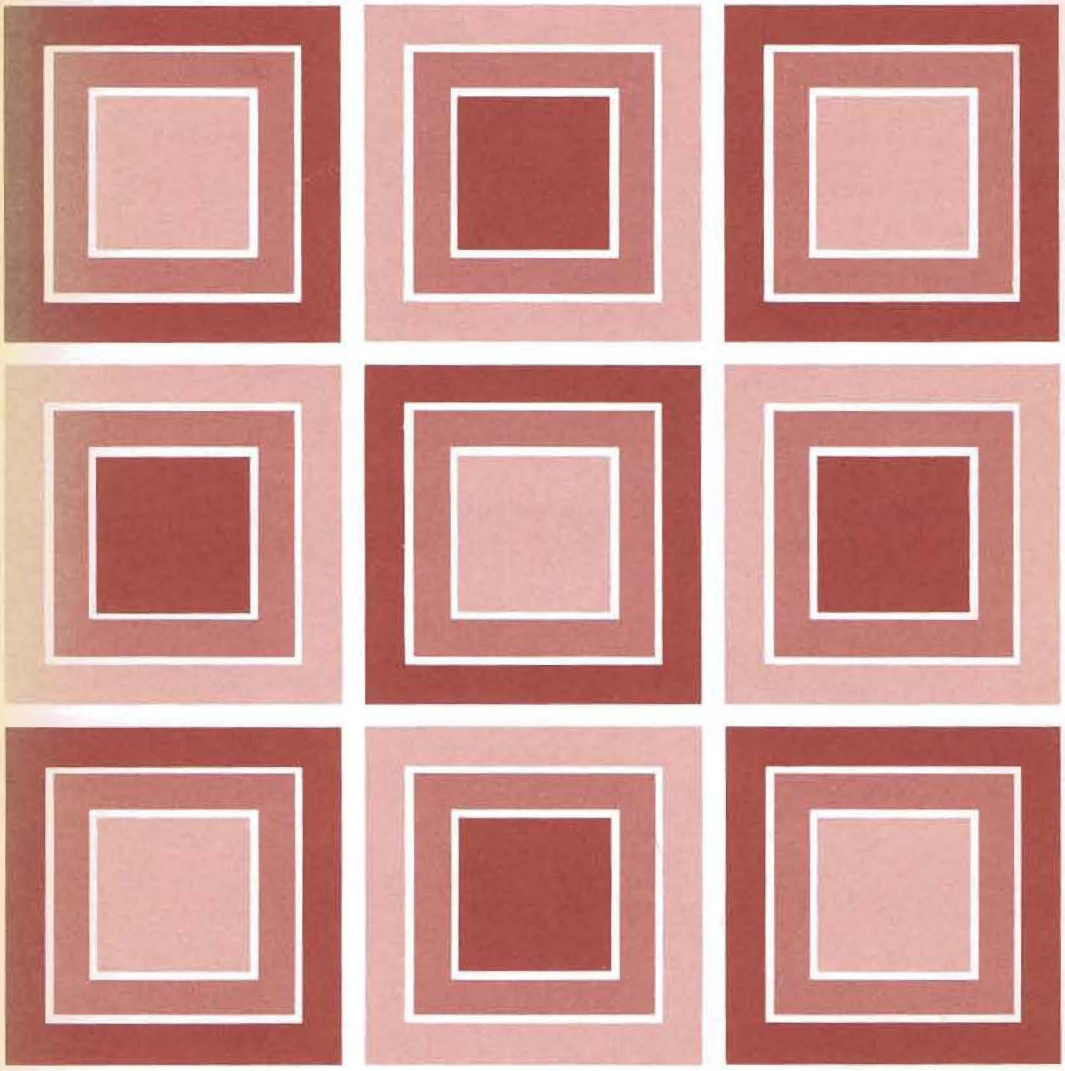
School of Science
1976-77 Bulletin

Indiana University-Purdue University
at Indianapolis



DEGREE PROGRAMS
SCHOOL OF SCIENCE

BIOLOGY

Bachelor of Arts ..... (I.U.)
- Biology

CHEMISTRY

Bachelor of Arts ..... (I.U.)
- 25 Sem. Hr. Major
- Regular Major

Bachelor of Science ..... (I.U.)
- Chemistry

Bachelor of Science ..... (P.U.)
- Chemistry
- Chemistry Major
- Chemistry Teaching

Master of Science ..... (P.U.)
- Chemistry

GEOLOGY

Bachelor of Arts ..... (I.U.)
- Geology
- Earth Science Teaching

Bachelor of Science ..... (I.U.)
- Geology

MATHEMATICAL SCIENCES

Bachelor of Science ..... (P.U.)
- Computer Science
- Mathematics
- Mathematics Teaching

Master of Science ..... (P.U.)
- Applied Computer Science
- Applied Mathematics
- Mathematics
- Mathematics (Option for Teachers)

Master of Arts ..... (P.U.)
- Teaching Mathematics

PHYSICS

Bachelor of Science ..... (P.U.)
- Physics
- Physics Teaching

PSYCHOLOGY

Bachelor of Arts ..... (I.U.)
- Psychology

Bachelor of Science ..... (P.U.)
- Psychology

Master of Science ..... (P.U.)
- Industrial Psychology
- Rehabilitation Counseling

AGRICULTURE

Master of Science ..... (P.U.)
- Extension Education

SCHOOL OF SCIENCE
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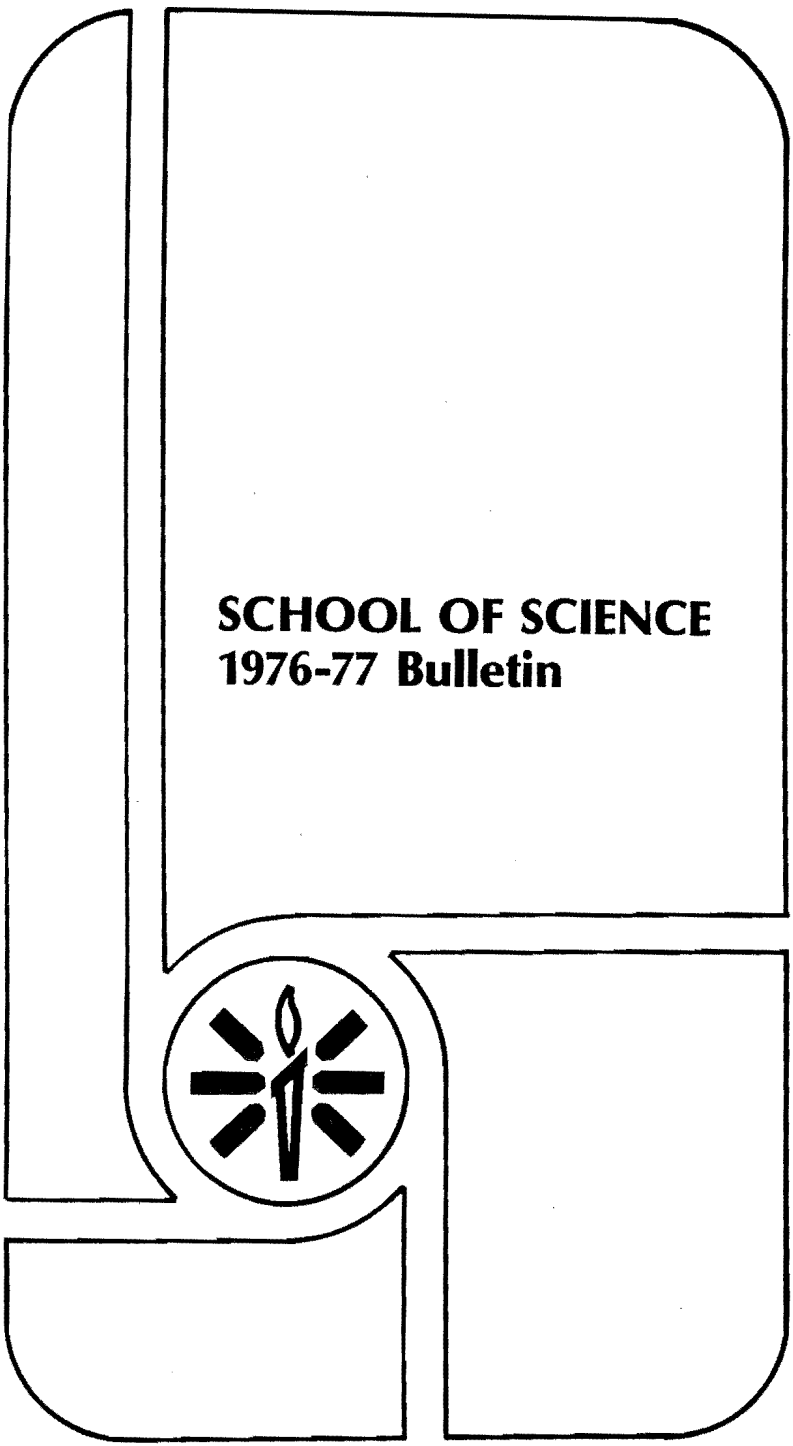

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IUPUI CALENDAR 1975-76

SUMMER SESSION I — 1976

Classes begin	M	May 10
Last day to withdraw from class with W	F	May 23
Memorial Day Holiday	M	May 31
Last day to withdraw from class	F	June 11
Classes end Summer Session I	M	June 21
Session ends	W	June 21

SUMMER SESSION II — 1976

Classes begin	M	June 28
July 4 Holiday	M	July 5
Last day to withdraw from class with W	Th	July 15
Last day to withdraw from class	Th	July 29
Classes end Summer Session II	M	Aug 9
Summer Session ends	W	Aug 11

IUPUI CALENDAR 1976-77

FALL SEMESTER — 1976

Classes begin	W	Aug 25
Labor Day Holiday	M	Sept 6
Mid-term Reports	F	Oct 15
Last day to withdraw from a class with W	W	Oct 20
Last day to withdraw from class with W or WF	W	Nov 17
Thanksgiving recess — first day	W	Nov 24
Classes resume	M	Nov 29
Classes end — last day	M	Dec 13
Exams end — last day	W	Dec 20
Semester ends	W	Dec 22

SPRING SEMESTER — 1977

Classes begin	Th	Jan 13
Mid-term reports	F	Mar 4
Spring recess	M	Mar 7
Classes resume	M	Mar 14
Last day to withdraw from class with W	F	Mar 11
Last day to withdraw from class with W or WF	F	Apr 8
Classes end — last day	W	May 4
Exams begin	Th	May 5
Exams end — last day	W	May 11
Semester ends	W	May 11
Commencement		

SUMMER SESSION I — 1977

Classes begin	M	May 16
Memorial Day Holiday	M	May 30
Last day to withdraw from class with W	M	June 6
Last day to withdraw from class with W or WF	M	June 20
Classes end Summer Session I	M	June 27
Session ends	M	June 29

SUMMER SESSION II — 1977

Classes begin	T	July 5
Last day to withdraw from class with W	F	July 22
Last day to withdraw from class with W or WF	F	Aug 5
Classes end Summer Session II	W	Aug 17
Summer Session ends	W	Aug 17

IUPUI PERSPECTIVE

Indiana University established its first extension center at Indianapolis in 1916. The Purdue University Indianapolis campus grew out of World War II training programs sponsored by Purdue and began its major operations in 1946. Indiana University established an Indianapolis regional campus in the mid-1960's. The Indianapolis unit of the Indiana University regional campus system was separated from the other units in 1968, when Indiana University at Indianapolis was created by the board of trustees. Less than a year later, in 1969, the boards of both Indiana and Purdue Universities merged their Indianapolis operations to form Indiana University-Purdue University at Indianapolis.

A restructuring of undergraduate programs at IUPUI in the fall semester, 1972, created three new schools, the School of Liberal Arts (humanities and the social sciences), the School of Science (physical, behavioral and life sciences), and the School of Engineering and Technology. Work in the School of Liberal Arts is concentrated at the University Quarter Campus on West Michigan Street. Work in the School of Engineering and Technology is centered at the University Quarter Campus while work in the School of Science is at both locations.

Because IUPUI combines the arts and sciences and the professions, including engineering and technology, it is potentially the most comprehensive public institution of higher learning in the state. This broad spectrum of educational opportunities enables its students to prepare for a wide range of careers.

IUPUI has an urban orientation. Most of its students commute, and many of its programs are directly related to metropolitan concerns and aspirations.

IUPUI divisions include the country's largest medical school, a dental school with an international reputation for its research in preventive dentistry, and the state's only graduate-degree-granting school of nursing. These, with associated teaching hospitals, clinics, and research facilities, form the state's major concentration of health care resources.

Other IUPUI units include the only graduate school of social service in the state, the country's oldest school of physical education, a law school with an urban emphasis, and a nationally recognized school of art. Purdue brought to the merger a growing complex of degree programs and the parent institution's traditional strengths in the physical sciences, engineering and technology.

Both the graduate and undergraduate divisions of IUPUI are fully and independently accredited by the North Central Association of Colleges and Secondary Schools. This assures the recognition of IUPUI credits, and graduates being able to study in virtually any school in the nation. However, because of the organization of the school, all degrees are awarded by either Indiana University, or Purdue University, depending upon the course of study.

Indiana University has the primary responsibility for the management functions of IUPUI. The chief executive officer of all Indianapolis operations is the Vice President who reports solely to the President of Indiana University.

The School of Science

The efforts of the School of Science are first of all dedicated to the fundamental purpose of every university: to provide an intellectual climate favorable to the development of productive, creative and responsible citizens. A broad program at the undergraduate level is designed to prepare students for graduate work.

In addition, undergraduate training in one or several of the sciences is considered necessary for subsequent professional work in such fields as medicine and dentistry and an excellent background for business administration, law and those areas of the social sciences where quantitative methods are important.

The School of Science is very much interested in helping people whose goals are not careers in science but a general education with emphasis on the scientific aspects of our culture.

Supplementing the full-time instructional staff with rank ranging from instructor through full professor is a contingent of well-qualified, experienced lecturers who are recruited from the reserve of talent existing in the Indianapolis area.

The School of Science offers Bachelor of Arts degrees in Biology, Chemistry, Geology, and Psychology. Bachelor of Science degrees are offered in Chemistry, Computer Science, Geology, Mathematics, Physics, and Psychology. Master of Science degrees are offered in Applied Computer Science, Chemistry, Psychology, and Mathematics.

Student Welfare and Responsibility

All colleges and universities establish certain academic requirements which must be met before a degree is granted. These regulations concern such things as curriculums and courses, majors and minors, and campus residence. Advisers, directors, and deans will always help a student meet these requirements, but the student himself is responsible for fulfilling them. At the end of his course of study, the faculty and the Board of Trustees vote upon the conferring of the degree. If requirements have not been satisfied, the degree will be withheld pending adequate fulfillment. For this reason, it is important for each student to acquaint himself with all regulations and remain currently informed throughout his university career.

Program-Planning and Counseling Guidelines

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

1. Every student should be thoroughly familiar with all academic requirements which must be met before a degree is granted.

2. Every student should seek an appointment with a faculty adviser in his major department on or before the dates established by the University calendar for academic counseling. In such conferences, each student should, as a minimum objective, make certain that he understands a program for successful completion of the degree requirements and that he has made an appropriate plan for the next semester.
3. Each student should understand that the responsibility for making an appropriate academic program and for meeting every degree requirement rests with him; faculty members acting in the capacity of advisers are obligated only to assist students in meeting this responsibility. If any student needs clarification of any of the requirements for his baccalaureate degree, he is urged to obtain this clarification from his faculty adviser or from the Office of the Dean of Science.

Student Conduct

Rules for student conduct are in keeping with the diverse nature of the student body and faith of the university in student responsibility.

A code of student conduct, enacted by the governing Indiana University Board of Trustees, is designed to assure due process for all students requiring disciplinary action. Student conduct is the responsibility of the Dean of each School or academic division. Within the School of Science an Academic Appeals Committee assists the Dean in these matters. The Dean for Student Services has the assignment of implementing central administration action if necessary. A copy of the code of student conduct may be obtained at any Student Services office.

Job Placement

The IUPUI Placement Office has the primary responsibility of assisting students and alumni in obtaining employment. The office maintains a library of company information, employment trends, occupational information, and provides career counseling to aid students with career planning and development.

Companies seeking college graduates interview students on campus during two recruitment periods: September through November and January through March. A list of firms and institutions which will visit the campus is published and circulated early in the Fall Semester. Students interested in interviewing with a company should register with the Placement Office. The Placement Office also serves as a referral agent to many companies and organizations. In specific cases the local placement office works in coordination with the placement services located on the Bloomington and Lafayette campuses.

Summer and Part-Time Employment: Another function of the Placement Office is to provide information regarding part-time and summer employment opportunities for students. Part-time employment listings are posted on job bulletin boards located throughout the University. Students interested in summer employment should register early with the Placement Office.

Career Information

Information about employment in specific career fields is available from any of these locations: placement offices, dean's offices, and/or department chairmen.

Housing

Residential housing for IUPUI students is located at the University Quarter Campus with approximately 600 accommodations for single students and 160 apartments for married students. Facilities are available to students from all divisions of IUPUI on a first-come basis. Residential housing is managed by the Department of Housing in the University Quarter. In addition, off-campus housing is available to students throughout Indianapolis. Although the University does not control off-campus housing facilities, the Department of Housing maintains a file of rooms and small private home apartments.

Information for Foreign Students

Foreign students attending IUPUI are required to register with the Division of International Programs as soon as possible after their arrival in Indianapolis. The Division of International Programs is officially appointed to represent the U.S. Immigration and Naturalization Service on the IUPUI campus, and it is therefore available to foreign students at all times to assist them with matters relating to their visas. In addition, the Division of International Programs is prepared to assist foreign students with any type of problem during their stay at IUPUI, or even prior to their arrival.

The address of the Division is:

Division of International Programs
Indiana University-Purdue University Indianapolis
Union Building — Suite 105
Indianapolis, Indiana 46202

Expenses And Financial Aid

Costs and Fees

The cost of attending IUPUI generally is related to the number of credit hours students take. The fee structure for general academic areas of IUPUI is as follows:

	In-State	Out-of-State
Undergraduate	$21/credit hour	$42/credit hour
Graduate	$26/credit hour	$52/credit hour

There may be other fees, such as laboratory, student activities, late registration, parking, and special fees for certain courses and programs.

Full-time, undergraduate students usually enroll for 15 to 17 credit hours per semester; thus an entire year for an in-state resident costs about $800 for fees, books and class supplies. Other expenses, such as transportation, food and entertainment, vary according to individual needs.

Refund Policy

Refunds are based upon the date of the official withdrawal application as stated below:

1. For withdrawal during the first week of classes or through Drop/Add Day — 100% refund.
2. For withdrawal during the second and third weeks of classes — 50% of all fees paid except $50, whichever is greater.
3. For withdrawal after the third week of classes — No refund.

To be eligible for a refund, students must notify the Registrar's Office at the time of withdrawal.

Special Examination Fees

With departmental approval, an admitted student, temporary student, or current student who has not paid full fees, may receive course credit by special examination. Fee per course is $10.

Health Care and Insurance

The Student-Employee Health Service (SEHS) is located at the Clinical Building at the Medical Center. All full-time IUPUI students are eligible for the program of health care provided by SEHS. There is no fee for the services of physicians, nurses, or specialty consultants. In addition, the clinic has available about 70 specialty clinics to which students may be referred. Certain in-patient benefits are also available to students, and prescriptions from SEHS cost a maximum of $3. The University has also arranged for an optional health insurance plan to supplement the services provided by the SEHS Clinic. All full-time students are eligible to participate in this program through a private insurance carrier. Information is available from any Student Services Office.

Financial Aids

It is the philosophy of IUPUI to encourage students in their educational goals and to reduce financial barriers. The University recognizes that many students and their parents cannot afford to finance a college education entirely from their own income and assets. For this reason, a program of financial assistance is available to admitted and enrolled students who have a demonstrated financial need. Aid is available

in the form of counseling, scholarships, grants, and participation in the work-study program.

Individuals desiring further information about any of the financial aid programs should write to:

Office of Scholarships & Financial Aids
Room 303, Cavanaugh Hall
925 West Michigan Street
Indianapolis, Indiana 46202

Veterans' Benefits

Students who are eligible for Veterans' benefits may enroll under the following scale of benefits:

FALL/SPRING	BENEFITS	SUMMER (6 week session)
12 hours or more	Full benefits	4 hours
9 through 11 hours	¾ benefits	3 hours
6 through 8 hours	½ benefits	2 hours
Fewer than 6 hours	Tuition only	1 hour

For further information, including tutorial assistance availability, consult the Office of Veterans Affairs at 946 West Vermont Street, Indianapolis, 46202.

Admissions And Transfers

All students entering the School of Science must have been officially admitted to the university by the Office of Admissions, 925 W. Michigan St., Indianapolis 46202. Further information and application forms are obtainable at this address. All applications for admission must be accompanied by a $15 non-refundable fee. Checks should be made payable to IUPUI.

IUPUI offers instruction during two semesters and two six-week summer sessions. You may start a program of study with any regularly scheduled session. These begin in August, January, May and July. Admissions are open generally until registration for classes.

Beginning Students

When you are entering directly from high school, your application should be filed at the end of your junior year.

Your acceptance as a new student in the university is influenced by several factors. The Office of Admissions is guided by the following:

1. Graduation from a high school accredited by a State Department of Public Instruction.

2. The extent to which you meet or exceed the minimum subject requirements is indicated below. For admission to the School of Science, your record should include:

Subjects	**Semesters**
English	6
History or social studies	2
Algebra*	3
Geometry*	2
Trigonometry or fourth semester Algebra*	1
Laboratory science	2

**Students in the B.A. and B.S. programs in Psychology and the B.A. program in Geology are required to have four semesters of mathematics, two of which will be in algebra, for admission to the School of Science.*

You may be admitted with some deficiencies in mathematics or laboratory science. Such deficiencies may be removed by taking courses offered by the School of Science. However, these courses may not be counted as credit toward a School of Science degree.

If your high school offers more than the above mathematics courses, you may benefit from taking analytic geometry (pre-calculus mathematics). It is advised that one semester of chemistry be included in your laboratory science.

In planning high school electives, the curricula of the various departments of the School of Science contained in this bulletin should be reviewed. Note that some degree programs require German. Thus, some study of German in high school may be valuable (although not required). Departmental Counselors will be glad to help you with your preplanning for admission.

3. Rank in High School class
   a. A resident of Indiana is expected to rank in the upper half of his high school graduating class. Agriculture students must rank in the upper two-thirds of their class. A marginal applicant may be granted admission, admitted on probation, or have admission denied.
   b. An out of state applicant must rank in the top third of his high school graduating class.
4. College Board Scholastic Aptitude Test results
   a. All applicants are required to take the College Board Scholastic Aptitude Test (SAT).
   b. An out of state applicant must rank in the top third of the IUPUI distribution on the SAT.
   c. It is recommended that you take the SAT in the spring of your junior year in high school.
5. Information provided by your high school counselor

If you declare a major at the time of your application for admission, you will be assigned an appropriate departmental advisor. If you have not selected a major field of study, you will be assigned to the University

Division. It is recommended that your preplanning be directed toward a choice of major at the time of admission. Premedical and predental students should declare a chemistry or biology major at the time of admission.

Advanced Standing

The School of Science permits high school students to take university courses following completion of the junior year under specified conditions. To determine whether you qualify for such advanced credit, consult your high school counselor and the Office of Admissions.

On the basis of departmental examinations, advanced credit and/or advanced placement may be awarded. To determine whether you qualify for such consideration, consult the department concerned.

Adult Non-Degree Students

Adult applicants, especially those with work experience in the field in which they wish to study, receive special consideration. If you are admitted in this category, you may enroll in a maximum of 30 hours, after which you must apply for admission to the university before enrolling in additional classes. All applicable credits earned as an adult non-degree student may be counted toward a School of Science degree.

Transient Students

If you are a student enrolled in another university, you may take 12 hours at IUPUI without consent of your own university. It is your responsibility as a transient student to determine whether credit so earned may be applied toward the degree you seek from your own university.

Transfers

FROM OTHER INDIANA UNIVERSITY CAMPUSES

If you are enrolled at another Indiana University campus and wish to enter the School of Science at Indianapolis for the first time, you must indicate this intention by formal notice to the Office of the Dean at the campus at which you are enrolled. This notice must be received no later than June 15, for the fall semester, December 5, for the spring semester or April 15, for the summer sessions. You must have a 2.0 grade point average to transfer to the School of Science.

If you are a student in the School of Science at Indianapolis and wish to attend another Indiana University Campus, you must indicate this intention to the Office of the Recorder, School of Science, AD Building, 1201 E. 38th Street, to secure an inter-campus transfer.

FROM OTHER IUPUI SCHOOLS

If you wish to transfer to the School of Science from another IUPUI school, consult the department in which you wish to major. You are required to have a minimum, cumulative, grade-point average of 2.0 and the signature of the chairman of a School of Science department which approves your request, and the signature of the Associate Dean for Academic Affairs of the School of Science. Obtain a transfer form from your school recorder. Submit the completed form to the Office of the Recorder, School of Science, AD Building, 1201 E. 38th Street. A request for transfer must be completed by June 15, for the fall semester, December 5, for the spring semester, and April 15, for the summer session.

FROM OTHER PURDUE UNIVERSITY CAMPUSES

Students in good academic and disciplinary standing may transfer from other campuses of Purdue University. Since Indiana University maintains the official records of all students at IUPUI, it is necessary to make an official application to IUPUI through the Office of Admissions. Students continuing to pursue Purdue degrees at IUPUI will have their records transferred intact and upon receiving a Purdue degree will have a permanent transcript created at Lafayette. Students electing to pursue an Indiana University degree will be processed as regular transfer students from another university.

FROM OTHER COLLEGES AND UNIVERSITIES

If you have earned transfer credit for 12 semester hours and a cumulative grade-point average of 2.0 on a 4.0 scale (3.0 for non-residents of Indiana) in other institutions, you may be admitted to the School of Science as follows. Submit with your application for admission:

1. A copy of your high school record showing satisfactory completion of entrance requirements.
2. An official transcript of work completed in each institution previously attended.
3. Evidence that you are in good academic and disciplinary standing at the institution you last attended.

To assure admission for any given semester the application should be received at least 30 days before the beginning of classes.

Credit from other institutions is evaluated by the Office of Admissions and its applicability toward degree requirements in the School of Science is determined by the major department.

TRANSFER CREDIT: Acceptability of transfer credits from another college or university is determined by the student's major department. However transfer credit will be allowed for the master's degree only after one semester of satisfactory work in residence at Indiana University-Purdue University/Indianapolis.

FROM IUPUI TO OTHER INDIANA UNIVERSITY AND PURDUE UNIVERSITY CAMPUSES

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

Foreign Students

Applicants from foreign countries will be considered for admission without taking the American Entrance Examination on the basis of credentials certifying the completion of secondary school. Official translations must accompany transcripts and other credentials not written in English. The applicant must submit evidence of adequate English proficiency by means of the TOEFL Examination. Financial aids for new foreign students are not available.

Graduate Students

To be considered for admission, a candidate must have a baccalaureate degree from an accredited institution, show promise of ability to engage in advanced work, and evidence of adequate preparation to pursue graduate study in his chosen field. Anyone not meeting these requirements should take the Aptitude Test Section of the Graduate Record Examination.

Application should normally be made at least 8 weeks before the beginning of the session in which the student wishes to enroll. The applicant will be advised of action on his application by the Office of the Director of Graduate Studies.

REGULAR GRADUATE STUDENT APPLICATION: Application forms for admission as a regular graduate student may be obtained from the major department.

Applicants must submit complete official transcripts of all previous college and university studies and three letters of academic reference for evaluation by the major department.

TEMPORARY GRADUATE STUDENT APPLICATION: Application for admission as a temporary graduate student must be made before a student starts graduate work. The temporary graduate student classification is primarily for those casual students who wish to take courses for personal improvement. A student who wishes to become a candidate for an advanced degree should consult with his major department at the time of his application for admission as a temporary graduate student. The major department will advise him of the procedure for obtaining regular graduate student status. Admission as a temporary graduate student is made by the Office of the Director of Graduate Studies in the Union Building. NOT MORE THAN NINE HOURS OF CREDIT EARNED UNDER THIS CLASSIFICATION MAY BE USED IN A PLAN OF STUDY WITHOUT MAJOR DEPARTMENT APPROVAL.

Graduation Requirements

BACCALAUREATE DEGREES

General Requirements

Listed below are the requirements related to degrees in the School of Science.

1. A minimum cumulative grade-point average of 2.0.
2. At least 24 hours with grade C or higher must be taken in the major subject area.
3. Courses taken on the Pass/Fail option can be applied only as electives in meeting degree requirements.
4. Not more than 60 hours earned in accredited junior colleges may be applied toward a degree.
5. By special permission of the department, credit may be earned through independent study and/or by special credit examination. Ordinarily, students in residence in the university are not permitted to enroll concurrently in courses offered through the Independent Study Division.
6. The following School of Science courses do not count toward any degree program in the School of Science: AGR 101; MATH 001, 002, 111, 112, 123, 130, 131, 132.
7. An application for a degree must be filed by the student, in the Office of the Recorder, School of Science.
   a) All credit of candidates for degrees, except that of the current semester, must be on record at least six weeks prior to the conferring of degrees.
   b) The deadlines for filing degree applications for graduation in January, May, or August, is September 1st.
   c) Degrees are conferred in May and September, Commencement is held only in May. Candidates for degrees in August may participate in the May Commencement.
8. A student who fails to complete work for a degree within 6 years from the time of first registration may be required to pass comprehensive examinations on the subjects in his areas of concentration.
9. For requirements of a sequence of courses, sequence does not necessarily imply consecutive numbering.

In addition to the above requirements, students must meet the following requirements, depending upon whether the degree sought is granted by Indiana University or Purdue University.

Requirements For Indiana University Degrees

1. A minimum of 122 hours (124 for students also satisfying requirements for a teaching certificate). At least 112 hours must be in courses offered by the School of Liberal Arts, the School of Science, or those approved by the department. The remaining 10 hours may be taken in the above areas or in other units of the University, e.g., Business, Education, Herron, Normal College, or Engineering and Technology.
2. A minimum of 30 hours in courses at the 300-400 (junior-senior) level.
3. Not less than 26 credit hours of the work of the senior year must be completed at IUPUI. See departmental advisor for residency requirements in the major field of study.

Requirements For Purdue University Degrees

1. A minimum of 124 hours.
2. The completion, either by resident course work, by examination, or by credit accepted from another institution, of the plan of study underlying the degree. Deans of schools may refuse to accept as credit toward graduation any course which was completed ten or more years previously.
3. Resident study at IUPUI for at least two semesters and the completion during this period of at least 32 semester hours of work in courses regularly open to third- or fourth-year students. Students are normally expected to complete the senior year in residence; however, with the approval of the dean of the school concerned, students who have had at least four semesters of resident study may complete up to 20 semester hours of the senior year in another approved college or university. For the purpose of this rule, two summer sessions shall be considered as equivalent to one semester.

Area Requirements

In an age of increasing specialization of functions and divisions of labor, it becomes more necessary than ever before that we maintain a broad base of general knowledge, ideas, skills, etc., that will insure at least a minimum level of general and humane learning. Such a broad base is necessary for an individual to function intelligently within it, to be aware of alternate possibilities open to him, and to learn how to pursue most effectively the goals selected from these possibilities. For this reason, areas I, II, and III (the divisional distribution requirements) are considered essential elements of the B.A. and B.S. programs.

The Faculty of the School of Science has adopted the following degree requirements for the Bachelor of Arts and Bachelor of Science degrees.

Students registering for the first time the fall semester of 1976-1977 will be required to follow the requirements listed below. Previously enrolled students may elect to follow either the requirements in effect at the time of their initial registration or the requirements listed below. School of Science requirements are the minimal requirements in various areas and individual departments *may require more* as listed under departmental listings. Students should consult with departmental counselors as listed under the various departments in planning their courses of study.

Students should note the following:

1. Check departmental course descriptions for courses which are considered repeats. Some courses may not be used to fulfill distributional requirements. Students should also check with their advisors.
2. Cross-listed courses may count only once in fulfilling requirements. Courses which do not carry Science credit (such as Mathematics M015, and M017) may not be used in the distribution.
3. English W115-117 may not be used to complete the distributional requirements.

BACHELOR OF ARTS DEGREE

Area I

English Composition and Communicative Skills. One course in English composition of at least three credits and one course in speech skills of at least three credits are required.

The English composition requirement is satisfied by completing English W115-116-117 (these are 5-week segments) with a grade of S (satisfactory — no letter grades are given), or by exemption from one or more segments of this course and satisfactory completion of those segments he is required to take. The department of English places entering freshmen in W115, W116 or W117 on the basis of scores on a departmental proficiency examination administered during registration week each semester. Students may apply to take this examination if they have an SAT verbal score of 500 or higher, an ACT composite score of 22, or a record of A and B in high-school English. Students exempted from the entire course will receive 3 hours of S credit in W115-116-117. A $10 fee payment is required and is payable to the bursar's office before the special credit is given. Students exempted from W115-116 will receive credit after satisfactorily completing W117.

Area II

Foreign Language. No courses are required by the School of Science. Consult departmental requirements.

Area III

IIIA. Arts and Humanities. Four courses of at least twelve credits are required. There must be at least one two-course sequence (not necessarily consecutively numbered) in either IIIA or IIIB. History is cross-listed.

American Studies
English
Fine Arts
Folklore
French
History
German
Journalism
Music
Philosophy
Religious Studies
Spanish
Speech and Theatre

(Performing arts courses are not accepted as fulfilling Arts and Humanities requirements.)

IIIB. Social and Behavioral Sciences. Four courses of at least twelve credits are required. There must be at least one two-course sequence (not necessarily consecutively numbered) in either IIIA or IIIB. History is cross-listed.

Anthropology
Economics
Geography
History
Linguistics
Political Science
Psychology
Sociology

IIIC. Physical and Biological Sciences. At least four science courses totaling a minimum of twelve credits outside the major department are required. (At least one of the courses must be a laboratory course.) Not acceptable are BIOL L111, L369, Z270, and Z271 as well as all agriculture courses.

Biology
Chemistry
Geology
Physics (including Astronomy)

Cross-listed courses: GEOG G107 and G304 and the following courses in Psychology: B320, B324, B326, B423, B427, and B431.

IIID. Mathematical Sciences. No courses are required.

Computer Science
Statistics
Mathematics

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 other areas.

BACHELOR OF SCIENCE DEGREE

Area I

English Composition and Communicative Skills. One course in English composition of at least three credits and one course in speech skills of at least three credits are required. Note that the English composition requirement shall be satisfied by completing English W115-116-117 (these

are 5-week segments) with a grade of S (satisfactory — no letter grades are given), or by exemption from one or more segments of this course and satisfactory completion of those segments he is required to take. The department of English places entering freshmen in W115, W116 or W117 on the basis of scores on a departmental proficiency examination administered during registration week each semester. Students may apply to take this examination if they have an SAT verbal score of 500 or higher, an ACT composite score of 22, or a record of A and B in high-school English. Students exempted from the entire course will receive 3 hours of S credit in W115-116-117. A $10 fee payment is required and is payable to the bursar's office before the special credit is given. Students exempted from W115-116 will receive credit after satisfactorily completing W117.

Area II

Foreign Language. No courses are required by the School of Science. Consult departmental requirements.

Area III

IIIA. Arts and Humanities. Two courses of at least six credits are required. There must be at least one two-course sequence (not necessarily consecutively numbered) in either IIIA or IIIB. History is cross-listed.

American Studies
English
Fine Arts
Folklore
French
History
German
Journalism
Music
Philosophy
Religious Studies
Spanish
Speech and Theatre

(Performing arts courses are not accepted as fulfilling Arts and Humanities requirements.)

IIIB. Social and Behavioral Sciences. Two courses of at least six credits are required. There must be one two-course sequence (not necessarily consecutively numbered) in either IIIA or IIIB. History is cross-listed.

Anthropology
Economics
Geography
History
Linguistics
Political Science
Psychology
Sociology

IIIC. Physical and Biological Sciences. At least four science courses totaling a minimum of twelve credits outside the major department are required. (At least one of the courses must be a laboratory course. Not acceptable are BIOL L111, L369, Z270, and Z271 as well as all agriculture courses.)

Biology
Chemistry
Geology
Physics

Cross-listed courses: GEOG G107 and G304 and the following courses in Psychology: B320, B324, B326, B423, B427, and B431.

IIID. Mathematical Sciences. At least two courses beyond algebra and trigonometry, totaling a minimum of six credits are required. (Purdue MA213 and MA 214, or their equivalents, are acceptable.)

Computer Science Mathematics
Statistics

Area IV

Major Department. Consult the listing of the major department for courses required within the major subject as well as other courses required by the major department in other areas.

PURDUE UNIVERSITY GRADUATE DEGREES

Currently, all of the graduate programs offered by the School of Science lead to Master's Degrees awarded by Purdue University.

General Requirements

1. Regular graduate student standing.
2. English requirement satisfied.

   Candidates for advanced degrees whose native language is English satisfy the English requirement (1) if they made no grade below B in undergraduate courses in composition or (2) if they make a scaled score of 600 or higher on the Verbal Aptitude Section of the Graduate Record Examination or 36 or higher on the verbal portion of the Admission Test for Graduate Students in Business. If the English requirement is satisfied in one of the above ways and the information is included as a part of the information submitted with the graduate application, English clearance will be given automatically. If the student takes the G.R.E. or the Admission Test for Graduate students in Business after applying for admission to the Graduate School, the student must be certain the Educational Testing Service sends test scores to the Graduate School.

   Those not cleared as specified above write a test paper for the Committee on Standards in English and are held for further writing if the test paper is not acceptable. Students so held are expected to work toward satisfying the requirement without delay. The student should make certain that the Committee on Standards in English sends the Graduate School notice of satisfaction when completed. See the secretary in the graduate counselor's office for the person to contact for clearance in this manner.

3. Plan of Study — The plan of study shall include a primary area and a related area or areas which are chosen on the basis of the student's interests and needs. A tentative plan of study should be drawn up in advance of registration for the first semester of graduate work. This

should be done by the student and his graduate advisor. The formal plan of study should be submitted as soon as possible and before the final semester. The English requirement must be met before the plan of study may be filed.

4. Grades and index requirement — Only grades of A, B, and C are acceptable on a plan of study. An advisory committee may require higher performance than C in certain courses. There is no general Graduate School cumulative index requirement. Specific requirements, if any, are up to the individual departments.
5. Hours of work required — This varies by department from thirty to thirty-six semester hours of credit.
6. Oral and written examinations — The Graduate School has no general requirement for oral and written examinations for the masters degree. In any department the final examinations may be waived if the student meets the minimum requirements of the departments of the school. In any event, a final examining committee is appointed for each candidate for the masters degree. The committee must certify to the Graduate School either that the student has passed the required examinations of the department in which his major graduate study has been taken or that the committee is satisfied with the accomplishment of the student as based on a committee conference.

Academic Regulations

Grades

The School of Science uses the following grade system:

A (4.0) Highest passing grade

B (3.0)

C (2.0)

D (1.0) Lowest passing grade

S Satisfactory

F (No credit) Failed the work in a course or failed to complete an official withdrawal

P Passed (See Pass-Fail Option)

F Failing (See Pass-Fail Option) (No credit)

P or F **Pass/Fail:** During the four years of his undergraduate program, any undergraduate student in good standing (not on probation) may enroll in up to a maximum of eight elective courses to be taken with a grade of P (pass) or F (fail). 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 course selected for pass/fail 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 concentration area. The course or courses may be used to meet the 300-400-level course requirement.

A grade of P is not counted in computing grade averages; a grade of F is included. A grade of P cannot be changed subsequently to a grade of A, B, C, or D.

W or WF **Withdrawal or Withdrawal, failing:** A student may officially withdraw from classes without penalty during the first one-half of a semester or session if he secures the approval of his advisor; a grade of "W" shall be recorded on the final grade report. A student may withdraw from classes during the third one-fourth of a semester or session if he secures the approval of his advisor and the instructor of the course; a grade of "W" or "WF" will be assigned by the instructor of the affected course, reflecting the student's progress to the date of withdrawal. The grade so assigned shall be recorded on the final grade report. A student may withdraw from classes during the last one-fourth of a semester or session if he secures the approval of his advisor, the instructor of the course, and his Dean; a grade of "W" or "WF" will be assigned by the instructor of the affected course, reflecting the student's progress to the date of withdrawal. The grade so assigned shall be recorded on the final grade report.

Any student who alters his schedule, whether by personal incentive or by departmental directive, must follow withdrawal procedures. A student who does not follow these procedures is jeopardizing his record by the possibility of incurring a failing grade in a course not properly dropped and/or not receiving credit for work done in a course not properly added.

Incomplete: The grade of I (Incomplete) indicates that the work is satisfactory as of the end of the semester but has not been completed. The grade of Incomplete may be given only when the completed portion of a student's work in the course is of passing quality. Instructors may award the grade of Incomplete only upon a showing of such hardship to a student as would render it unjust to hold the student to the time limits previously fixed for the completion of his work.

Removal of Incomplete: The removal of a grade of Incomplete is the responsibility of the student. A grade of Incomplete must be removed within one year from the time that it is given. An Incomplete grade which has not been removed by the end of one year will be converted by the Registrar's Office to the grade of F.

Courses Repeated

The School of Science computes a School grade-point average which is the basis for recommending the awarding of a degree. The computation of this grade-point average including repeated courses is done during the senior year at IUPUI. This computation is made using the rule that only the most recent grade in repeated courses counts in computing the School grade-point average.

Course Audits

While auditing of courses is permitted under University policy, audited courses may not be retaken at a later date for academic credit.

Petition for Grade Change

Course grades may be changed by petition, from either the student or the faculty member.

1. Faculty petition: A faculty member may request a change of grade for the student. This request can be honored only after approval of the Department Chairman and the Dean for Academic Affairs of the School of Science.
2. Student petition: A student may request a change of grade by filing a petition with the Dean for Academic Affairs, and should include:
   a. A statement of attempted but unsuccessful interview with the faculty member and the Chairman of the department.
   b. Supportive evidence for petition.

THE NECESSARY FORMS FOR WITHDRAWAL FROM A COURSE; CHANGE OF CLASS, SCHOOL, OR MAJOR: CHANGE OF GRADE; AND PASS/FAIL OPTION ARE AVAILABLE IN THE DEPARTMENTAL OFFICES OR THE REGISTRATION OFFICE.

Class Standing

Class standing is based on the number of credit hours completed:

Freshman	0 to 25
Sophomore	26 to 55
Junior	56 to 85
Senior	86 or more

Dean's Honor List

The School of Science recognizes exceptional academic performance prior to graduation from the University by periodically publishing the Dean's Honor List. This is a list of the names of full-time students (carrying 12 or more credit hours per semester) who have achieved a GPA of 3.3 or higher during a given semester. Part-time students who are Juniors or Seniors, and who have a cumulative GPA of 3.3 or higher, also will be included on the Dean's Honor List. Students who have received an incomplete (I) during the given semester, or for whom no report (NR) has been made by an instructor outside of the School of Science will not be placed on the Dean's Honor List.

Candidates For Baccalaureate Degrees

A student is considered to be a candidate in good standing for a baccalaureate degree awarded by the School of Science when he has been admitted as a regular student by the Office of Admissions, his last semester's grade point average (index) is not less than a C (2.0), and his cumulative grade point average (graduation index) is not below this same level.

Second Bachelor's Degree

Normally the holder of a baccalaureate degree who wishes to pursue a further educational goal is encouraged to become qualified for admission to a graduate degree program. In certain cases, however, the Dean of the School of Science may admit a student who has earned a baccalaureate degree to candidacy for a second baccalaureate degree. The student should petition the Dean for this privilege before beginning the program. If such admission is granted, the candidate must earn at least 26 additional credit hours in residence and meet the requirements of the School of Science and of the department in which he is a candidate.

Degrees Awarded With Distinction

IUPUI recognizes outstanding performance in course work of any student by awarding bachelor's degrees with distinction. IU degrees are awarded with three levels of distinction: Distinction, High Distinction, Highest Distinction. Purdue degrees are awarded with Distinction and Highest Distinction.

Degree GPA	I.U.	P.U.
3.5500-3.7499	Distinction	Distinction
3.7500-3.8499	High Distinction	Highest Distinction
3.8500-4.0000	Highest Distinction	

Academic Standing

Academic Probation

A full-time student is on academic probation when either his semester grade point or cumulative grade point average is below C (2.0). A part-time student is on academic probation when his grade point average of 12 credits of consecutive enrollment or cumulative grade point average is below C (2.0).

A student on academic probation will be so advised by letter from the Office of the Dean of the School of Science. The student is informed of all conditions and restrictions required for reestablishing a status of good academic standing.

Dismissal

A student is dismissed from the university when, in the opinion of the Office of the Dean of the School of Science, he has ceased to make progress toward his degree.

A full-time student is subject to dismissal when he has failed to attain a C (2.0) average in any two consecutive semesters and when his cumulative grade point average is below C (2.0).

A part-time student is subject to dismissal when his grade point average of 15 credits of consecutive enrollment or cumulative grade point average is below C (2.0).

A student who is dismissed will be so advised by letter from the Office of the Dean of the School of Science.

Readmission

A student dismissed for the first time may immediately petition the Office of the Dean of the School of Science for readmission. A student dismissed for the second time may submit a petition for readmission after a period of at least one regular semester.

In order that petitions for readmission have sufficient time for consideration, students eligible to submit them should do so before July 1 for the fall semester, November 15 for the spring semester and April 1 for the summer sessions.

A student who is readmitted will be so informed by letter from the Office of the Dean of the School of Science. He is informed of conditions and restrictions upon which his readmission depends.

Special Facilities And Services

Libraries

The IUPUI Library system is composed of six separate libraries which are open to all students enrolled at the University. These are located at the Dental School, Herron School of Art, Downtown Campus, Law School, Medical School, and 38th Street Campus. The Normal College also maintains a reference room of professional physical education materials. The Dental, Herron, Law, and Medical libraries contain specialized collections reflecting their respective curricula. The collections at the Downtown and 38th Street Campuses cover a wide range of academic disciplines from humanities to science, engineering, and technology.

Since procedures vary slightly among the different libraries, students should consult each before checking out books and other materials.

Audio-Visual Facilities

Audio-visual learning centers are located in the Krannert and "A" buildings at the 38th Street, and in Cavanaugh Hall on the University Quarter Campus. The centers provide a variety of audio-visual materials, equipment, and services for student and faculty use. Study carrels are equipped with cassette tape recorders and projectors (movie or slide) provide convenient facilities for individual study of recorded course and

reference material. Equipment available for classroom and laboratory use includes audio and video tape recorders, closed-circuit TV, and various projectors (overhead, movie and slide).

Evening Administration

An administrative office is open for the convenience of night students at each IUPUI location after 5 p.m. when general offices close.

KRANNERT BUILDING, 38th Street, Room 153, phone 923-1329, exts. 238, 260, 422.

This office provides all of the bulletins and brochures of the university, all of the forms for admission and registration, all Graduate School forms; processes advance registration cards, supplies information about classes and locations, and maintains a complete list of all students in the University and all faculty who teach at the 38th Street Campus. This Evening Administration Office is open Monday through Friday until 8:30 p.m. This office does NOT provide any parking services for the Safety and Security Division.

ENGINEERING/TECHNOLOGY BUILDING, 445 North Blake Street, Monday-Thursday 9 a.m. to 9 p.m., Friday to 5:30 p.m.

CAVANAUGH HALL, 925 West Michigan Street, Room 441, phone 264-7718.

This office provides services to all students in the School of Liberal Arts; Monday through Thursday until 8 p.m.

MAROTT BUILDING, 902 North Meridian Street, phone 264-3704.

The switchboard and main office is open to serve faculty and students in the Division of Education, Monday through Thursday until 8:30 p.m.

HERRON MAIN, 16th and Pennsylvania, phone 923-3651.

The office of the secretary to the dean is open to serve faculty and students Monday through Thursday until 9 p.m.

Students should contact the most appropriate office.

Computing Services

The Computing Services Division operates four computer facilities at IUPUI: The Research Computer Center, the Educational Computer Center, the Administrative Data Processing Center, and Hospital Data Processing Center. Of these, the student has access to the Research Computer Center and the Educational Computer Center.

The Educational Computer Center operates an IBM 360/44 devoted exclusively to the processing of student jobs. In addition, the Center also provides an IBM 1620 computer which the student is able to use in a hands-on environment. Unit record equipment, such as sorters and collators, are also available for student use.

The Research Computer Center operates a DEC-10 computer which supports terminal operation from remote terminals throughout the IUPUI

campuses. Interactive computing (time sharing, computer assisted instruction) is provided to and for the student through this facility. The DEC-10 also provides a link to the CDC 6600 computer at the Indiana University-Bloomington Campus. A hybrid (analog-digital) computer is part of equipment available on a special projects basis at this facility.

"Clusters" of keyboard terminals located in the Union Building, Cavanaugh Hall, and the AD Building provide access to the DEC-10 as well as other computers in the Indiana University Network.

There are also a number of computer terminals, analog computers, and mini-computers located within the individual departments of the School of Engineering and Technology.

Special Programs

Secondary Teachers' Certificate

With careful planning, a student may earn a baccalaureate degree in the School of Science and may receive a provisional secondary teacher's certificate, completing the requirements for both in four years. The Secondary School Teacher Certificate, Provisional, qualifies the holder to teach in the subject-matter fields for which it is endorsed in any public secondary school in Indiana. It is granted upon completion of a baccalaureate degree based upon a program of teacher education and the recommendation of the graduating institution. It is valid for five years from the date of issue and may be renewed one time only for a period of two years, provided a minimum of 20 semester hours towards the master's degree on a teacher education program has been accumulated.

Every student who plans to obtain a teaching certificate must pass a speech and hearing test, which is given usually during the first week of fall and spring semesters, and be admitted formally to the teacher education program by the end of his sophomore year. Application forms are available from the student's departmental advisor or from the Division of Education, Marott Building, 902 N. Meridian Street.

A candidate for a secondary teacher's certificate *and* a bachelor's degree must satisfy the appropriate degree requirements of the IUPUI School of Science, the departmental requirements, and the certification requirements. The student must, therefore, plan a complete program with the departmental advisor to insure that all requirements are satisfied.

A candidate for a secondary teacher's certificate must earn a baccalaureate degree which includes 124 credit hours. The student must have an average grade of C or above in all university work taken, in all his education courses (with at least a C in the methods course in his major), and in all the course work of his teaching major and of his teaching minor if he has one.

For a Provisional Certificate the State of Indiana sets the following General Education, Professional Education and Subject Matter Area requirements:

GENERAL EDUCATION

50 credits as follows:

Humanities: 16-18 credits (for example English, Fine Arts, Folklore, Foreign Language, Philosophy, Speech & Theatre)

Social and Behavioral Sciences: 14-16 credits (for example Anthropology, Economics, Geography, History, Political Science, Psychology, Sociology)

Life and Physical Sciences: 14-16 credits (subject matter area meets this requirement; some departments specify lab sciences)

Electives as needed for a total of 50 credits

PROFESSIONAL EDUCATION

At least 18 or 21 credits.

IUPUI courses which meet this requirement are:

EDUC F200 — Introduction to Teaching (3 cr.)

EDUC P280 — Human Development and Learning (5 cr.)

EDUC M440-478 — Methods of Teaching High School Subjects (one course to be taken in each major area) (3 cr.)

EDUC M448 — Methods of Teaching High School Mathematics (offered only in fall of odd numbered years) (3 cr.)

EDUC M462 — Methods of Teaching High School Reading (3 cr.) (Required ONLY for Indiana University Degrees)

EDUC S485 — Principles of Secondary Education (3 cr.)

EDUC M480 — Student Teaching in the Secondary School (6-8 cr.)

Methods courses (M440-M478) must be taken at least one semester before student teaching (M480). Also, P280 must be taken before the methods courses. Application for student teaching should be filed in the Office of the Director of Laboratory Experiences during the first semester of the year immediately preceding that in which the student teaching is to be done. The application must be completed in personal conference with the faculty member in charge of student teaching in the area of the candidate's teaching major. Student teaching requires a full semester for one-half day. A student should take no more than two additional courses while student teaching.

SUBJECT MATTER AREA

Major, 40 credits; minor, 24 credits (minor not required)

Program planning should be done in consultation with student's advisor in his major department.

Pre-Pharmacy Program

IUPUI does not grant a degree in pharmacy. However, students may complete one year of pre-pharmacy instruction on this campus. The following program is specifically designed for students who expect to apply for admission to the School of Pharmacy and Pharmacal Sciences of Purdue University (West Lafayette Campus).

Pre-Pharmacy Year

First Semester	Second Semester
(4) BIOL 108 (Intro to Botany)	(4) BIOL 109 (Intro to Zoology)
(5) C105 (Prin. of Chem)	(5) C106 (Quantitative Chem)
(3) W117 (Basic ENGL Comp)	(3) MA154 (College Algebra & Trig)
(3) MA153 (College Algebra & Trig)	(1) W118 (Research Report Writing)
(1) Elective	(3) Elective
(16)	(16)

Students with sufficient backgrounds in mathematics should schedule MA151 or MA163 instead of MA153-4.

The application for admission must be submitted to Purdue before February 1, to insure consideration for the Fall semester. A student desiring to transfer to another institution may have to adjust his basic program.

Pre-Veterinary Program

IUPUI offers an organized, 4-semester curriculum meeting requirements for admission to the School of Veterinary Science and Medicine. This curriculum provides a strong program in the biological and physical sciences which may be used also as a basis for continued training in the School of Agriculture should the degree Bachelor of Science in Agriculture be desired.

The student who has successfully completed 2 years or more of pre-veterinary instruction at IUPUI is then eligible to apply for admission to the School of Veterinary Science and Medicine at Purdue University in Lafayette.

The requirements for admission to the pre-veterinary program are the same as those for students in the School of Agriculture.

Semester 1			**Semester 3**		
Eng.	W117	3 cr	Eng.	W118	1 cr
Chem	C105	5 cr	Chem	C106	5 cr
Math	153	3 cr	Math	154	3 cr
or	221		or	222	
Biol	108	4 cr	Biol	109	4 cr
Agr.	101	1 cr	An Sc*	102	3 cr

Semester 2			Semester 4		
Chem	C102	5 cr	Phys	219	4 cr
Phys	218	4 cr	An Sc	221	3 cr
Zool	364	4 cr	Spch	C110	3 cr
Electives		6 cr	Electives		6 cr

*Offered every other year — may be replaced by another agricultural elective.

Electives are commonly selected from:

Agricultural Economics
Agronomy
Biology
Business
Economics
Geography
Geology
History
Horticulture
Philosophy
Political Science
Psychology
Sociology

Pre-Dental and Pre-Medical Programs

Admission to dental and medical schools is highly competitive. The preprofessional student is therefore urged to elect a degree program, rather than to strive for the minimal requirements of these schools. Skilled preprofessional counseling is available in the Departments of Biology and Chemistry, which also offer preprofessional degree programs. This service will assist the student to prepare himself well for the professional school admissions process. It will also suggest alternative, rewarding career opportunities should the application to the professional school be unsuccessful. Graduate students holding non-science degrees, who are electing courses in the School of Science to prepare for professional school, are also invited to use this counseling service.

Cooperative Education Program

A career in a science field requires one to have a knowledge of the mathematical and natural sciences, gained by study, experience and practice. The knowledge must be applied with judgment in order to utilize economically the materials and forces of nature for the benefit of mankind.

Cooperative education at IUPUI is an elective plan of education in which a student may alternate periods of academic study with periods of employment in business, government or industry. In addition, a parallel program of work and study may be set up.

The program contributes essential elements to the educational process and is directly related to one's career field of study. Work assignments provide varied experience with increasing difficulty and responsibility. These experiences cannot be acquired through college laboratory participation or limited work experience during summer vacations. Cooperative education is a formalized educational plan built into any one of many curriculums.

In the Chemistry Department, students may apply for the program following four semesters of chemistry. Students seeking information or guidance should contact the chemistry office.

Once a student has accepted cooperative employment with a company, he will be encouraged to continue with the company throughout the program. Students will not be permitted to change employers indiscriminately.

A student should apply directly to the cooperative education coordinator for information and specifics of program implementation.

Military Training Program

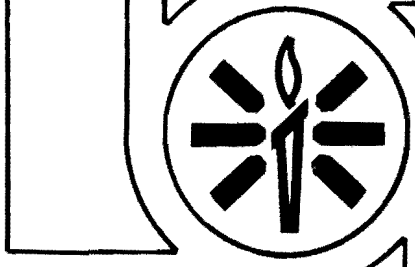
ROTC programs are offered (not required) by the Air Force, which offers courses which lead to a commission as an officer upon graduation. Military courses are pursued in conjunction with the academic curriculum and receive academic credit as elective courses.

Men with evidence of honorable discharge or separation from active duty in the armed forces may apply for credit in basic armed forces training if they desire to use ROTC as an elective sequence.

Departmental Programs

KEY to Symbols In Departmental Course Lists

P: Prerequisite Course
C: Corequisite Course
R: Required Course
Equiv: Acceptable at IUPUI in lieu of the IUPUI course listed



DEPARTMENT OF BIOLOGY

PROFESSORS: Samuels (Chairman), Sanborn; ASSOCIATE PROFESSOR: Pflanzer; ASSISTANT PROFESSORS: Bard, Courtis, Juillerat, Keck, Kirk, Lees, Stark.

DEPARTMENTAL COUNSELORS: Juillerat, Lees, Samuels.

The sequence of courses required for the Biology major is designed to introduce students to the broad, general concepts of modern Biology. Courses emphasize principles and processes of living systems rather than groups of organisms. Elective courses allow for the beginning of specialization.

Projects in Biology are an important part of the conventional courses and the elective program. They are intended to help students' self development and to give them some understanding of the professional approach to biological investigation.

A series of courses in other sciences is designed to support and extend students' biological awareness by giving them the ability to solve biological problems in terms of physical and chemical mechanisms.

BACHELOR OF ARTS

(Granted by Indiana University)

DEGREE REQUIREMENTS

AREA I: See School of Science requirements on page 18.

Fulfillment of the following is also strongly recommended. Two semester courses dealing with communication of data, to be selected in consultation with departmental advisor (courses might include: foreign language, photography, graphics, drawing, logic, computer science, etc.).

AREA II: There is no foreign language requirement, however, knowledge of a foreign language is strongly recommended (see Area I above).

AREAS IIIA and IIIB: See School of Science requirements on page 19.

AREA IIIC: Physical and Biological Sciences:

PHYSICS: 2 semesters of basic Physics. (Suggested: 152-251 or 218-219.)

CHEMISTRY: Through 2 semesters of Organic Chemistry with laboratory. Basic Chemistry sequence to be worked out with departmental advisor based on SAT scores and/or background of student. (Suggested: C255-255L-256-256L or C261-265A-262-266L or C341-344; plus prerequisite basic sequence or background to enter selected sequence above; a course in Analytical Chemistry is also strongly suggested — determination to be made in consultation with departmental advisor.)

AREA IIID:

MATHEMATICS: Through 2 semesters of Calculus. Starting point and program to be worked out with departmental advisor based on SAT scores

and/or background history of student. (Suggested: MA221-222 or MA163-164; Statistics, such as STAT311, is also strongly suggested.)

AREA IV: Biology Requirements*

Introductory Courses:

Year 1 — Biol K 101-103 or Biol 108-109**
Year 2 — Biol K 201-203***

Upper Division Courses:

Cell Biology — Biol 420-421
Developmental Biology — Biol 466-467 or
Biol 466-Z 215
Genetic Biology — Z 364
Electives — To establish 30-33 total
credit hours (depending on entry sequence) in Biology.
To be selected in consultation with departmental advisor.

*The curriculum of the Department of Biology is being revised and some courses listed above may be eliminated and replaced by new courses. Students should consult with the Biology department advisors to determine present requirements.

**Acceptable in cases of transfer from another department or institution where these courses are normal to that curriculum (i.e., Agriculture-Purdue). A student beginning his biology curriculum should not take these courses.

***Biol 285 may be substituted by students who started in previous programs.

Courses In Biology

108 INTRODUCTION TO BOTANY (4 Cr)
P: None. Fall, Spring; day.
This course probes the functions of plants on the cellular and total organism levels, examines the roles of plants in the environment, and surveys the major plant groups alive today.

109 INTRODUCTION TO ZOOLOGY (4 Cr)
P: None. Equiv. to I.U. Zoology Z 103. Fall, Spring; day, night.
Basic principles of biology, growth, reproduction, energy transport, heredity as they occur in animals. Survey of the animal kingdom emphasizing structure as related to function as well as taxonomic relationships.

210 BIOLOGY OF MAN (2 Cr)
P: None. Fall; day.
Two-semester sequence in human biology with emphasis on anatomy and physiology providing a solid foundation in body structure and function.

202 BIOLOGY OF MAN (2 Cr)
P: 201. Continuation of BIOL201. Spring; day.

203 BIOLOGY OF MAN (3 Cr)
P: None. Fall; day.
Same as BIOL201 with an accompanying laboratory.

204 BIOLOGY OF MAN (3 Cr)
P: 203. Continuation of BIOL203. Spring; day.

220 INTRODUCTION TO MICROBIOLOGY (3 Cr)
P: One semester general chemistry or one semester of life science. Spring; day.
The isolation, growth, structure, functioning, heredity, identification, classification, and ecology of microorganisms, their role in nature and significance to man.

221 INTRODUCTION TO MICROBIOLOGY (4 Cr)
P: Same as BIOL220.
The isolation, growth, structure, functioning, heredity, identification, classification, and ecology of microorganisms, their role in nature and significance to man.

285 ENVIRONMENTAL BIOLOGY (3 Cr)
P: One year of life science and one year of general chemistry. Spring; day.
A study of interactions, (physical and biological), mineral use, structure, population genetics, and energetics of a nonspecific ecosystem model.

295 SPECIAL ASSIGNMENTS (arr.)
P: None. Fall, Spring.
Special work, such as directed readings, laboratory or field work, or presentation of material not available in the formal courses in the department.

420 CELL BIOLOGY (2 Cr)
P: One semester of life science and one semester of organic chemistry with laboratory. C: BIOL421. Fall; day.
Composition, structure, heredity, and growth of cells. Analysis of the cell concept in biological terms.

421 LABORATORY IN CELL BIOLOGY (2 Cr)
P or C: BIOL420. Fall; night.

466 DEVELOPMENTAL BIOLOGY (2 Cr)
P: K 103; Biol 420. Spring; day, night.
Principles of development of plants and animals.

467 LABORATORY IN DEVELOPMENTAL BIOLOGY (2 Cr)
P or C: BIOL466. Spring; night.
Descriptive and experimental study of the development of plants and animals.

520 CELL BIOLOGY (2 Cr)
Graduate standing; see BIOL420 above.

521 LABORATORY IN CELL BIOLOGY (2 Cr)
Graduate standing; see BIOL421 above.

566 DEVELOPMENTAL BIOLOGY (2 Cr)
Graduate standing; see BIOL466 above.

567 LABORATORY IN DEVELOPMENTAL BIOLOGY (2 Cr)
Graduate standing; see BIOL467 above.

595 SPECIAL ASSIGNMENTS (arr.)
P: Graduate standing. Fall, Spring.
Special work, such as directed readings, independent study or research, supervised library, laboratory, or field work, or presentation of material not available in the formal courses in the department.

A210 HUMAN ANATOMY (5 Cr)
P: None. Fall, Spring; day.
Lecture and laboratory studies of the histology and gross morphology of the human form, utilizing a cell-tissue-organ system-body approach.

B403 PLANT FUNCTION (2 Cr)
P: One course in general botany or general biology *and* one course in organic chemistry with lab; or consent of instructor. Spring; night.
A study of water relations, photosynthesis, respiration, growth, development, flowering and some urban induced stress phenomena in higher plants.

B404 LABORATORY IN PLANT FUNCTION (2 Cr)
P: As for BIOL B403. P or C: BIOL B403. Spring; night.
The laboratory is designed to develop expertise in some instrumentation in the study of whole plants, excised organs, isolated organelles, and enzymes.

B481 PROSEMINAR IN ANIMAL BIOLOGY (1 Cr)

P: Upper division standing in Science or Engineering and consent of instructor. Spring; day.

Guided individual presentations on topics in an area of current importance not included in other courses.

B482 PROSEMINAR IN PLANT BIOLOGY (1 Cr)

P: Upper division standing in Science or Engineering and consent of instructor. Spring; day.

Guided individual presentations on topics in an area of current importance not included in other courses.

B483 PROSEMINAR IN MICROBIOLOGY (1 Cr)

P: Upper division standing in Science or Engineering and consent of instructor. Fall; day.

Guided individual presentations on topics in an area of current importance not included in other courses.

K101 CONCEPTS OF BIOLOGY (4 Cr)

P: None. Fall, Spring, Summer; day, night.

Experiments are used to derive structure-function relationships of biological systems at all levels of organization. Chemical regulation in plants and animals will also be examined. This is the first course of a sequence for majors.

K103 CONCEPTS OF BIOLOGY II (4 Cr)

P: K101. Continuation of K101 examining chemical regulation in plants and animals, biometrics, principles of genetics, and the growth and development of living organisms.

K201 CONCEPTS OF BIOLOGY III (4 Cr)

P: K101 and K103 or equivalent. Fall, day.

Continuation of K103 examining environmental problems and the principles of evolution.

K203 CONCEPTS OF BIOLOGY IV (4 Cr)

P: K101, K103, or equivalent (to be determined by examination; see departmental advisors). Fall, Spring; day, night.

Continuation of Concepts of Biology, examining behavior of living organisms, principles of chemical mechanisms in biological systems, and applications of biology.

K512 COMPARATIVE ANIMAL PHYSIOLOGY (3 Cr)

P: 1 year animal biology, 1 year physics, chemistry through organic or biochemistry, mathematics through calculus, or consent of instructor. Spring; day.

Lectures, literature analysis, student seminar presentations. Analysis of comparative vertebrate and invertebrate function with regard to fluid, electrolyte, and acid-base balance, nutrition, digestion, intermediary metabolism, respiration, circulation, thermoregulation, and biological rhythms.

L111 CONTEMPORARY BIOLOGY (3 Cr)

P: None. Fall, Spring; day, night.

Selected principles of biology with emphasis on issues and problems extending into everyday affairs of the student.

L369 HEREDITY, EVOLUTION, AND SOCIETY (3 Cr)

P: None. Fall, Spring; day, night.

Basic concepts and principles of evolution genetics, and development. Problems of the individual and society raised by current genetic knowledge and technology. Cannot be taken for credit by those who have credit in Z364.

L490 SPECIAL ASSIGNMENTS (arr.)

See BIOL595 above; for upper division undergraduates in science.

M250 MICROBIOLOGY: LECTURE (3 Cr)

P: One year of biology; one year of general chemistry. Spring; night.

Introduction to microorganisms: cytology, nutrition, physiology, ecology, genetics and life history. Importance of microorganisms in applied fields including infectious disease.

M255 MICROBIOLOGY: LABORATORY (2 Cr)
P: M250, preferably concurrently. Spring; night.
Laboratory experiments and demonstrations to yield proficiency in aseptic cultivation and utilization of microorganisms; experimental investigations of biological principles in relation to microorganisms.

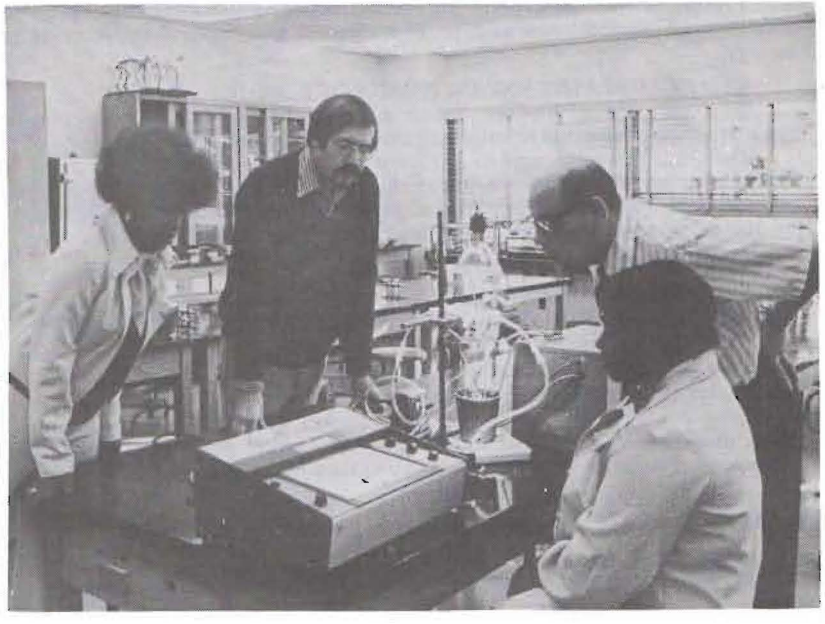
P204 HUMAN PHYSIOLOGY (5 Cr)
P: None. Fall, Spring; day.
Lectures and laboratory work related to cellular, musculoskeletal, neural, cardiovascular, gastrointestinal, renal, endocrine, and reproductive function in man.

Z215 DEVELOPMENTAL ANATOMY (5 Cr)
P: Introductory Biology course with grade of C or higher. Fall, Spring; day, night.
Comparative study of the development of structure in vertebrates, including man.

Z270 ROLE OF BIOLOGY IN SOCIETY (2 Cr)
P: None. Fall; night.
The principles of ecology are studied as they relate to pollution. Student reports of local problems and action.

Z271 ROLE OF BIOLOGY IN SOCIETY (2 Cr)
P: None. Spring; night.
The principles of ecology are studied as they relate to population dynamics and control. Student reports in interdisciplinary problem solving approaches.

Z364 GENETICS (4 Cr)
P: One introductory biology course. Fall, Spring; day, night.
Principles of genetics at the molecular, cellular, organismal and population level.



DEPARTMENT OF CHEMISTRY

PROFESSORS: Fife (Chairman), Nevill and Welcher; ASSOCIATE PROFESSORS: Boaz, Boschmann, Cutshall, Fricke, Metz, Rabideau and Wyma; ASSISTANT PROFESSORS: Cady, O'Donnell, Raichart, and Wilson. DEPARTMENTAL COUNSELORS: Professors Boaz, Fife, Fricke, and Raichart; GRADUATE COUNSELOR: Professor Metz.

The Department of Chemistry provides instruction that leads to degrees in chemical technology, an associate degree (for details, see the Bulletin of the School of Engineering and Technology), and in chemistry: Bachelor of Arts degrees, Bachelor of Science degrees, and Master of Science degrees. Two Bachelor of Science degrees (IU and PU) carry certification by the American Chemical Society Committee on Professional Training (see pages 41 and 42).

The Department of Chemistry offers special courses in cooperation with the Continuing Education Department which can be taken either on a credit or non-credit basis. Offered at both the graduate and undergraduate levels, individual courses are given when there is sufficient demand or need. The professional chemist with a degree will find them useful in keeping up with the latest developments in a particular field or in broadening his knowledge and background, and the student presently working toward a degree may enrich his educational program with a "special topic" course or an interdisciplinary course.

C101 is elected by students in IU programs which require only one semester of chemistry (e.g., degree requirement in physical science, 3-year nursing, education). Students required to complete two semesters of chemistry take the sequence C101-C102 (e.g., 4-year nursing). C105-C106 is required for students pursuing advanced work in scientific fields (e.g., chemistry, biology, geology). If both C101 and C105 are taken, the credit hours earned in C101 will not count toward the total hours needed for graduation. Admission to C106 on a basis of C101 is not granted.

Purdue students expecting to major in Biology, Chemistry or Physics should take the sequence C105-C106. Students in Engineering should take C111-C112 or C105-C106, if qualified. Students in Home Economics take C101-C102, those in Pre-Pharmacy C105-C106, and students in Agriculture C105-C106. C101-C102 is designed for students who do not need Chemistry as a tool subject.

The following degrees in Chemistry are offered.* To enter the curriculum in chemistry, a student should have completed a minimum of two years of high school algebra, one-half year of trigonometry, one year each of chemistry and physics, and three to four years of a modern foreign language. The choice of a particular degree program in chemistry should be made in consultation with a departmental counselor. The level, time and sequence of courses in the chemistry curriculum is rigid. Thus, all study plans should be made with the assistance of the chemistry counselor.

*All degrees carry the general requirements of the university granting the degree. These are described elsewhere in this bulletin.

BACHELOR OF ARTS — 25 HOUR

(Granted by Indiana University)

For students requiring knowledge in chemistry as a basis for work in other fields. Suitable for students planning chemical industry positions as laboratory technicians. Recommended for premedical students with minimum preparation and 7 elective hours: C342, C344, 2 hours of C301-C302 or C209.

Degree Requirements

Areas I, IIIA, and IIIB: See the School of Science requirements on page 18.

Area II: Foreign Language: 10 hours of a modern foreign language.

Area IIIC: Physical and Biological Sciences: Physics 218 and 219. Recommended Physics 152 and 251. Also, at least two additional courses in a laboratory science outside chemistry are required which may be chosen from, e.g., Biology (K101, K103) or Geosciences or Physics.

Area IIID: Mathematical Sciences: MA221 and MA222. Recommended MA163 and MA164.

Area IV: Chemistry Concentration Requirements: C105, C106, C341, C343, C360, and 7 elective hours in chemistry, 4 of which must be selected from: C310, C311, C342, C344, C362, C363, C430, C483. Recommended Chemistry courses: C105, C106, C310, C311, C341, C342, C343, C344, C361, C362, C363.

BACHELOR OF ARTS

(Granted by Indiana University)

For students planning to become professional chemists. Not recommended to students planning to pursue graduate studies in chemistry.

Degree Requirements

Areas I, IIIA, and IIIB: See the School of Science requirements on pages 18-19.

Area II: Foreign Language: 13 hours of a modern foreign language (German, French or Russian strongly recommended).

Area IIIC: Physical and Biological Sciences: Physics 218 and 219. Recommended Physics 152 and 251. Also, at least two additional courses in a laboratory science outside chemistry are required which may be chosen from, e.g., Biology (K101, K103) or Geosciences or Physics.

Area IIID: Mathematical Sciences: MA163 and MA164.

Area IV: Chemistry Concentration Requirements: C105, C106, C310, C311, C341, C342, C343, C344, C361, C362, C363, C430, and 3-9 hours of advanced chemistry (e.g., C400, C409, C410, C411, C483, 561)

BACHELOR OF SCIENCE
(Granted by Indiana University)

For students planning to become professional chemists. Recommended to students planning to pursue graduate studies in chemistry. Available only to students of high academic standing, with permission of Departmental Counselor at the beginning of the junior year. This degree carries certification by the Committee on Professional Training of the American Chemical Society.

Degree Requirements

Areas I, IIIA, and IIIB: See the School of Science requirements on pages 19-20.

Area II: Foreign Language: 13 hours of German, including G231 — may substitute another reading course if G231 is not available (e.g., G213).

Area IIIC: Physical and Biological Sciences: Physics 152, 251 and at least two additional courses in a laboratory science outside chemistry are required which may be chosen from, e.g., Biology (K101, K013) or Geosciences or Physics.

Area IIID: Mathematical Sciences: MA163, MA164, and MA261.

Area IV: Chemistry Concentration Requirements: 47 hours of chemistry including C105, C106, C310, C311, C341, C342, C343, C344, C361, C362, C363, C400, C410, C411, C430, and 6 hours of advanced chemistry (e.g., C301, C302, C335, C409, C483, 561). Note: a maximum of 3 hours of C409 may be used to satisfy the 6 hours of advanced chemistry electives.

BACHELOR OF SCIENCE — MAJOR IN CHEMISTRY
(Granted by Purdue University)

Recommended to students planning to be professional chemists; secondary school science teachers, and those desiring non-research industrial positions (e.g. sales). Not recommended to students planning to pursue graduate studies in chemistry.

Degree Requirements

Areas I, IIIA, and IIIB: See the School of Science requirements on pages 19-20.

Area II: Foreign Language: 13 hours of a modern foreign language (German, French, or Russian strongly recommended).

Area IIIC: Physical and Biological Sciences: Physics 152, 251 and at least two additional courses in a laboratory science outside chemistry which may be chosen from, e.g., Biology (K101, K103) or Geosciences or Physics.

Area IIID: Mathematical Sciences: MA163, MA164, and MA261.

Area IV: Chemistry Concentration Requirements: 36 hours of chemistry including C105, C106, C310, C311, C341, C342, C343, C344, C361, C362, C363, and C430.

Teacher Certification: For certification to teach chemistry at the secondary level the chemistry, mathematics, and physics requirements are the same. The general education requirements for the teaching option exempt the second year of modern language. A total of 18 hours in professional education is needed. This includes a professional semester with practice teaching in chemistry.

BACHELOR OF SCIENCE
(Granted by Purdue University)

For students planning to become professional chemists. Recommended to students planning to pursue graduate studies in chemistry. This degree carries certification by the Committee on Professional Training of the American Chemical Society.

Degree Requirements

Areas I, IIIA, and IIIB: See the School of Science requirements on pages 19-20.

Area II: Foreign Language: 13 hours of German including G231 — may substitute another reading course if G231 is not available (e.g., G213).

Area IIIC: Physical and Biological Sciences: Physics 152, 251, 342, 342L and at least one additional course in a laboratory science outside chemistry which may be chosen from, e.g., Biology (K101, K103) or Geosciences or Physics.

Area IIID: Mathematical Sciences: MA163, MA164, MA261, and MA262.

Area IV: Chemistry Concentration Requirements: 47 hours of chemistry including C105, C106, C310, C311, C341, C342, C343, C344, C361, C362, C363, C400, C410, C411, C430, and 6 hours of advanced chemistry (e.g., C301, C302, C335, C409, C483, 561). Note: a maximum of 3 hours of C409 may be used to satisfy the 6 hours of advanced chemistry electives.

MASTER OF SCIENCE

The complete course and research work for the M.S. (Purdue) degree in chemistry with thesis or nonthesis option is offered at IUPUI. The nonthesis program is designed mainly for the part-time student who works in local industry or in chemically-related fields such as quality control, high school teaching, etc., and the thesis program is designed for the full-time student who is preparing for a career in the research-oriented fields of chemistry.

Admission Requirements

The prospective student should have a baccalaureate degree from an accredited institution, show promise of ability to engage in advanced work, and have made an adequate preparation (approximately 35 hours of coursework in under-graduate chemistry) to enter upon graduate study in

chemistry. Anyone not meeting these requirements should take the Aptitude Test Section of the Graduate Record Examination or seek immediate counselling.

Application for Admission

Regular graduate student application forms should be obtained from the Department of Chemistry, IUPUI. Usually eight weeks are required for final approval of these applications. Regular graduate students are eligible to become candidates for advanced degrees.

Temporary graduate student application forms may be obtained from the IUPUI Graduate School Office in the Union Building. The temporary graduate classification is primarily for those who wish to take courses for personal improvement. Usually not more than nine hours of credit earned under this classification may be applied toward an advanced degree.

Transfer Credit

The chemistry department will accept by transfer a maximum of six hours of graduate credit from approved institutions which are in excess of undergraduate degree requirements.

General Degree Requirements

The general requirements include admission to regular graduate status, completion of the English requirement, and satisfactory completion of an approved plan of study. A suitable research or library thesis must be submitted for the thesis option.

The English requirement for candidates whose native language is English is satisfied by having no undergraduate grades below B in 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 English Department to demonstrate their proficiency.

An informal plan of study should be drawn up by the student and the graduate advisor in advance of registration for the first semester of graduate work. The formal plan of study should be submitted as soon as possible and before the final semester. The English requirement must be satisfied before the plan of study may be filed. Only grades of A, B, and C are acceptable as satisfactorily completing an approved plan of study. All grades earned count toward the calculation of the grade point average.

Departmental Degree Requirements

Incoming students with an undergraduate grade point average of 2.80 or higher (A=4.00) will automatically be recommended for admission as regular graduate students. Those with an average below 2.80 will be admitted as temporary graduate students with the provision that a 2.50 average must be achieved in the first three graudate courses (or nine credit hours) if they are to be admitted as regular graduate students.

Departmental placement examinations in analytical, inorganic, organic, and physical chemistry are given each fall to incoming regular graduate students to determine deficiencies which must be removed before the completion of the graduate program. The remedial courses are considered to be CHM 525 for analytical, CHM 542 for inorganic, undergraduate organic courses (no graduate credit) for organic, and CHM 573 and/or CHM 574 for physical.

The requirements for each degree are designed to provide both depth and diversity in knowledge. Of the 30-hour requirement for the nonthesis program or the 20-hour course requirement for the thesis program, 12 hours must be at the CHM 600-level and 9 hours must be in a declared major. Courses from three of the following areas must be taken: biochemistry, CHM 533 (I.U. C483); organic, CHM 561 (I.U. C443); analytical, CHM 621 (I.U. C510); inorganic, CHM 641 (I.U. C530); and physical, CHM 671 (I.U. C561), CHM 672 (I.U. C661), CHM 675 (I.U. C673) or CHM 679 (I.U. C563). Electives to meet the total number of credits may be taken in other departments, but prior approval of the advisory committee is required. A minimum grade point average of 2.80 must be maintained.

Financial Assistance

The chemistry department has available financial support in the form of tuition-refund assistantships and associate faculty positions on a very limited basis.

COURSES IN CHEMISTRY

C101 ELEMENTARY CHEMISTRY 1 (5 Cr, 3 Cr without laboratory)
P: At least 1 semester high school algebra. Equiv. PU CHM 113. Fall, day and night; Spring, day and night; Summer, day.
Essential principles of chemistry. Lectures, laboratory. N.B. Most degree programs which include C101 require laboratory. Before registering for 3 credits, the student should be certain that this meets the requirements of his program.

C102 ELEMENTARY CHEMISTRY II (5 Cr, 3 Cr without laboratory)
P: C101. Continuation of C101. Equiv. PU CHM 251. Fall, night; Spring, day and night; Summer, day.
Introduction to organic and biochemistry; organic compounds and their reactions. Lectures, recitation, laboratory.

C105 PRINCIPLES OF CHEMISTRY I (5 Cr, 3 Cr without laboratory)
P: Two years of high school algebra, one year of high school chemistry. Equiv. PU CHM 117. Fall, day, night; Spring, day, night; Summer, day, night.
Basic concepts and nomenclature, atomic structure, nuclear chemistry, chemical bonding, stiochiometry, oxidation-reduction, the states of matter, solutions, colloids. Lectures, recitation, laboratory.

C106 PRINCIPLES OF CHEMISTRY II (5 Cr, 3 Cr without laboratory)
P: C105. Equiv. PU CHM 126. Fall, night; Spring, day, night; Summer, day.
Thermodynamics, electrochemistry, chemical equilibrium, kinetics, descriptive and environmental chemistry. Lectures, recitation, laboratory.

C111 CHEMICAL SCIENCE FOR ENGINEERS (4 Cr)
Equiv. PU CHM 101. Fall, day, night; Summer, day, night.
A non-laboratory course for engineers who do not expect to take more than one year of chemistry. Lectures, recitations.

C112 CHEMICAL SCIENCE FOR ENGINEERS (3 Cr)
P: C111. Equiv. PU CHM 102. Fall, day; Spring, day, night; Summer, day.
Continuation of C111. Lectures, recitation.

C207 BIOCHEMISTRY (4 Cr)
P: C102. Equiv. PU BCHM 207. Spring, night.
Introduction to Biochemistry presents the fundamental concepts of biochemistry to students who are more interested in the application of science than in the pursuit of science itself. Major emphasis is given to the chemical characteristics of biomolecules and to the interrelationships of the metabolic pathways common to all living organisms. Lectures, laboratory.

C209 SPECIAL PROBLEMS (1-2 Cr)
P: Two semesters of college chemistry and consent of instructor. Equiv. PU CHM 290. Every semester, time arranged.
Individually supervised special problems of chemical interest, e.g., environmental problems, development of experiments, development of audiovisual materials, etc. May be repeated for credit. but maximum credit of 2 hours may be applied toward a chemistry degree.

C224 QUANTITATIVE ANALYSIS (4 Cr)
P: C106. Equiv. PU CHM 224. Fall, night.
Introduction to the major methods of chemical analysis and separation for the chemical technician or non-chemistry major.

C225 QUANTITATIVE ANALYSIS/INSTRUMENTS (4 Cr)
P: C106. Equiv. PU CHT 225. Spring, night.
Instrumental methods of chemical analysis for the chemical technician or non-chemistry major.

C301 CHEMISTRY SEMINAR I (1 Cr)
P: C341 and junior standing. Fall, night.
Topics in basic chemistry and interdisciplinary applications. Research reports and discussion by students, faculty and outside speakers. C301 and C302 may be elected three semesters for credit.

C302 CHEMISTRY SEMINAR II (1 Cr)
P: C341 and junior standing (C301 is not prerequisite). Spring, night.
Content same as C301.

C309 COOPERATIVE EDUCATION IN CHEMISTRY (1 Cr)
P: general and organic chemistry and consent of department chairman. Every semester. Time arranged.
Industrial or similar experiences in chemically-oriented employment. Grade is determined on basis of employment visitations, a written student report, and a supervisor evaluation report. May be repeated for a maximum of 5 credits of which 3 may be used as satisfying an advanced chemistry elective.

C310 ANALYTICAL CHEMISTRY (3 Cr)
P: C342. Equiv. PU CHM 321. Fall, night.
Fundamental analytical processes including solution equilibria, theory and applications of electrochemistry and spectrophotometry, chemical methods of separation and measurement.

C311 ANALYTICAL CHEMISTRY LABORATORY (2 Cr)
C: C310. Fall, night.
Laboratory instruction in the fundamental analytical techniques discussed in C310. This course must be taken concurrently with C310.

C335 INORGANIC CHEMISTRY LABORATORY (1-3 Cr)
P: 1 year physical chemistry, P or C: C430. Equiv. PU CHM 342L. Fall, night.
Preparation of compounds of rarer elements and unusual compounds of common elements. Reactions of rarer elements.

C341 ORGANIC CHEMISTRY (3 Cr)

P: C106. Equiv. PU CHM 261. Fall, day, night; Spring, night; Summer, day.

Comprehensive study of aliphatic and aromatic compounds. Nomenclature, qualitative theory of valence and reactions. Commercial and laboratory syntheses and uses of monofunctional compounds.

C342 ORGANIC CHEMISTRY (3 Cr)

P: C341. Equiv. PU CHM 262. Spring, day, night; Summer, day.

Syntheses and reactions of polyfunctional compounds. Natural and industrial products. Physical and chemical methods of purification.

C343 ORGANIC CHEMISTRY LABORATORY (1 or 2 Cr)

P or C: C341. Equiv. PU CHM 255L (1 Cr), CHM 263L (1 Cr), CHM 265L (2 Cr). Fall, day, night; Spring, night; Summer, day.

Fundamental laboratory techniques of organic chemistry and general synthetic methods.

C344 ORGANIC CHEMISTRY LABORATORY (1 or 2 Cr)

P or C: C342. P: C343. Equiv. PU CHM 256L (1 Cr), CHM264L (1 Cr), CHM 266L (2 Cr). Spring, day, night; Summer, day.

Preparation, isolation and identification of organic compounds; emphasis on modern research methods.

C360 ELEMENTARY PHYSICAL CHEMISTRY (3 Cr)

P: C106, Mathematics MA M119, Physics 218. Spring.

Chemical thermodynamics, chemical equilibria, solutions, phase equilibria, electrochemistry, and kinetics. For students not intending to specialize in physical sciences.

C361 PHYSICAL CHEMISTRY I (3 Cr)

P: C106, Mathematics MA164, Physics 219 or 251. Equiv. PU CHM 373. Fall, day and night.

Order of taking C361 and C362 optional. Gases, kinetic-modular theory, chemical thermodynamics and kinetics, introduction to statistical thermodynamics.

C362 PHYSICAL CHEMISTRY II (3 Cr)

P: C106, C361 or Mathematics MA261 and Physics 251. Equiv. PU CHM 374. Spring, day and night.

Order of taking C361 and C362 optional. Introduction to quantum chemistry; structure and spectra of atoms, molecules, and solids; solids, liquids, and phase equilibria.

C363 EXPERIMENTAL PHYSICAL CHEMISTRY (2 Cr)

P: One semester of physical chemistry. Equiv. PU CHM 374L. Spring, day.

Experimental work to illustrate principles of physical chemistry and to introduce research techniques.

C400 CHEMICAL DOCUMENTATION (1 Cr)

P: C341. Equiv. PU CHM 513. Spring, night.

Lectures and library problems on classical and computer techniques of searching and evaluating chemical literature — reference books, periodicals, patents, etc.

C409 CHEMICAL RESEARCH (1-5 Cr)

P: junior or senior standing and consent of instructor. Equiv. PU CHM 499. Every semester. Time arranged.

Chemical or literature research. Can be elected only after consultation with research advisor and approval of program. May be taken for a total of 10 credit hours which count toward graduation. However, a maximum of 3 hours may be used to satisfy the 6 hours of advanced chemistry electives in the I.U. and P.U. Bachelor of Science in Chemistry degree programs.

C410 INSTRUMENTAL METHODS OF ANALYSIS (2 Cr)

P: 1 year of physical chemistry, C310. Equiv. PU CHM 424. Spring, night.

Theory and practice of modern analytical methods, including electroanalytical techniques, quantitative spectrophotometry, chromatography and radiochemical methods. Lectures, laboratory.

C411 INSTRUMENTAL METHODS OF ANALYSIS LABORATORY (2 Cr)
P: C311, P or C: C410. Spring, night.
Laboratory instruction in the instrumental analysis techniques discussed in C410.

C430 INORGANIC CHEMISTRY (3 Cr)
P: 1 year of physical chemistry. Equiv. PU CHM 342. Fall, night.
An introduction to the principles of inorganic chemistry with emphasis on the chemistry of the nontransition elements. A brief introduction to coordination chemistry and ligand field theory.

C483 BIOLOGICAL CHEMISTRY (3 Cr)
P or C: C224 or C310, C342. Equiv. PU CHM 533. Spring, night.
Chemistry of biologically important molecules, including carbohydrates, lipids, proteins and nucleic acids. Special emphasis on chemistry of intermediary metabolism.

525 INTERMEDIATE ANALYTICAL CHEMISTRY (3 Cr)
P: C310. P or C: second semester physical chemistry. Not open to students with credit in CHM 424. Equiv. I.U. C520. Spring, night.
Survey of chemical and instrumental methods of analysis.

542 INORGANIC CHEMISTRY (3 Cr)
P: 1 year of physical chemistry. Equiv. I.U. C430. Fall, night.
An introduction to the principles of inorganic chemistry with emphasis on the chemistry of the nontransition elements.

542L INORGANIC CHEMISTRY LABORATORY (1 Cr)
Laboratory work to accompany 542.

561 FUNDAMENTAL ORGANIC CHEMISTRY (3 Cr)
P: C342. Equiv. I.U. C443. Fall, night.
A general survey of synthetic organic chemistry including some discussion of current organic theory.

573 PHYSICAL CHEMISTRY (3 Cr)
P: C106, Mathematics MA164, Physics 219 or 251, Fall, day and night.
Order of taking 573 and 574 optional. Properties of gases; kinetic-molecular theory; introduction to atomic and molecular structure; classical thermodynamics including chemical equilibria; molecular interpretation of thermodynamics.

574 PHYSICAL CHEMISTRY (3 Cr)
P: C106, Mathematics MA261 and Physics 251. Spring, day and night.
Order of taking 573 and 574 optional. Phase equilibria; liquids; electrolytic solutions and cells; structure of atoms and molecules; spectroscopy; chemical kinetics; the solid state.

574L PHYSICAL CHEMISTRY LABORATORY (2 Cr)
Laboratory portion of 573 and 574.

599 SPECIAL ASSIGNMENTS (1-4 Cr)
P: consent of instructor. Every semester, on demand. Time arranged.
Directed reading or special work not included in other courses.

621 ADVANCED ANALYTICAL CHEMISTRY (3 Cr)
P: C310, C410. Equiv. I.U. C510. Spring, odd years, night.
A critical survey of recent developments in chemical and instrumental methods of analysis.

626 ON LINE COMPUTER TECHNIQUES IN CHEMICAL INSTRUMENTATION (2 Cr)
P: 621. Spring, odd years, night.

Introduction to the basics of digital instrumentation and the incorporation of digital computers in the chemical laboratory. About one-third of the course will be devoted to discussion of the hardware and logic of digital electronics, and the principles and techniques for implementation in chemical instrumentation. Another third of the course will develop the skills of machine-language computer programming, oriented towards applications in chemistry. The last third will combine the digital logic and programming principles for on-line computer applications in chemical experimentation.

626L ON LINE COMPUTER TECHNIQUES IN CHEMICAL INSTRUMENTATION LABORATORY (1 Cr)

Laboratory to accompany 626. A sequence of progressively more difficult laboratory projects to develop the capability for designing and interfacing systems for on-line communication between the digital computer and chemical instrumentation.

636 BIOCHEMICAL MECHANISMS (3 Cr)

P: 1 year of physical chemistry and 651. Fall, night.

The chemical basis of enzymatic catalysis with particular emphasis on catalytic interactions important in aqueous media.

641 ADVANCED INORGANIC CHEMISTRY (3 Cr)

P: C430 or 542. Equiv. I.U. C530. Spring, night.

Bonding in inorganic chemistry, symmetry and group theory, transition metal chemistry, spectra and magnetism, mechanisms of inorganic reactions, limited survey of periodic table.

651 ADVANCED ORGANIC CHEMISTRY (3 Cr)

P: 561. Equiv. I.U. C540. Spring, odd years, night.

A survey of advanced organic chemistry.

652 SYNTHETIC ORGANIC CHEMISTRY (3 Cr)

P: 651. Equiv. I.U. C543. Fall, odd years, night.

Continuation of 651, with special emphasis on synthetic organic chemistry.

668 PHYSICAL ORGANIC CHEMISTRY (3 Cr)

P: 561. Equiv. I.U. C644. Spring, even years, night.

A consideration of organic reactions employing modern theories.

671 ADVANCED PHYSICAL CHEMISTRY (3 Cr)

P: 1 year of physical chemistry. Equiv. I.U. C561. Fall, even years, night.

Selected topics, including atomic and molecular structure and modern theories underlying thermodynamics and chemical kinetics.

672 QUANTUM CHEMISTRY (3 Cr)

P: 1 year of physical chemistry. Equiv. I.U. C661. Spring, odd years, night.

Basic principles of classical and quantum mechanics; exact solutions for simple systems; approximation methods; atomic structure; spectoscopy; application of group theory; theory of molecular binding.

675 CHEMICAL KINETICS (2 or 3 Cr)

P: 1 year of physical chemistry. Equiv. I.U. C673. Fall, odd years, night.

Experimental and theoretical considerations of chemical reaction rates and mechanisms.

679 CHEMICAL THERMODYNAMICS (3 Cr)

P: 1 year of physical chemistry. Equiv. I.U. C563. Spring, even years, night.

Advanced thermodynamics of chemical and phase equilibria, of electrolyte and nonelectrolytic solutions, and of imperfect gases.

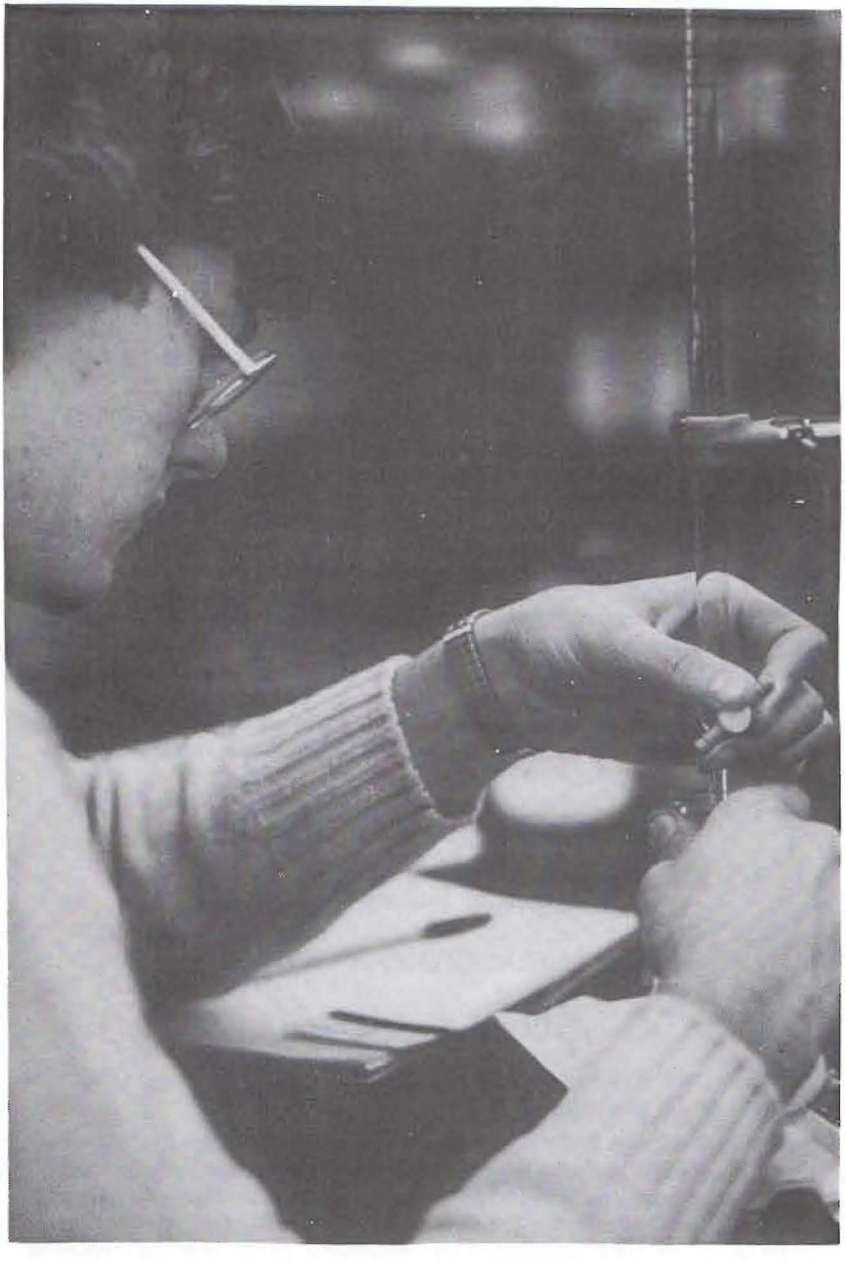
696 SPECIAL TOPICS IN CHEMISTRY (2 or 3 Cr)

On demand, night.

Lectures on selected topics of current interest.

698 RESEARCH. M.S. THESIS (Credit arranged)

Occasional courses of special interest are offered on the undergraduate and graduate level. For details see Special Programs, this bulletin.



DEPARTMENT OF GEOLOGY

PROFESSOR: Mirsky (Chairman), Weihaupt; ASSISTANT PROFESSOR: Hall, L. Younker; LECTURER: J. Younker; DEPARTMENTAL COUNSELORS: Professors Mirsky and Hall.

Geology is the science of the earth — man's systematic attempt to understand the planet and the environment in which he dwells. Geology includes the location, extraction, and economic use of minerals, rocks, soils, water, coal, and petroleum. These natural resources compose the earth and make possible our modern technology and civilization. Geologists study the landforms produced by volcanoes, streams, wind, glaciers, and other surficial earth processes. Geologists investigate the internal earth processes of earthquakes, mountain building, continental drift, and sea-floor spreading. Geology includes the fossils which record the development of life on the earth and also includes the investigation of the billions of years of earth history. Geology has recently expanded to include the study of the moon and the earth-like planets.

The Department of Geology furnishes training for (1) those who desire to become professional geologists and seek careers in industry, in research laboratories, in federal or state or local government, or in university or college teaching; (2) those who wish to teach earth science or geology at the secondary school level; and (3) those who seek a general knowledge of geology, its relationship to other sciences, and its importance to the environment of mankind.

The following degree options are offered in geology: Bachelor of Arts (B.A.) in Geology (with General Geology Option or Earth Science Secondary Teaching Certification Option), and Bachelor of Science (B.S.) in Geology (with General Geology Option or Environmental and Urban Geology Option). The choice of a particular degree option and proposed plan of study must be made in consultation with a departmental counselor.

Bachelor Of Arts Degree

(Granted by Indiana University)

GENERAL GEOLOGY OPTION

Degree Requirements

Area I: See School of Science requirements. Geology G205 may partially satisfy this requirement.

Area II: There is no requirement for a foreign language. However, those planning to continue with graduate studies, especially toward the doctorate, normally are urged to take a modern foreign language through at least the first-year level. Those planning to obtain only the B.A. degree, particularly in such specialties as Secondary Earth Science Teaching, Environmental Geology, or Applied Geology may find it more advantageous to substitute other electives for a modern foreign language.

Each student should consult his departmental counselor to determine his foreign language needs.

Area IIIA: See School of Science requirements. First year of a foreign language does not apply towards satisfying this requirement, but is an elective.

AREA IIIB: See School of Science requirements.

AREA IIIC: Physical & Biological Sciences: See School of Science requirements, but at least two of the four courses must include Chemistry C101-C102 or C105-C106, and at least one of the four courses must be in Biological Sciences.

AREA IIID: Mathematical Sciences: Entrance requirement for School of Science fulfills this requirement.

Area IV: Geology Concentration Requirements

30 credits of Geology (including G109, G110, G205, G221, G222, G323, G334, G404, but not Geology G107 which applies as an elective), and sufficient credits from related subjects to complete the concentration group. This program can provide, in addition to a broad general education, an adequate background for professional employment and advanced study in geology.

Other Requirements

See School of Science General Requirements.

EARTH SCIENCE SECONDARY TEACHING CERTIFICATION OPTION

Degree Requirements

A. **Humanities:** 16-18 credits

Area I: See School of Science requirements. Geology G205 may partially satisfy this requirement.

Area II: No foreign language requirement.

Area IIIA: See School of Science requirements. First year of a foreign language does not apply towards satisfying this requirement, but is an elective.

B. **Social and Behavioral Sciences:** 14-16 credits

Area IIIB: See School of Science requirements.

C. **Life and Physical Sciences:** 14-16 credits

Area IIIC & D: Same as under General Geology option above

D. **Electives as needed to obtain a total of 50 credits of Humanities**

Earth Science Requirements (Area IV)

40 credits of Geology and related subjects (including G109, G110, G205, G221, G222, G323, G334, G404), 10 credits of Chemistry. The additional related subjects are listed below:

Certification Requirements

Astronomy, A100 or A105—3 credits
Physical Geography, G107—3 credits
Meteorology, G304—3 credits
Conservation, G316 or G416 or T480—3 credits
Regional Geography, G300 or G326 or G329 or G415—3 credits
Field Techniques or Cartography, G303 or G429—3 credits
Physical Anthropology, A303—3 credits

Professional Education Requirements

24 credits including F200, P280, M449, M462, M480, and S485. Every student who plans to obtain a teaching certificate must meet a minimum competence in a speech and hearing test and be formally admitted to the teacher education program. M449 must be taken one semester before student teaching. Also methods and student teaching must be taken on the same campus.

Other Requirements

See School of Science General Requirements, except electives to make a minimum of 124 credits, and an average of C or better for education courses (with at least a C in M449).

Bachelor Of Science Degree

(Granted by Indiana University)

GENERAL GEOLOGY OPTION

Degree Requirements

Area I: See School of Science requirements. Geology G205 may partially satisfy this requirement.

Area II: Same as in B.A. degree.

Area IIIA: See School of Science requirements. First year of a foreign language does not apply towards satisfying this requirement, but is an elective.

Area IIIB: See School of Science requirements.

Area IIIC: Physical & Biological Sciences: Chemistry C105-C106; Physics 218-219 or 152-251; and two courses in Biological Sciences, with Geology Department's approval.

Area IIID: Mathematical Sciences: Calculus MA163-MA164, and two courses in computers and/or statistics. (May include certain computer courses in School of Engineering/Technology, with Departmental approval.)

Area IV: Geology Concentration Requirements

Geology: 30 credits, including G109, G110, G205, G221, G222, G323, G334, G404, G429 (but not Geology 107 which applies as an elective).

General: four courses at 300-400 level in two or more of the following Departments: Biological Sciences, Chemistry, Geology, Mathematical Sciences, Physics, with at least two courses outside of Geology.

Other Requirements

See School of Science General Requirements.

ENVIRONMENTAL AND URBAN GEOLOGY OPTION

Degree Requirements

Areas I, II, and III are the same as those for the B.S. in Geology (General Geology Option).

Area IV: Geology Concentration Requirements

Generally the same as those noted under the B.S. in Geology (General Geology Option), except that Geology G300, G415, and G430 are required. One of these three courses may, with the approval of the Departmental counselor, substitute for G205 or G404 among the Geology requirements, and the other two courses will be included among the four courses in the General requirements.

Other Requirements

Same as those noted under the B.S. in Geology (General Geology Option), except that certain specific courses in other Departments are preferred for inclusion among the electives to make the minimum of 122 credits. The identification of these recommended courses depends on the specific objectives of the student as expressed in consultation with his Departmental counselor.

COURSES IN GEOLOGY

Courses with numbers in the 100's and 200's are lower division undergraduate courses. Courses with numbers in the 300's and 400's are upper division undergraduate courses which may, in some cases, be used for graduate credit. Courses in the 300's, prefixed by G or T, may be used for graduate credit by M.A.T. students and graduate students in Education but not by other students. The T prefix indicates that the course is especially designed for prospective teachers. Courses in the 400's may be taken for graduate credit by all graduate students.

NOTE: P — prerequisite; C — concurrent registration; R — recommended; Every — offered in both Fall and Spring Semesters and Summer Session; Fall — offered Fall Semester; Spring — offered Spring Semester; Summer — offered in one or both of the Summer Sessions; Day — offered as a daytime section; Night — offered as an evening section. For courses with no designated semester or section consult the *Schedule of Classes*. Equiv. — course is equivalent to the indicated course taught at Indiana

University-Bloomington or the indicated course taught at Purdue University-West Lafayette.

G107 GEOLOGY, RESOURCES, AND MAN (3 Cr)
P: None. Every.
An introduction to geology through discussion of geological topics that show the influence of geology on modern society. Topics include Mineral and Energy Resources, Land Use and Water Supplies, Geologic Hazards and Problems, Geology and Health, and New Geological Developments.

G109 GEOLOGY: EVOLUTION OF THE EARTH (3 Cr, 2 Cr without laboratory)
P: None. Every, day; Fall, night.
Basic principles of interpreting earth history: geologic time, stratigraphic analysis, reconstructing past environments. Physical development of the earth: geosynclines, mountainbuilding, continental drift, sea-floor spreading. Origin and development of life: evolution, the fossil record. With laboratory, 3 credits (equiv. I.U. G104, I.U. G112, and P.U. GEOS112); without laboratory, 2 credits. Credit not given for both G109 and G100 or G105.

G110 GEOLOGY: THE EARTH'S ENVIRONMENT (3 Cr, 2 Cr without laboratory)
P: None. Every, day; Spring, night.
Description, classification, and origin of minerals and rocks. Internal processes: earthquakes, rock deformation, origin of crustal structures. External processes: landslides, streams, glaciers, groundwater, man's geologic environment. With laboratory, 3 credits (equiv. I.U. G103, I.U. G111, and P.U. GEOS111); without laboratory, 2 credits. Credit not given for both G110 and G100 or G105.

G205 REPORTING SKILLS IN GEOSCIENCE (3 Cr)
P: English W117, Geology G107 or G109 or G110. Fall, day.
Techniques of presenting written and oral reports from the geoscience approach. The written report: mechanics of format and illustrations, proper citation of geoscience literature, the Abstract, proof-reading and editing. The oral report: effective presentation and response to audience questions, simulating a professional science meeting.

G221 INTRODUCTORY MINERALOGY (3 Cr)
P: An introductory geology course or consent of instructor. Fall.
Crystallography: morphology, classes, twinning, habit. Mineral chemistry, physics, and genesis. Description, identification, association, occurrence, and use of common and important minerals. Credit not given for both G221 and G106 or T306.

G222 INTRODUCTORY PETROLOGY (3 Cr)
P: G221. Spring.
Igneous, sedimentary, and metamorphic rocks: composition, field occurrence, characteristics, classification, and origin, laboratory description and identification. Credit not given for both G222 and G106 or T306.

G300 ENVIRONMENTAL AND URBAN GEOLOGY (3 Cr)
P: Geology G107, or G109 or G110 or Geography G107 or consent of instructor. Spring.
Significance of regional and local geologic features and geologic processes in land use planning; use of geologic data in areas of rapid urbanization to properly utilize mineral and water resources and to assess potential geologic hazards.

G303 GEOLOGY: MAPS AND AIR PHOTOS (3 Cr)
P: G109 or G110, or Geography G107 and consent of instructor. Fall.
Field use and interpretation of maps and aerial photographs. Planimetric, topographic, geologic, and soils maps; vertical and oblique air photos and photo mosaics. Introduction to remote sensing: infrared and radar imagery.

G323 STRUCTURAL GEOLOGY (3 Cr)
P or C: G222. R: G303. Spring.

Nature and origin of primary and secondary structural features of the earth's crust; with emphasis on mechanics of deformation and origin. Laboratory consists of three-dimensional problems illustrating structural concepts. Field trips.

G334 PRINCIPLES OF SEDIMENTATION AND STRATIGRAPHY (3 Cr)

P: G222 or consent of instructor. Spring.

Interrelationship of sedimentation and stratigraphy: processes and factors influencing genesis of sedimentary strata; provenance, depositional environment, sedimentary facies, paleoecology; analytical techniques, application of principles to interpretation of stratigraphic record.

G401 OPTICAL MINERALOGY (3 Cr)

P: G222. Fall in Alternate Years, day.

Principles of optical crystallography applied to identification of minerals by immersion and thin-section methods. Solid solution series and chemical relations within the rock-forming minerals.

G402 PETROGRAPHY AND ADVANCED PETROLOGY (3 Cr)

P: G401. Spring in Alternate Years, day.

Identification, description, and classification of igneous, sedimentary, and metamorphic rocks using the petrographic microscope. Textures, structures, mineralogical, and chemical classification; petrogenesis including field relations, physical and chemical aspects of rock systems, with emphasis on phase relations.

G404 GEOBIOLOGY (3 Cr)

P: G109 or consent of instructor. R: Biology 109. Fall.

Principles of paleontology. Application of biological principles and use of fossils in the study of earth history. G410 (1 Cr) must be taken concurrently for field project.

G406 INTRODUCTION TO GEOCHEMISTRY (3 Cr)

P: G221, Chemistry C106 or consent of instructor.

Chemistry in the study of the earth employing elementary chemical thermodynamics, the phase rule, chemical equilibria, redox reactions, the radioactive decay law, and organic chemistry.

G410 RESEARCH IN GEOLOGY (1-6 Cr)

P: junior standing and consent of instructor. Every, day, night.

Field and laboratory research in selected problems in geology. May be repeated. Total of 6 credits may be applied toward the degree.

G413 INTRODUCTION TO EARTH PHYSICS (3 Cr)

P: consent of instructor. Fall.

Physics in the study of the earth, its origins, history, and internal constitution.

G415 PRINCIPLES OF GEOMORPHOLOGY (3 Cr)

P: G110 or consent of instructor. Fall.

Geomorphic processes, evolution, and classification of landforms. Laboratory: topographic maps; aerial photographs.

G416 ECONOMIC GEOLOGY (3 Cr)

P: G222 or consent of instructor. Fall.

Origin, geologic occurrence, distribution, use, and conservation of important geologic natural resources of the world. Metallic minerals; industrial minerals and rocks; coal, petroleum, natural gas, and other energy resources; water as a natural resource. Credit not given for both G416 and G316.

G420 REGIONAL GEOLOGY FIELD TRIP (1-2 Cr)

P: consent of instructor. Spring, day.

Seminar and field investigation of selected regions for study of mineralogic, lithologic, stratigraphic, structural, paleontologic, geomorphologic, or other geological relationships. Seminar held during the semester. Six to ten days in the field during or following the semester.

G429 FIELD GEOLOGY IN THE ROCKY MOUNTAINS (6 or 8 Cr)

P: G221, G222, G323, and G334. Summer.

Six or eight weeks at Geologic Field Station in Montana. Geologic reconnaissance, measurement of stratigraphic sections, mapping on aerial photographs, construction of structure sections. Regional geomorphology, stratigraphy, and structure through South Dakota, the Black Hills, Wyoming, Montana, Yellowstone Park, and Glacier Park. Students register through the Geology Department at Indiana University-Bloomington.

G430 GEOLOGY OF WATER (4 Cr)

P: G110. R; G300, MA164, introductory chemistry, introductory biology.

Water as a natural resource, including both surface and subsurface water; investigation of physical, chemical, and biological properties of water; components of hydrologic cycle; environmental hydrology; includes field and laboratory study.

G451 PRINCIPLES OF HYDROGEOLOGY (3 Cr)

P: G109, G110 or consent of instructor. R: G334. Spring.

Water resources; occurrence, regulation, and management of water; hydrologic cycle, water movement, water quality and pollution; surface and subsurface investigations; basin-wide development of water resources.

G490 SEMINAR IN GEOLOGY (2-3 Cr)

P: junior or senior standing and consent of instructor. Fall.

Readings and discussion of selected topics. May be repeated, provided different topics are studied, for a maximum of 6 credits.

T309 EARTH SCIENCE: GEOLOGIC ASPECTS I (3 Cr)

P: None, Fall, night.

Introductory course for advanced students. Basic principles of interpreting and reconstructing earth history; physical and biological evolution of the earth. May be used for graduate credit by students in education. Credit not given for both T309 and G109.

T310 EARTH SCIENCE: GEOLOGIC ASPECTS II (3 Cr)

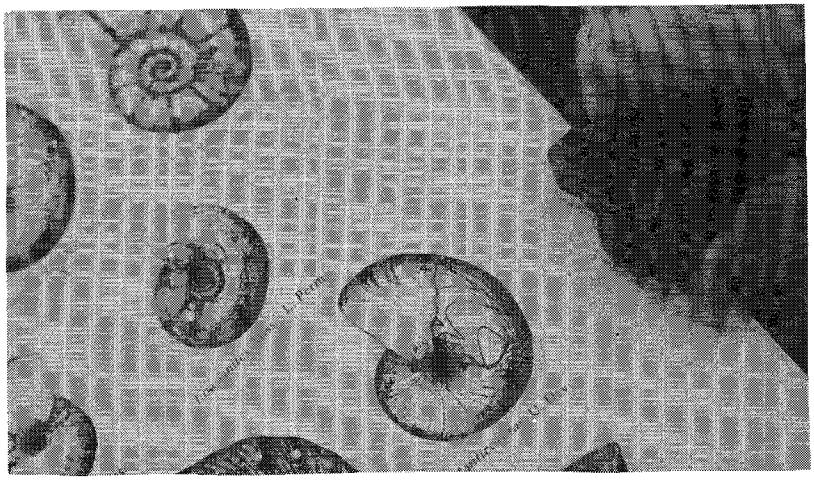
P: None. Spring, night.

Introductory course for advanced students. Geologic principles, minerals and rocks, internal and external geologic processes. May be used for graduate credit by students in education. Credit not given for both T310 and G110.

T480 SEMINAR IN EARTH SCIENCE (3 Cr)

P: consent of instructor. Spring.

Selected topics in earth sciences. May be repeated, provided different topics are studied, for a maximum of 6 credits. May be used for graduate credit by students in education.



DEPARTMENT OF MATHEMATICAL SCIENCES

PROFESSORS: Crown, Gemignani (Chairman), Johnston, Kuczkowski, Huffman; PROFESSORS EMERITUS: Suter, Sconce; ASSOCIATE PROFESSORS: Alton, Bittinger, John Gersting, Judith Gersting, Kleyle, Loh; ASSISTANT PROFESSORS: Aliprantis, Beeson, Burkinshaw, Hunter, Hutton, Kaminker, Luke, Ng, Patterson, Penna, Rigdon, Rigo; INSTRUCTOR: Suer; DEPARTMENTAL COUNSELOR: Loh; GRADUATE COUNSELOR: Kuczkowski.

The Department of Mathematical Sciences includes the areas of Computer Science, Mathematics, and Statistics.

The department offers the Bachelor of Science degree with major in Mathematics and provides electives leading to specialization in any one of five optional areas: pure mathematics, applied mathematics, computer science, statistics, and secondary school teaching.

The department offers the Bachelor of Science degree in Computer Science.

Graduate degrees offered are: Master of Arts in Teaching, Master of Science (Applied Computer Science), Master of Science (Option for Teachers), Master of Science (Applied Mathematics) and Master of Science.

Undergraduate Programs

BACHELOR OF SCIENCE (MATHEMATICS)

(Granted by Purdue University)

Although a student may declare a mathematics major in his freshman year, he is not officially admitted to the department as a major in mathematics until completion of MA351 or its equivalent. An average grade of 2.0 with no failing grades in mathematics courses through MA351 is a minimum indication of success in this major.

Degree Requirements

The requirements for the Bachelor of Science degree with major in Mathematics in any optional area except secondary school teaching are:

1. Those general requirements under Area I and III of the University and the School of Science, see page 19, except that
   a. Mathematics courses below MA163 do not count toward the degree.
   b. Courses in other schools that are primarily mathematical may not be used to fulfill Area III A & B, humanities and social science requirement of the School of Science. If in doubt about a particular course, the student should consult his advisor.

c. Certain courses, such as Chemistry C101, C102; Physics 100, 200, 218, 219; Astronomy A100, A105; and Geography G107 may not be used to fulfill the Science requirement, Area III C, of the School of Science. If in doubt about a particular course, the student should consult an advisor.

d. AREA II: No foreign language requirement.

2. Those relating to the minor.

3. Those relating to the major.

Minor Requirements

In order that a student should acquire some depth of study in a subject outside his major area, he is required to have a minor in the natural sciences, the social sciences, the behavioral sciences, or the humanities. For this minor he needs 18 hours including at least three courses beyond the introductory level. While a minor is usually in one department it may be from two or more, if the student's advisor approves. Courses may be used for the double purpose of fulfilling general requirements and the minor requirements of the Department of Mathematical Sciences. Physics is a good choice of minor for students in this department.

Major Requirements

AREA IV: PURE MATHEMATICS OPTION

With this option you would be well prepared for graduate work in pure mathematics. However students who are interested in mathematics have also been successful with graduate studies in business administration, computer science, economics, engineering, educational research, law, medicine, operations research, psychology, statistics and physics. Persons with advanced degrees in pure mathematics find careers primarily in college teaching, but careers in business, industry or government service are also possible. A minor in one of the physical sciences or in a subject which makes serious use of mathematics, such as economics, is desirable.

The major requirements are:

1. The calculus sequence MATH 163, 164, 261
2. Computer Science CSCI 220
3. Linear and Abstract Algebra MATH 351 (or MATH 511) and MATH 453
4. Analysis MATH 361 and MATH 441
5. Twelve additional hours selected from mathematics, computer science or statistics courses at the 300 level or higher, and approved by your academic advisor.
6. A graduation index of at least 2.0 in these courses used to fulfill the requirements listed under 3, 4, and 5 above.

AREA IV: APPLIED MATHEMATICS OPTION

Graduates with training in applied mathematics are employed in business, industry and government. You would probably work as part of a team and often would need to communicate mathematical ideas to persons trained in other subjects. In many instances, you would need to formulate

problems for solution on a computer and then interpret the answers. Thus, besides a fundamental knowledge of mathematics, a knowledge of what computers can do is essential. This option is also a good preparation for graduate study in applied mathematics, computer science, statistics and engineering.

With this option a minor in physics or engineering is required.

The major requirements are:

1. The calculus sequence MATH 163, 164, 261
2. Computer Science CSCI 220, CSCI 320
3. Linear Algebra MATH 511 (or MATH 351)
4. Analysis MATH 361 and CSCI 414 (or CSCI 512)
5. Mathematical Modeling MATH M598 or CSCI 520
6. Statistics STAT 311
7. Six additional hours, three of which must be in applied mathematics, selected from mathematics, computer science or statistics courses at the 300 level or higher, and approved by your academic advisor.
8. A graduation index of 2.0 or higher in those courses (not counting CSCI 220) used to fulfill the requirements listed under 2, 3, 4, 5, 6, and 7 above.

The student whose primary interest is in applied mathematics, computer science, pure mathematics, statistics, or secondary school teaching should see his advisor for suggestions concerning his plan of study.

SECONDARY SCHOOL TEACHING OPTION

To teach in secondary schools, you must meet the requirements for teacher certification in the state you expect to teach. You can find out these requirements by writing to the Department of Public Instruction, Certification Office, in the capital city of any state.

According to Indiana state law, a student should have 50 semester hours in general education courses and at least 18 semester hours of professional education courses as part of the requirement for a teaching license. You should be sure to see an advisor to ensure that these hours are properly distributed and that the professional education requirements are met. The State of Indiana also requires high school mathematics teachers to have at least forty semester hours of mathematics courses. The general requirements for this option differ from the other options in that 4 hours of English composition is required under AREA I and one year (at least five semester hours) in a modern foreign language is required under AREA II. Your minor is satisfied by the courses that you take to meet the professional education requirement.

Major Requirements

The requirements in AREA IV are:

1. The calulus sequence MATH 163, 164, 261
2. Computer Science CSCI 220

3. Linear and Abstract Algebra MATH 351 (or MATH 511) and MATH 453
4. Analysis MATH 361, and MATH 441 (or MATH 300)
5. Geometry MATH 563 (or MATH 561)
6. Probability and Statistics STAT 311 (or MATH 519)
7. Three hours selected from a mathematics, computer science or statistics course at the 300 level of higher.
8. Two additional hours of electives in Mathematics, Computer Science, or Statistics. This requirement may also be met by courses that are basically mathematical in nature in Physics or Engineering.
9. A grade point average of at least 2.0 in all Mathematics, Computer Science and Statistics courses at the 300 level or higher used to fulfill the requirements of 3, 4, 5, 6, 7, and 8 above.

According to Indiana state law, a student should have fifty semester hours in general 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.

BACHELOR OF SCIENCE (COMPUTER SCIENCE)

(Granted by Purdue University)

Degree Requirements

Those general requirements under AREA I and III of the University and the School of Science, see pages 19-20, except that Mathematics courses below MA163 and Computer Science courses below CSC1220 do not count toward the degree. There is no foreign language requirement under AREA II.

AREA IV: Major Requirements

1. The calculus sequence MA163, 164, 261.
2. One year of algebra MA351 and either CSCI482 or MA453.
3. One year of analysis MA361 and CSCI414.
4. CSCI220, 300, 320, 402, 484.
5. STAT511 or 516.
6. At least three additional computer science courses at the 400 level or above of which at least one is a 500 level course.

GRADUATE PROGRAMS

The department of Mathematical Sciences offers complete programs leading to the following Purdue Master's degrees: Master of Arts in Teaching, Master of Science (Option for Teachers), Master of Science, Master of Science (Applied Mathematics), and Master of Science (Applied Computer Science). These programs are designed for the part-time student, and all course offerings are normally offered on the IUPUI evening schedule.

Admission Requirements

Students entering a graduate program in mathematics should have completed an undergraduate program containing as many courses in abstract algebra, linear algebra, advanced calculus, differential equations, logic and foundations, and probability as is possible.

Students entering the graduate program in applied mathematics should have completed an undergraduate program in mathematics, or an undergraduate program in engineering or physical sciences that is highly mathematics oriented.

Students entering the program in applied computer science should have an undergraduate degree and a background in computer programming and mathematics with an overall B average or better. All applicants should have completed the following courses (or equivalents) which if taken as deficiency courses carry no credit: CSCI220, CSCI300, CSCI320, MA163, MA164, and MA261.

Application for Admission

The student who wishes to pursue an advanced degree in the department of Mathematical Sciences should see a graduate advisor in order to receive counseling, prepare an informal plan of study, and obtain a regular graduate student application form. While this application is being processed the student may enter IUPUI as a temporary graduate student. Not more than nine hours of credit earned under this classification may be applied towards an advanced degree. Those individuals who do not want to pursue an advanced degree, but desire to take graduate courses for personal improvement may also take courses under the temporary graduate student classification.

Transfer Credit

The department of Mathematical Sciences will accept by transfer a maximum of nine hours of graduate credit which are in excess of undergraduate degree requirements from approved institutions.

General Degree Requirements

The general requirements include admission to regular graduate status, completion of the English requirement, and satisfactory completion of an approved plan of study.

The English requirement for candidates whose native language is English is satisfied by having no undergraduate grades below B in 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 English department to demonstrate their proficiency.

The student's formal plan of study should be submitted and accepted by the graduate school before the semester in which the student expects to receive his degree. The English requirement must be satisfied before the plan of study may be filed. No course in which the grade earned is below C, and normally no more than six hours of courses with a grade of C, may be accepted toward completion of the plan of study.

MASTER OF ARTS IN TEACHING

This program is open only to students who are (or are preparing to be) secondary school teachers and whose mathematics background is not sufficient to permit candidacy for the M.S. (Option for Teachers) degree. It is a flexible program designed to provide certificated secondary school teachers with an additional year of training.

This non-thesis program requires a minimum of 33 credits. Not more than six hours of courses with a grade of C may be counted. Required courses are MA547, 548, 550, 551, 561, 563. In addition the student selects one, three-hour course in mathematics, computer science or statistics and twelve hours of electives which must be approved by his advisory committee.

MASTER OF SCIENCE (OPTION FOR TEACHERS)

Secondary school Mathematics teachers who wish to have a stronger program in mathematics will meet the requirements of the M.S. (Option for Teachers). This program normally requires 33 hours of course work. Required courses are MA540 or MA544, MA525, MA553, MA554, MA519, one course in geometry selected from MA561, MA562 and MA563, and one additional graduate level course in the mathematical sciences. The remaining hours of electives are to be selected by the student and his advisory committee.

MASTER OF SCIENCE (APPLIED MATHEMATICS)

This program is authorized for Indianapolis by the Department of Mathematics of Purdue University. It leads to a Purdue University degree.

Under this program, candidates must complete at least 30 credit hours with at least a B average and normally no more than two courses with grade C will be acceptable in a plan of study. Normally no more than 9 credits can be transferred from another institution.

Requirements for students in applied mathematics terminating with the M.S. degree are:

a) Complex Analysis: MA525 or MA530
Real Analysis: MA534 or MA544
Linear Algebra: MA511 or MA554
Partial Differential Equations: MA523
Applied Mathematics: MA611
Computer Science, Probability: CSCI512, or 514, or 515, or 516, or 520, or MA519

b) Two of the remaining courses required should provide depth in a specific area. These courses must be approved by the students advisory committee, and they are not restricted to courses within Mathematical Sciences provided they deal with mathematical applications.

c) Three to six credit hours of the student's plan of study must be devoted to an applied mathematics research project on a topic approved by the student's advisory committee. A formal written report on the project will be submitted to the advisory committee for approval.

MASTER OF SCIENCE

This Master of Science is a strong terminal masters degree with emphasis in pure mathematics. The program normally requires 31 hours of course work. Required courses are MA525, 544, 553, 554, 571, and 585. Twelve hours of electives are to be selected by the student and his advisory committee.

MASTER OF SCIENCE (APPLIED COMPUTER SCIENCE)

This program is authorized for the Indianapolis Campus by the Department of Computer Science of Purdue University, and it leads to a Purdue University Degree. The MS(ACS) is a strong terminal masters degree with emphasis on applications.

The requirements for the MS(ACS) degree are:

1. Completion of at least 30 credit hours with a grade average of at least B. The credit hours must include the courses required under 2 and 3 below. Not more than 6 credit hours of grade C can be included, and no credits for grades below C can be included. Not more than 9 credit hours can be transferred from another institution.
2. Completion of one of the following major options:
   a. Numerical analysis — CSCI514, CSCI520, and either CSCI614 or CSCI615.

      Students in the numerical analysis option should also have completed MA262 (or 361), MA511 (or 351), and CSCI512 (or 414).

   b. Systems programming — CSCI501, CSCI502, CSCI503, and CSCI660.

      Students in the systems programming option should also have completed CSCI402 and CSCI403, and MA511 (or 351).
3. Completion of at least one course from each of the following categories:
   a. Numerical analysis above CSCI512.
   b. Systems programming — CSCI501 or CSCI502.
   c. Logic and automata theory — CSCI482 and CSCI484 or CSCI582.
   d. Mathematics above MA511.
4. Courses not required under 2 and 3 above must be Computer Science courses numbered above 500, with the exception: with the approval of the candidate's advisory committee, the following courses may be counted for half credit (1½ credits for a nominally 3 credit course): CSCI402, CSCI403, CSCI461, CSCI482, CSCI484.

Courses In Mathematical Sciences

Information pertaining to time of offering is intended only as a guide for the student. Schedules are sometimes very tentative. For this reason very little summer session information has been included.

Computer Sciences

UNDERGRADUATE LEVEL
Lower-Division Courses

CSCI201 INTRODUCTION TO COMPUTERS FOR THE HUMANITIES (3 Cr)
P: None.
An introduction to computers intended for students in the humanities and liberal arts. FORTRAN programming with emphasis on non-numerical programs. Computer applications which affect everyday life. The impact of computers on society, including both problems and benefits. Computer applications in the humanities.

CSCI208 THE COMPUTER IN BUSINESS (3 Cr)
P: MA111 or equivalent. Fall, Spring, day, night.
Introduction to digital computers and illustrations of their use in business: stored program concept, types of programming languages, computer experience using the FORTRAN language to solve business oriented problems.

CSCI220 PROGRAMMING I (3 Cr)
P or C: One semester of mathematics beyond MA151. Not open to students with credit in CSCI208. Fall, Spring, day, night.
An introduction to computer programming intended for students in the natural and social sciences. Basic concepts of computer organization and machine language. Programming in a high-level language (FORTRAN). Program development and debugging.

Upper-Division Courses

CSCI300 ASSEMBLY LANGUAGE PROGRAMMING (3 Cr)
P: CSCI220. Spring, day, night.
Assembly language programming, pseudo-operations, macros, and buffering. Interfacing with programs written in a higher-level language, parameter passing, and common storage. Components of digital computers. Number and character representation.

CSCI320 PROGRAMMING II (3 Cr)
P: CSCI208 or CSCI 220 or ENGR109 or equivalent. Fall.
Continuation of higher-level language (FORTRAN) programming. Program organization and data structure. User's view of operating system concepts and facilities. Program development and testing.

CSCI385 INTRODUCTION TO LOGIC
See MA385.

CSCI402 ARCHITECTURE OF COMPUTERS (3 Cr)
P: CSCI300 and CSCI320 or equivalent. Fall, night.
Introduction to computer hardware organization and operation. Instruction forms and execution. Addressing modes. Computer arithmetic; fixed and floating-point operations. Hardwired and microprogrammed control. Memory organization and technology. Boolean algebra and logic design.

CSCI403 SYSTEMS PROGRAMMING (3 Cr)
P: CSCI300, CSCI320 or equivalents. R: CSCI402.
Principles of software design with emphasis on language processors. Symbol tables, sorting, and searching. Assemblers: one-pass and two-pass assembly, macro expansion, object code generation. Relocatable and linking loaders. Interpreters. Introduction to compiler and operating system software.

CSCI414 NUMERICAL METHODS (3 Cr)
P: MA262 or MA361, CSCI220 or equivalent. Fall, night.

Error analysis, solution of nonlinear equations, direct and iterative methods for solving linear systems, approximation of functions, numerical differentiation and integration, numerical solution of ordinary differential equations.

CSCI461 PROGRAMMING III (3 Cr)

P: CSCI300 and CSCI320 or equivalent. Spring, night.

Syntax and semantics of ALGOL, COBOL and PL/1. Students are expected to write, debug, and run programs in the languages discussed.

CSCI482 DISCRETE COMPUTATIONAL STRUCTURES (3 Cr)

P: MA351.

Discrete mathematical structures and their applications to computer science. Sets, relations, functions, binary operations. Groups, cosets, group homomorphisms, applications of group theory to computer design, error detection and error correction codes. Semigroups, monoids, finite-state machines, regular expressions.

CSCI484 THEORY OF COMPUTATION (3 Cr)

P: CSCI482 or MA453.

Introduction to effective computability. Informal study of effective procedures, recursive and partial recursive functions. Turing machines, Church's thesis, halting problem. Equivalence of Turing machine computability with computability by S-rudimentary predicates. Introduction to formal language theory.

CSCI490 TOPICS IN COMPUTER SCIENCES FOR UNDERGRADUATES (1-5 Cr)

By arrangement.

Supervised reading and reports in various fields. Open to students only with the consent of the department.

DUAL LEVEL
Undergraduate-Graduate

CSCI501 DATA AND STORAGE STRUCTURES (3 Cr)

P: CSCI300 and CSCI320 or equivalent. R: CSCI461. Spring, night.

Methods of organizing and linking together information. Representation of discrete events, data files, polynomials, etc. in lists and tree structures. Searching of lists and trees. Storage allocation and reclamation. Applications to compiler and operating system design, information storage and retrieval, and simulation.

CSCI502 COMPILING AND PROGRAMMING SYSTEMS (3 Cr)

P: CSCI402, CSCI403, CSCI461 or equivalents. R: CSCI501.

Basic principles of compilers and operating systems. Compilers: lexical and syntax analysis, runtime storage and register management, optimization, and I/O processing; top-down and bottom-up strategies; syntax specification schemes. Operating systems: resource management, task management, and data management; multi-programming and virtual memory-based systems; control languages. Systems programming principles: composite design, systems programming languages, reliability considerations.

CSCI503 OPERATING SYSTEMS (3 Cr)

P: CSCI502. R: CSCI501.

Advanced topics in operating system design, continuing the coverage of operating systems in CSCI502. Deadlock detection and prevention; synchronization among tasks and system components. Virtual machine systems, system security. Performance measurement tools and methods; system tuning. Distributed-processor systems.

CSCI512 NUMERICAL METHODS FOR ENGINEERS AND SCIENTISTS (3 Cr)

P: MA262 or MA361, CSCI220 or equivalent. Not open to students with credit in CSCI414. Fall, night.

Error analysis, solution of nonlinear equations, direct and iterative methods for solving linear systems, eigenvalues, approximation of functions, interpolation, numerical differentiation and integration, numerical solution of ordinary differential equations, numerical instability.

CSCI514 NUMERICAL ANALYSIS (3 Cr)
P: CSCI414 or CSCI512 or equivalent.
Difference equations, spline theory, analysis of iterative methods for solving nonlinear equations, quotient-difference algorithm for solution of polynomial equations, numerical solution of ordinary differential equations, analysis of algorithms for stability and round-off error.

CSCI515 NUMERICAL ANALYSIS OF LINEAR SYSTEMS (3 Cr)
P: MA351 or 511, CSCI220 or equivalent.
Computational aspects of linear algebra; linear equations and matrices, direct and iterative methods; eigenvalues and eigenvectors of matrices; error analysis.

CSCI516 COMPUTATIONAL METHODS IN APPLIED MATHEMATICS
P: CSCI320 or equivalent, MA510 or consent of instructor.
A study of techniques such as direct integration, shooting, finite difference, finite element, method of weighted residuals, method of characteristics and others for solving problems in fluid mechanics, solid mechanics, dynamics and other fields of applied mathematics.

CSCI520 LINEAR SYSTEMS AND MATHEMATICAL PROGRAMMING (3 Cr)
P: MA351 or MA511. Spring, night.
Systems of linear equations, Gauss-Jordan reduction and echelon form, systems of linear inequalities, convex sets, linear programming, simplex method, duality, parametric programming, integer programming, networks.

CSCI542 DESIGN OF DATA PROCESSING SYSTEMS (3 Cr)
P: CSCI402 or consent of the instructor. Spring, night.
Structuring of data processing systems and computer organization as it affects those systems. File organization, file maintenance routines; sorting, retrieval algorithms. Evaluation and analysis of batch processing, real time, and time share systems and the related problems of feasibility and implementation. The total systems concept in the design of integrated information systems.

CSCI543 DISCRETE SYSTEM SIMULATION (3 Cr)
P: MA M119, CSCI208 or 220, STAT311 or 511, or consent of the instructor. R: CSCI F490.
Simulation and modeling. Monte Carlo techniques; use of special simulation languages to simulate actual systems; generation of random numbers and stochastic variates; verification of simulation models; design of simulation experiments.

CSCI582 AUTOMATA, FORMAL LANGUAGES, AND COMPUTABILITY I (3 Cr)
P: CSCI484 or MA453. By arrangement.
Formal grammars, with particular emphasis on context-free grammars. Computational complexity, LR(k) grammars, unsolvability questions.

CSCI585 MATHEMATICAL LOGIC I
(See MA585)

CSCI590 TOPICS IN COMPUTER SCIENCES (1-5 Cr)
By arrangement.
Directed study for students who wish to undertake individual reading and study on approved topics.

CSCI T590 COMPUTER SCIENCE FOR TEACHERS (3 Cr)
Fall, night.
An introduction to computer science intended for high school mathematics teachers. Basic concepts of computer organization and machine language. Programming in a high-level language (FORTRAN). Applications including computer-aided instruction, information storage and retrieval, and computer science teaching.

GRADUATE LEVEL

CSCI614 NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS (3 Cr)

P: CSCI514 or consent of the instructor. Fall, night. By arrangement.

Numerical solution of initial-value problems by Runge-Kutta methods, general one-step methods, and multistep methods. Analysis of discretization error and rounding error. Stability of multistep methods. Numerical solution of boundary-and eigen-value problems by initial-value techniques and finite difference methods.

CSCI615 NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS (3 Cr)

P: CSCI514, MA523. By arrangement.

The numerical solution of hyperbolic, parabolic, and elliptic equations by finite difference methods; iterative methods (Gauss-Seidel, overrelaxation, alternating direction) for solving elliptic equations; discretization and round-off errors; explicit and implicit methods for parabolic and hyperbolic systems; the method of characteristics; the concept of stability for initial value problems.

CSCI660 DESIGN OF TRANSLATING SYSTEMS (3 Cr)

P: CSCI502. R: CSCI501.

Advanced topics in language processing, continuing the coverage of compilers in CSCI502. Source-level logic optimization; compilers for small machines; debugging compilers. Formal properties of languages and their effects on syntax analysis; language specification methodologies. Extensible languages and nonprocedural languages. Compiler-compilers and decompilers.

Mathematics

SPECIAL SERVICE COURSES

MA001 HIGH SCHOOL ALGEBRA (0 Cr one unit for admission)

P: Eighth Grade Math. Fall, Spring, night.

Covers the material in the first year of high school algebra. Numbers and algebra, integers, rational numbers, equations, polynomials, graphs, systems of equations, inequalities, radicals.

MA002 PLANE GEOMETRY (0 Cr)

P: MA001 or one year of high school algebra. Fall, Spring, night.

Covers the material in a year of high school geometry. Sets and real numbers, coordinate systems, loci, lines, circles, angles, triangles, constructions, area and perimeter, surface area and volume.

UNDERGRADUATE LEVEL

Lower-Division Courses

MA111 ALGEBRA (3 Cr)

P: MA001 or one year of high school algebra. Fall, Spring, day, night.

Real numbers, linear equations and inequalities, systems of equations, polynomials, exponents, logarithmic functions. Covers material in the second year of high school algebra.

MA112 TRIGONOMETRY (3 Cr)

P: MA111 or 3 semesters of high school algebra. Fall, Spring. Not open to students with credit in MA151 or 153.

Real numbers, factoring, functions, exponents, trigonometric functions, tables, identities, complex numbers.

MA M118 FINITE MATHEMATICS I (3 Cr)

P: MA111 or equivalent. Equiv. PU MA213. Fall, Spring, day, night.

Set theory, vectors, matrices, permutations, combinations, simple probability, conditional probability, Markov chains, linear programming, graphical and simplex methods, duality theorem.

MA M119 BRIEF SURVEY OF CALCULUS I (3 Cr)

P: MA111 or two years of high school algebra. Fall, Spring, day, night.

Sets, limits, derivatives and applications, integrals and applications, functions of several variables.

MA123 ELEMENTARY CONCEPTS OF MATHEMATICS (3 Cr)

P: None. Fall, day.

Mathematics for liberal arts students; experiments and activities which provide an introduction to inductive and deductive reasoning, number sequences, functions and curves, probability, statistics, topology, metric measurement, and computers.

MA130 MATHEMATICS FOR ELEMENTARY TEACHERS I (3 Cr)

P: MA001 or one year of high school algebra, MA002 or one year of high school geometry. Equiv. IU MA T101. The sequence MA130, 131, 132 fulfills the mathematics requirements for elementary education majors. Fall, Spring, day, night.

Numeration systems, mathematical reasoning, natural numbers, whole numbers, properties, algorithms, sets, sentences, logic.

MA131 MATHEMATICS FOR ELEMENTARY TEACHERS II (3 Cr)

P: MA130. Equiv. IU MA T102. Fall, Spring, day, night.

Number systems: numbers of arithmetic, integers, rationals, reals, mathematical systems, decimal and fractional notations; probability, simple and compound events, algebra review.

MA132 MATHEMATICS FOR ELEMENTARY TEACHERS III (3 Cr)

P: MA131. Equiv. IU MA T103. Fall, Spring, day, night.

Metric and nonmetric properties of geometric figures, measurement; introduction to the foundations of euclidean geometry; coordinate geometry.

MA147 ALGEBRA AND TRIGONOMETRY FOR TECHNOLOGY I (3 Cr)

P: 3 semesters of high school algebra. Fall, Spring, day, night.

MA147-148 is a two semester version of MA150. MA147 covers Algebra.

MA148 ALGEBRA AND TRIGONOMETRY FOR TECHNOLOGY II (3 Cr)

P: 4 semesters of high school algebra. Equiv. IU MA M017. Fall, Spring, day, night.

MA147-148 is a two semester version of MA150. MA148 covers Trigonometry.

MA150 MATHEMATICS FOR TECHNOLOGY (5 Cr)

P: 3 semesters of high school algebra. Equiv. IU MA M015. Fall, Spring, day, night.

MA147-148 is a two semester version of MA150. Fundamental laws of algebra, functions and graphs, trigonometric functions, linear equations, factoring, exponents, vectors, complex numbers, logarithms, ratio, proportion, variation.

MA163 INTEGRATED CALCULUS AND ANALYTIC GEOMETRY I (5 Cr)

P: 2 years of high school algebra, one semester of trigonometry, one year of geometry. Equiv. IU MA M215. Fall, Spring, day, night.

The Cartesian plane, functions, limits, differentiation and applications, mean value theorem, definite integral and applications.

MA164 INTEGRATED CALCULUS AND ANALYTIC GEOMETRY II (5 Cr)

P: MA163. Equiv. IU MA M216. Fall, Spring, day, night.

Transcendental functions, methods of integration, conics, polar coordinates, parametric equations, vectors, improper integrals.

MA214 FINITE MATHEMATICS II (3 Cr)

P: MA M118.

Vectors, matrices, systems of linear equations, linear programming, game theory.

MA221 CALCULUS FOR TECHNOLOGY I (3 Cr)
P: MA150 or equivalent. Fall, Spring, day, night.
Analytic geometry, the derivative and applications, the integral and applications.

MA222 CALCULUS FOR TECHNOLOGY II (3 Cr)
P: MA221. Fall, Spring, day, night.
Differentiation of transcendental functions, methods of integration, power series, Fourier series, differential equations.

MA261 MULTIVARIATE CALCULUS (4 Cr)
P: MA164. Equiv. IU MA M311. Fall, Spring, day, night.
Partial differentiation, multiple integration, vector functions and vector analysis, infinite series.

MA262 LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS (4 Cr)
P: MA261. Fall, Spring, day, night.
Vector spaces, bases, orthogonality, determinants, differential equations, first order equations, applications, second order equations.

Upper-Division Courses

MA300 FOUNDATION OF THE NUMBER SYSTEMS (3 Cr)
P: MA163. Equiv. IU MA M391. Spring, night.
Logic, sets, functions, relations, groups, natural numbers, rational numbers, real numbers. The notion of proof is emphasized. Suggested for prospective high school teachers.

MA351 ELEMENTARY LINEAR ALGEBRA (3 Cr)
P: MA261. Fall, day, night.
Vector spaces, bases, linear transformations, scalar products, triangulation, spectral theorem.

MA361 ADVANCED CALCULUS AND DIFFERENTIAL EQUATIONS (3 Cr)
P: MA261. Spring, night.
Uniform convergence, Fourier series, linear differential equations, existence and uniqueness of solutions of first order equations.

MA362 TOPICS IN ADVANCED CALCULUS (3 Cr)
P: MA261.
Multivariate calculus, partial differentiation, implicit function theorems, line and surface integrals, vector fields, theorems of Gauss, Green, Stokes.

MA385 INTRODUCTION TO LOGIC
P: MA261.
Propositional calculus and predicate calculus with applications to mathematical proofs, valid arguments, switching theory, and formal languages.

MA441 FOUNDATIONS OF ANALYSIS (3 Cr)
P: MA261. Fall, night.
Topology of Cartesian spaces, sequences, continuity, differentiation, Riemann-Stieltjes integral.

MA442 MULTIVARIATE ANALYSIS (3 Cr)
P: MA351 and 441.
Euclidean spaces, differentiation, vector valued functions, measure and integration, exterior algebra, differential calculus, integration on manifolds.

MA453 ALGEBRA I (3 Cr)
P: MA351 or consent of the instructor. Spring, night.
Fundamental properties of groups, rings, and fields with emphasis on structure, morphisms, quotients, fundamental homomorphism theorems.

MA454 ALGEBRA II (3 Cr)
P: MA453.

Rings of polynomials, extension fields, automorphisms of fields, finite fields, Galois theory.

MA471 INTRODUCTION TO TOPOLOGY (3 Cr)
P: MA261.
Topological spaces, metric spaces, sequences, completeness, connectedness, compactness. Emphasis on the topological properties of the real line.

MA490 TOPICS IN MATHEMATICS FOR UNDERGRADUATES (1-5 Cr)
By arrangement.
Supervised reading and reports in various fields. Open only to students with the consent of the department.

MA S490 SENIOR SEMINAR (3 Cr)

DUAL LEVEL COURSES
Undergraduate — Graduate

MA510 ADVANCED CALCULUS (3 Cr)
P: MA262.
Functions of several variables, partial derivatives, differentials, chain rules, extreme, gradient fields, divergence, curl, Laplacians, multiple integration, line integrals, Green's theorem, surface integrals, divergence theorem, Stoke's theorem, change of variable.

MA511 LINEAR ANALYSIS (3 Cr)
P or C: MA510. Fall, night.
Matrices, rank and inverse of a matrix, linear programming, simplex method, eigenvectors, unitary and similarity transformations on matrices.

MA519 INTRODUCTION TO PROBABILITY (3 Cr)
P: MA362 or 510. Spring, night.
Algebra of sets, sample spaces, combinatorial problems, conditional probability, independence, random variables, distribution functions, characteristic functions, special distributions, limit theorems.

MA520 BOUNDARY VALUE PROBLEMS OF DIFFERENTIAL EQUATIONS (3 Cr)
P: MA261, 361. Recommended P or C: MA362 or 510. Spring, night.
Sturm-Liouville theory; singular boundary conditions, orthogonal expansions, separation of variables in partial differential equations; spherical harmonics.

MA523 INTRODUCTION TO PARTIAL DIFFERENTIAL EQUATIONS (3 Cr)
P: MA261 and 361. Recommended P or C: MA362 or 510.
Method of characteristics for quasilinear first-order equations; complete integral; Cauchy-Kowalewsky theory; classification of second-order equations in two variables; canonical forms; difference methods for hyperbolic and parabolic equations; Poisson integral method for elliptic equations.

MA525 INTRODUCTION TO COMPLEX ANALYSIS (3 Cr)
P: MA510.
Complex numbers and complex-valued functions: differentiation of complex functions; power series, uniform convergence; integration, contour integrals; elementary conformal mapping.

MA529 OPERATIONAL CALCULUS (3 Cr)
P: MA525.
Laplace and Fourier transforms; Heaviside-Mikusinski calculus; generalized functions; asymptotic evaluation of Fourier integrals.

MA532 ELEMENTS OF STOCHASTIC PROCESSES (3 Cr)
P: MA519, 525.
A basic course in stochastic processes including normal processes, covariance processes, Poisson processes, renewal processes, and Markov processes.

MA540 ANALYSIS I (3 Cr)
P: MA351.
Continuity, differentiation, functions of bounded variation, Riemann-Stieltjes integral.

MA541 ANALYSIS II (3 Cr)
P: MA540.
Multiple integrals, line integrals, infinite series, sequences of functions, Fourier series and integrals.

MA544 REAL ANALYSIS AND MEASURE THEORY (4 Cr)
P: MA441 or consent of instructor. Algebras of sets, real number system, Lebesgue measure, measurable functions, Lebesgue integration, differentiation, absolute continuity, Banach Spaces, Metric Spaces, general measure and integration theory, Riesz representation theorem.

MA546 INTRODUCTION TO FUNCTIONAL ANALYSIS (3 Cr)
P: MA545. By arrangement.
Banach spaces, Hahn-Banach theorem, uniform boundedness principle, closed graph theorem, open mapping theorem, Hilbert spaces.

MA547 ANALYSIS FOR TEACHERS I (3 Cr)
P: MA261.
Set theory, logic, relations, functions, Cauchy's inequality, metric spaces, neighborhoods, Cauchy sequences.

MA548 ANALYSIS FOR TEACHERS II (3 Cr)
P: MA547.
Functions on a metric space, continuity, uniform continuity, derivative, chain rule, Riemann integral, fundamental theorem of calculus, double integrals.

MA550 ALGEBRA FOR TEACHERS I (3 Cr)
P: MA351. Fall, night.
Definitions and elementary properties of groups, rings, integral domains, fields. Intended for secondary school teachers.

MA551 ALGEBRA FOR TEACHERS II (3 Cr)
P: MA550. Spring, night.
Polynomial rings, fields, vector spaces, matrices.

MA553 INTRODUCTION TO ABSTRACT ALGEBRA (3 Cr)
P: MA453.
Basic properties of groups, rings, integral domains, fields, polynomials, solvable groups, finitely generated abelian groups. Algebraic and transcendental field extensions. Separable extensions. Normal extensions. Galois theory.

MA554 LINEAR ALGEBRA (3 Cr)
P: MA453.
Vector spaces, matrices and linear transformations, eigenvalues, similarity, duality, bilinear forms, quadratic forms, inner products, orthogonal bases, adjoint, applications.

MA556 INTRODUCTION TO THE THEORY OF NUMBERS (3 Cr)
P: MA261.
Divisibility, congruences, quadratic residues, Diophantine equations, the sequence of primes.

MA561 PROJECTIVE GEOMETRY (3 Cr)
P: MA261. Summer.
Projective invariants, Desargues' theorem, cross-ratio, axiomatic foundation, duality, consistency, independence, coordinates, conics.

MA562 INTRODUCTION TO DIFFERENTIAL GEOMETRY AND TOPOLOGY (3 Cr)

P: MA351.

Linear Algebra and Calculus, curves and surfaces in three dimensions, Frenet formulas, fundamental form, curvature. Applications are made to physical science and elementary geometry: classical vector analysis and differential equations of mathematical physics in the language of differential forms; minimal surfaces and soap films, models for non-Euclidean geometry.

MA563 ADVANCED GEOMETRY (3 Cr)

Analysis of axiomatic systems, finite geometries, critique of Euclid, axiomatic development, incidence, existence, betweenness, congruence, non-Euclidean geometry. Parallel postulate, Hilbert's geometry, hyperbolic geometry, models.

MA571 ELEMENTARY TOPOLOGY (3 Cr)

P: MA441.

Topological spaces, metric spaces, continuity, compactness, connectedness, separation axioms, nets, function spaces.

MA581 INTRODUCTION TO LOGIC FOR TEACHERS (3 Cr)

P: MA351.

Logical connectives, rules of sentential inference, quantifiers, bound and free variables, rules of inference, interpretations and validity, theorems in group theory, introduction to set theory.

MA583 HISTORY OF ELEMENTARY MATHEMATICS (3 Cr)

P: MA261.

A survey and treatment of the content of major developments of mathematics through the 18th century, with selected topics from more recent mathematics, including non-Euclidean geometry and the axiomatic method.

MA585 MATHEMATICAL LOGIC I (3 Cr)

P: MA351. Spring, night.

Formal theories for propositional and predicate calculus with study of models, completeness, compactness. Formalization of elementary number theory; Turing machines, halting problem, and the undecidability of arithmetic.

MA587 GENERAL SET THEORY (3 Cr)

P: MA351.

Informal axiomatization of set theory, cardinal numbers, countable sets, cardinal arithmetic, order types, well ordered sets and ordinal numbers, axiom of choice and equivalences, paradoxes of intuitive set theory, Zermelo-Fraenkel axioms.

MA592 MATHEMATICAL MODELING OF TRANSPORT PROCESS IN THE LOWER ATMOSPHERE (3 Cr)

P: MA361 or consent of instructor.

Derivation of the governing differential equations. Transport equations in turbulent flow. Application of the governing differential equations to planetary boundary layer. Mechanics of turbulence. Profiles of velocity and temperature in lower atmosphere. Magnitude of turbulent fluctuations. Diffusion and estimation of diffusion from meteorological data.

MA598 TOPICS IN MATHEMATICS (1-5 Cr)

By arrangement.

Directed study and reports for students who wish to undertake individual reading and study on approved topics.

MA A598 ARITHMETIC FOR ELEMENTARY SCHOOL TEACHERS (3 Cr)

Spring, night.

Set theory, systems of numeration, operations on whole numbers, mathematical sentences, integers, rational numbers, real numbers.

MA B598 GEOMETRY FOR ELEMENTARY SCHOOL TEACHERS (3 Cr)

Fall, night.

Rational numbers, real numbers, measurement, geometry.

MA C598 MATHEMATICS FOR ELEMENTARY SCHOOL TEACHERS (3 Cr)
Additional topics not covered in A598 or B598.

MA M598 MATHEMATICAL MODELING (3 Cr)
P: MA262, MA351, MA511, MA551, or MA554.
Linear programming; game theory, mathematical modeling of problems in economics, politics, psychology, sociology.

Graduate Level

MA611 METHODS OF APPLIED MATHEMATICS I (3 Cr)
Introduction to Banach and Hilbert spaces, linear integral equations with Hilbert-Schmidt kernels, eigenfunction expansions and Fourier transforms.

Statistics

UNDERGRADUATE LEVEL

Upper-Division Courses

STAT301 ELEMENTARY STATISTICAL METHODS I (3 Cr)
P: College algebra. Not open to students in the Division of Mathematical Science and Schools of Engineering. Fall, Spring, day, night.
A basic introductory statistics course with applications shown to various fields and emphasis placed on assumptions, applicability, and interpretations of various statistical techniques. Subject matter includes frequency distribution, descriptive statistics, elementary probability, normal distribution, applications, sampling distribution, estimation, hypothesis testing, and linear regression.

STAT302 ELEMENTARY STATISTICAL METHODS II (3 Cr)
P: STAT301 or equivalent. Continuation of STAT301.
Multiple regression and analysis of variance, with emphasis on statistical inference and applications to various fields.

STAT311 INTRODUCTORY PROBABILITY (3 Cr)
P: MA261 or equivalent. Fall, night.
Formulation of probability problems, discrete and continuous random variables, expectation, standard distributions, applications to statistical problems and problems in the physical sciences.

STAT490 TOPICS IN STATISTICS FOR UNDERGRADUATES (1-5 Cr)
Spring.
Supervised reading and reports in various fields.

DUAL LEVEL
Undergraduate-Graduate

STAT511 STATISTICAL METHODS I (3 Cr)
P: MA163. Fall, night.
Descriptive statistics; elementary probability; normal, binomial, Poisson, hypergeometric distributions; sampling distributions; testing hypotheses, and estimation; one-way analysis of variance; chi-square test; correlation and regression.

STAT512 STATISTICAL METHODS II (3 Cr)
P: STAT511. Spring, night.
Linear and multiple regression; non-linear regression; analysis of variance; random, fixed, mixed models, nested factorial, expected mean squares, pooling, modifications under relaxed assumptions, multiple comparisons, variance of estimates; analysis of covariance.

STAT513 APPLICATIONS OF STATISTICS IN INDUSTRY (3 Cr)
P: STAT511.
Control charts and acceptance sampling, continuous sampling plans, sequential analysis, statistics of combinations, and some non-parametric methods.

STAT514 DESIGN OF EXPERIMENTS (3 Cr)
P: STAT512.
Fundamentals, completely randomized design, randomized complete blocks; Latin square; multiclassification; factorial; incomplete blocks and fractional replications; confounding; lattice design; general mixed factorials; split plot; analysis of variance to regression models; optimum design.

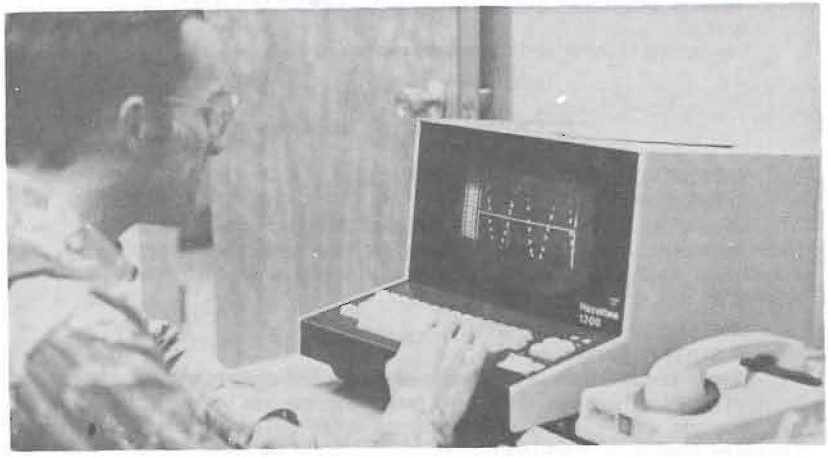
STAT516 BASIC PROBABILITY AND APPLICATIONS (3 Cr)
P: MA164 or equivalent. MA261 desirable.
A first course in probability intended to serve as a foundatin for statistics and other applications. Intuitive background; sample spaces and random variables; joint, conditional, and marginal distributions; special distributions of statistical importance; moments and moment generating functions; statement and application of limit theorems; Markov chains.

STAT517 STATISTICAL INFERENCE (3 Cr)
P: STAT516 or equivalent.
Sampling Distribution, Estimation including unbiased, maximum likelihood, and moment estimation, testing hypotheses for standard distributions and contingency tables; confidence intervals and regions; introduction to nonparametric inference and tests of goodness of fit; introduction to multivariate analysis.

STAT519 INTRODUCTION TO PROBABILITY
See MA519.

STAT528 FOUNDATIONS AND METHODS OF STATISTICS I (3 Cr)
P: MA519.
Distribution of the mean and variance in normal samples, sampling distribution derived from the normal distribution, chi-square, t, and F. Distribution of statistics based on ordered samples. Asymptotic sampling, distributions. Introduction to multivariate normal distribution and linear models. Maximum likelihood, least squares, linear estimation, other methods of point estimation, and discussion of their properties, Cramer-Rao inequality and Rao-Blackwell theorem. Tests of statistical hypotheses, simple and composite hypotheses, likelihood ratio tests, power of tests.

STAT532 ELEMENTS OF STOCHASTIC PROCESSES
See MA532.



DEPARTMENT OF PHYSICS

PROFESSORS: Flake, Kaplan, Meiere (Chairman), Vasavada; ASSOCIATE PROFESSORS: Novak, Seubert, Yen; ASSISTANT PROFESSORS: Kleinhans, Morrison, Paik, Thatcher.

BACHELOR OF SCIENCE

(Granted by Purdue University)

AREAS I, II, III: Minimum requirements for the School of Science are given on pages 19-20. The Department of Physics has the following additional requirements:

AREA II: FOREIGN LANGUAGE

A two course sequence which includes a significant cultural component. With the approval of the Physics Department two Humanities courses, in addition to Area III requirements, may be substituted.

AREA IIIC: PHYSICAL AND BIOLOGICAL SCIENCES

Courses must include Chemistry C105 and C106 or their approved equivalent. Certain Engineering courses may be substituted for the other science courses with the approval of the Physics Department.

AREA IIID: MATHEMATICAL SCIENCES

Courses must include Mathematics MA163, MA164, MA261, and MA262 plus six more hours approved by the Physics Department.

AREA IV: CONCENTRATION

A concentration program in Physics must include Physics 152, 251, 342, 342L, 310, 322, 330, 350, 351, 515, 550 plus at least one of the courses 545, 556, 570, or 590.

For the secondary school teaching option the Physics Department may substitute other Science courses for the 500-level courses and recommend Education courses in order to meet teacher certification requirements.

The Department of Physics recommends the following program leading to the degree of Bachelor of Science.

FRESHMAN YEAR
- MA163 (Calculus)
- CHM C105 (Chemistry)
- ENGL W117 (English)
- Elective
- MA164 (Calculus)
- CHM C106 (Chemistry)
- PHYS152 (Mechanics)
- Elective

SOPHOMORE YEAR
- MA261 (Calculus)
- PHYS 251 (Heat, Electricity and Optics)
- ENGL W118 (English)
- Language
- MA262 (Linear Algebra and Differential Equations)
- PHYS342 (Modern Physics)
- PHYS342L (Laboratory)
- Elective
- Language

JUNIOR YEAR
PHYS310 (Intermediate Mechanics)
PHYS322 (Oscillations and Waves)
PHYS350 (Laboratory I)
Electives

SENIOR YEAR
PHYS550 (Quantum Mechanics)
PHYS515 (Thermodynamics)
Electives

PHYS330 (Electricity and Magnetism)

PHYS351 (Laboratory II)
Electives

PHYS545 (Solid State) and/or
PHYS556 (Nuclear Physics)
PHYS590 (Research)
Electives

Electives should be chosen to satisfy the General Requirements for a Bachelor of Science degree from Purdue University. They may also be chosen to satisfy requirements for certification as a high school teacher.

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 and Divisions served by these courses is:

100: Allied Health, Business, and Liberal Arts (a traditional survey course).

200: Education, SPEA, and Liberal Arts (a non-traditional course).

218-219: Liberal Arts and Technology (designed for pre-professional or technology students and others requiring a non-calculus sequence).

152-251-342: Science and Engineering (for students requiring a calculus based sequence.

The Department of Physics also participates in offering the interdisciplinary course SCI 201, Citizen and Science. Please refer to the Interdisciplinary Course listing SCI 201 for the course description.

Courses In Physics

100 PHYSICS IN THE MODERN WORLD (5 Cr)
P: Introductory high school mathematics. Fall, Spring, Summer, day, night.
Ideas, language, methods, and impact of physics today.

200 OUR PHYSICAL ENVIRONMENT 3 (Cr)
P: None. Fall, Spring.
A non-mathematical introduction to physical concepts and methods by means of examples from daily life and current technological applications.

218 GENERAL PHYSICS (4 Cr)
P: MA150 or equivalent. Equiv. IU P201. Fall, Spring, Summer, day, night.
Mechanics, conservation laws, gravitation; simple harmonic motion and waves; kinetic theory, heat and thermodynamics for students not specializing in physics.

219 GENERAL PHYSICS (4 Cr)
P: PHYS218. Equiv. IU P202. Fall, Spring, Summer, day, night.
Electricity, light and modern physics for students not specializing in physics.

152 MECHANICS (4 Cr)
P or C: MA164. Equiv. IU P221. Fall, Spring, Summer, day, night.
Statics, uniform and accelerated motion; Newton's Laws; circular motion; energy, momentum, and conservation principles; dynamics of rotation; gravitation and planetary motion; properties of matter; simple harmonic and wave motion.

251 HEAT, ELECTRICITY, AND OPTICS (5 Cr)
P: PHYS152. Equiv. IU P222. Fall, Spring, day, night.
Heat, kinetic theory, elementary thermodynamics, heat transfer. Electrostatics, current electricity, electromagnetism, magnetic properties of matter. Geometrical and physical optics.

310 INTERMEDIATE MECHANICS (4 Cr)
P: MA261 and two terms of general physics. Fall.
For students familiar with calculus. Elements of vector algebra; statics of particles and rigid bodies; theory of couples; principle of virtual work; kinematics; dynamics of particles and rigid bodies; work, power, and energy; elements of hydromechanics and elasticity.

322 OSCILLATIONS AND WAVES (3 Cr)
P: PHYS251. Fall.
Modes of vibration of a system; emission and absorption of waves; properties of sound, electromagnetic and particle waves including phenomena of refraction, reflection, dispersion, diffraction, interference, polarization, and double refraction; lasers and holography.

330 INTERMEDIATE ELECTRICITY AND MAGNETISM (3 Cr)
P: PHYS251; P or C: MA262. Spring.
Electrostatics; electric currents; magnetostatics; electromagnetic induction; Maxwell's equations; electromagnetic waves.

342 MODERN PHYSICS (3 Cr)
P: PHYS251. Equiv. IU P301. Fall, Spring.
A survey of basic concepts and phenomena in atomic, nuclear, and solid state physics.

342L MODERN PHYSICS LABORATORY (1 Cr)
Laboratory experiments to accompany PHYS342.

350 INTERMEDIATE LABORATORY I (2 Cr)
P or C: PHYS322.
Lectures on geometrical optics; instructor demonstrations and student experiments involving mechanical and electromagnetic wave and oscillation phenomena.

351 INTERMEDIATE LABORATORY II (2 Cr)
P or C: PHYS330. Spring.
Lectures on AC circuit theory; instructor demonstrations and student experiments involving particle diffraction, wave polarization, double refraction, AC circuits, and meters.

470 READING IN SPECIAL TOPICS (1-3 Cr)

490 UNDERGRADUATE READING AND RESEARCH (1-3 Cr)
Independent study for undergraduates.

501 PHYSICAL SCIENCE (3 Cr)
P: None. Fall, Spring.
Survey of the physical sciences with emphasis on methods of presentation appropriate to the elementary school. Graduate credit is extended only for elementary school teacher programs.

515 THERMODYNAMICS (3 Cr)
P: PHYS310 and 330 and a course in differential equations or advanced calculus. Fall.
Fundamental concepts of heat; theory and practice of heat measurements; first and second laws of thermodynamics, with applications; kinetic theory.

545 SOLID STATE PHYSICS (3 Cr)
P: Any undergraduate course in modern physics. Spring.
Crystal structure; lattice vibrations; free electron theory of solids; band theory of solids; semiconductors; superconductivity; magnetism; magnetic resonance.

550 INTRODUCTION TO QUANTUM MECHANICS (3 Cr)
P: Should be preceded by PHYS342 and at least one other junior-level course in each of mathematics and physics or equivalent. Fall.
Brief historical survey; waves in classical physics; wavepackets; uncertainty principle; operators and wave functions; Schrodinger equation and application to one-dimensional problems; the hydrogen atom; electron spin; multi-electron atoms; periodic table: molecules; Periodic potentials; Bloch wave functions.

556 INTRODUCTORY NUCLEAR PHYSICS (3 Cr)
P: PHYS550 or equivalent. Spring.
Theory of relativity; brief survey of systematics of nuclei and elementary particles; structure of stable nuclei, radioactivity; interaction of nuclear radiation with matter; nuclear reactions; particle accelerators; nuclear instruments; fission; nuclear reactors.

570 SELECTED TOPICS IN PHYSICS (3 Cr)
Specialized topics in physics selected from time to time.

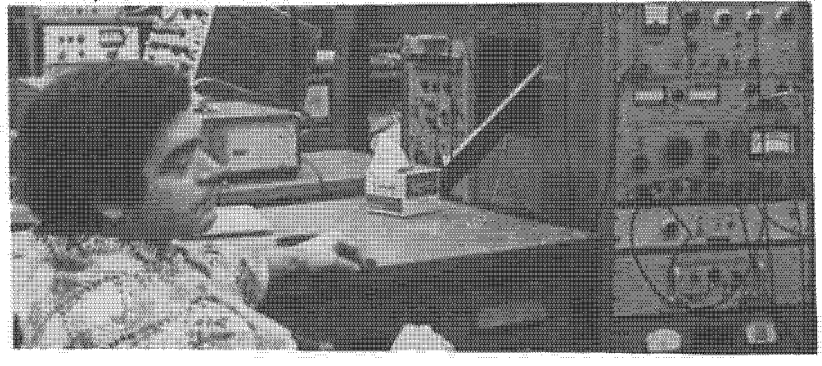
590 READING AND RESEARCH (1-3 Cr)

ASTRONOMY

The Department of Physics has academic, counseling, and administrative responsibility for the courses in Astronomy offered at IUPUI.

A100 THE SOLAR SYSTEM (3 Cr)
P: None. Fall.
Celestial sphere and constellations, measurement of time, astronomical instruments, earth as a planet, moon, eclipses, planets and their satellites, comets, meteors, theories of origin of solar system.

A105 STELLAR ASTRONOMY (3 Cr)
P: None. Spring.
The sun as a star, physical properties of stars, principles of spectroscopy as applied to astronomy, double stars, variable stars, star clusters, gaseous nebulae, stellar motions and distributions, Milky Way system, external galaxies, expanding universe, cosmic time scale.



DEPARTMENT OF PSYCHOLOGY

PROFESSORS: Hanford, Long, Morris, Neel (Chairman); ASSOCIATE PROFESSORS: Fleener, Fortier, Ware; ASSISTANT PROFESSORS: Bringle, Evenbeck, Goldberg, Kelfer, Kremer, Lauer, Sha'ked; LECTURERS: Hall, Hazer. DEPARTMENTAL COUNSELORS: Professors Evenbeck and Long (undergraduate) and Professor Neel and Sha'ked (graduate).

Psychology is the science that studies the behavior of man and other animals. Traditionally, the discipline has been described as having both experimental and applied approaches. In experimental work, research often is conducted with animal subjects where regularities of behavior are investigated. Clinical psychology, a major applied area, is concerned with the professional therapeutic role of psychology in dealing with mental and nervous disorders. Other applied areas of psychology include counseling psychology, industrial psychology, and engineering psychology.

The two introductory courses give surveys of these two general approaches, although both emphasize the use of experimental methods in investigating behavior. Psychology B104 covers clinical psychology as well as other social aspects of the discipline including social psychology, developmental psychology, tests and measurements, psycholinguistics, and human aspects of emotion and motivation. Psychology B105 includes treatment of the various experimental areas of psychology including learning and memory, physiological psychology, sensation, and perception.

The Psychology Department provides curricula that lead to Bachelor of Arts, Bachelor of Science, and Master of Science degrees. Besides this professional and preprofessional training, the department serves the needs of students in many other fields in providing an introduction to psychology.

The following degrees in psychology are offered. The choice of a particular program should be made in consultation with one of the academic counselors. The department strongly recommends that students desiring experience in the field include a practicum (B362, B372, or B382) in their curricula. Those planning graduate work in psychology should include B305. Those planning graduate work in clinical psychology should also include B360, B380, B424, and B307. Those planning careers in personnel work should also take B424 and B307 in addition to B370 and B270.

BACHELOR OF ARTS DEGREE

(Granted by Indiana University)

The degree requirements for a Bachelor of Arts degree are listed on pages 18-19 of this bulletin.

AREA I: See School of Science requirements.

AREA II: There is no requirement for a foreign language. However, those planning to continue with graduate studies, especially toward the doctorate, normally are urged to take a modern foreign language through at least the first-year level.

AREA III: See School of Science requirements.

AREA IV: Psychology B104, Psychology B105, 9 hours of Methodology courses (courses above 100 level ending in odd numbers), and 9 hours of Content courses (courses above 100 level ending in even numbers, except courses ending with the digit 2). TOTAL of 24 hours in Psychology.

BACHELOR OF SCIENCE DEGREE

(Granted by Purdue University)

The degree requirements for a Bachelor of Science degree are listed on pages 19-20 of this bulletin.

AREA I: See School of Science requirements.

AREA II: There is no requirement for a foreign language. However, those planning to continue with graduate studies, especially toward the doctorate, normally are urged to take a modern foreign language through at least the first-year level.

AREA III: See School of Science requirements.

AREA IV: Psychology B104, Psychology B105, 9 hours of Methodology courses (courses above 100 level ending in odd numbers), and 9 hours of Content courses (courses above 100 level ending in even numbers, except courses ending with the digit 2). TOTAL of 24 hours in Psychology.

MASTER OF SCIENCE DEGREE

(Granted by Purdue University)

The Psychology Department offers a Master of Science degree with specialties in Personnel and Industrial Psychology and in Rehabilitation Counseling. Under consideration is a program in Urban Psychology (Community Program Evaluation). The purposes of the program in Personnel and Industrial Psychology are to prepare individuals for work in personnel and related functions in business and industry through a study of appropriate psychological theories and techniques and to prepare students intending to pursue the Ph.D. degree.

Traditionally, training programs in rehabilitation counseling have focused on helping people adjust to their immediate environment, community, or society in general through individual and/or group counseling. While retaining essential elements of the conventional approach, the program in Rehabilitation Counseling will provide training directed at the development of the student as an agent of social change. Toward that end, institutional structures and dynamics will be examined to help students understand how these systems impinge upon and affect the lives of all people in general and minority groups in particular. At the master's level, the rehabilitation counselor is a key member of the rehabilitation team which may include a physician, psychologist, social worker, physical therapist, occupational therapist, special teacher, and/or other professional personnel. Typically, the counselor is responsible for the coordination and integration of services provided by these people. He

provides continuing counseling service throughout the rehabilitation process to the end that the disabled person is restored to the fullest physical, mental, social, vocational, and economic usefulness of which he is capable.

Admission Requirements

All applicants must have a Bachelor's degree from an accredited institution and must take the Aptitude Test section of the Graduate Record Examination for admission as regular graduate students. An undergraduate major in psychology is not required. All interested individuals are invited to apply regardless of undergraduate major. Applicants not meeting regular admission requirements and/or standards may be admitted on a probationary basis. Prospective students should contact the Psychology Department for the appropriate forms needed in application.

Transfer Credit

The Psychology Department will accept by transfer a maximum of nine hours of appropriate graduate credit from approved institutions which are in excess of undergraduate degree requirements.

Temporary Student Status

Students may enroll in courses of the graduate program without making formal application after making application as temporary graduate students. Only nine hours of courses completed as a temporary student may be used in completing the requirements of the degree.

Financial Assistance

Positions as Associate Instructors are available to selected students. In addition, students in the Rehabilitation Counseling specialty may apply for graduate stipends.

DEGREE REQUIREMENTS

(Specialty in Personnel and Industrial Psychology)

Two options are offered within the program: a nonthesis option and a thesis option. The Thesis Option requires the 18 hours of core courses, 9 hours of approved electives, and 3-9 hours of thesis credit. The Nonthesis Option requires the 18 hours of core courses and 18 hours of approved electives. This latter option is generally recommended for students with a limited background in psychology. Students electing a nonthesis option are also required to design a research project by registering for Individual Research Problems (Psychology 590). An oral examination of the degree candidate is conducted by a faculty committee of three members for both options.

Core Courses:

Psychology 600. Statistical Inference.

Psychology 601. Correlation and Experimental Design.

Psychology 608. Advanced Technology of Tests and Measurements.

Psychology 680. Analysis of Published Research in Industrial Psychology.

Psychology 681. Seminar in Industrial Psychology.

Psychology 683. Seminar in Industrial-Social Psychology.

Approved Electives within Psychology:

Psychology 500. Statistical Methods Applied to Psychology, Education and Sociology.

Psychology 505. Mental Measurement.

Psychology 570. Industrial Psychology.

Psychology 572. Organization Psychology.

Psychology 574. Psychology of Industrial Training.

Psychology 577. Human Factors in Engineering.

Psychology 578. Occupational Analysis.

Psychology 585. Psychological Foundations of Consumer Behavior.

Psychology 590. Individual Research Problems.

Psychology 624. Human Learning and Memory.

Psychology 646. Special Topics in Social-Personality Psychology.

Approved Electives in Other Fields:

See the Psychology Department graduate academic counselor.

DEGREE REQUIREMENTS

(Specialty in Rehabilitation Counseling)

The program consists of 36 credit hours of course work and supervised field experience. This includes core requirements in basic behavioral competencies in rehabilitation, in addition to courses and seminars on selected topics. The length of the program ranges from 24 to 36 months. The degree requires an oral examination and a half-time internship for nine months.

While there is flexibility in the program to accommodate the individual student's background, a typical program would include the following courses:

Psychology 549. Introduction to Vocational Rehabilitation.

Psychology 552. Psychological Counseling Theory and Practice in Rehabilitation.

Psychology 565. Interpersonal Relations.

Psychology R679. Practicum in Counseling Psychology — Rehabilitation.

Psychology 505. Mental Measurement.

Psychology 553. Introduction to Community Resources.

Psychology 554. Psychosocial Aspects of Disability.

Psychology 555. Medical Aspects of Disability.

Psychology 578. Occupational Analysis.

Psychology 690. Career Development, Selection, and Placement in Rehabilitation.

Psychology 691. Seminar in Rehabilitation Counseling.

Psychology R697. Internship.

Each individual student should consult with the Program Director in planning a course of study and in seeking approval for elective courses.

Courses In Psychology

B104 PSYCHOLOGY AS A SOCIAL SCIENCE (3 Cr)
Equiv. to IU P102 and PU 120. Every semester.
Introduction to scientific method, individual differences, personality, developmental, abnormal, social, and industrial psychology.

B105 PSYCHOLOGY AS A BIOLOGICAL SCIENCE (3 Cr)
Equiv. to IU P101 and PU 120. Every semester.
Research Methods and Content areas of learning, sensation-perception, psycho-physiology, motivation, emotions, and statistics.

B211 INTRODUCTORY LABORATORY IN PSYCHOLOGY (3 Cr)
P: PSY B105. Equiv. to IU P111, P211 and PU 200. Every semester.
Introductory laboratory in psychology experimental methods, statistical treatment of data, in several areas of psychology; introduction to experimental report writing.

B270 INTRODUCTION TO INDUSTRIAL PSYCHOLOGY (3 Cr)
P: 3 hours of psychology. Equiv. to IU P233. Fall.
Applications of psychological principles and research methods to personnel and industrial problems including selection, performance evaluation, motivation, morale, supervision, and union-management relations.

B305 STATISTICS (3 Cr)
P: PSY B105 and one year of high school algebra or equivalent. Equiv. to IU P354, K300, K310 and PU 301. Fall and Spring.
Introduction to basic statistical concepts; descriptive statistics and inferential statistics.

B307 TESTS AND MEASUREMENT (3 Cr)
P: 3 hours of psychology and B305. Equiv. to IU P336 and PU 302. Fall.
An introduction to psychological measurement, including psychophysics, scaling techniques, psychological testing, and individual differences.

B320 PHYSIOLOGICAL PSYCHOLOGY (3 Cr)
P: PSY B105. Equiv. to IU P326 and PU 329. Fall.

Review of necessary background in neurophysiology and neuroanatomy followed by the relationship of physiology to sensory processes, motivation, and learning. Emphasis on research with animals.

B324 PSYCHOPHYSIOLOGY OF THE SENSES (3 Cr)
P: PSY B105 or equivalent. Equiv. to IU P329 and PU 328. Spring.
This course will consider vision, audition, taste, smell, touch, temperature sensitivity and the vestibular and kinesthetic senses and their relation to behavior.

B326 COMPARATIVE PSYCHOLOGY (3 Cr)
P: PSY B105.
An introduction to the psychological and ethological accounts of behavior development. Emphasis on the application of the comparative method to the study of behavior of organisms.

B334 PERCEPTION (3 Cr)
P: PSY B105 and consent of Psychology Department. Equiv. to IU P329 and PU 310. Fall.
Consideration of the concepts and research in perception. Relation of sense organ systems to human behavior. Some attention to social and cultural factors.

B344 LEARNING (3 Cr)
P: 3 hours of psychology. Equiv. to IU P325 and PU 311. Every semester.
History, theory, and research involving human and animal learning and cognitive processes.

B356 MOTIVATION (3 Cr)
P: 3 hours of psychology. Equiv. to IU P326 and PU 311. Every semester.
Study of motivational processes in human and animal behavior; how needs and incentives influence behavior, and how motives change and develop.

B360 CHILD AND ADOLESCENCE (3 Cr)
P: 3 hours of psychology. Equiv. to IU P316 and PU 235. Every semester.
Development of behavior in infancy, childhood and adolescence including sensory and motor development and processes such as learning, motivation, and socialization.

B362 PRACTICUM IN CHILD PSYCHOLOGY (3 Cr)
P or C: PSY B360.
Experience in working with children in field settings. May be repeated once.

B370 SOCIAL (3 Cr)
P: 3 hours of psychology. Equiv. to IU P420 and PU 340. Every semester.
Study of the individual in social situations including socialization, social perception, social motivation, attitudes, social roles, and small group behavior.

B372 PRACTICUM IN INDUSTRIAL PSYCHOLOGY (3 Cr)
P: PSY B270 or equivalent. Fall, Spring.
This course will provide students with work experience, one day per week, in local organizations. Practice will be obtained in using the applied skills of Industrial Psychology to solve actual organizational problems.

B374 GROUP DYNAMICS, THEORY AND RESEARCH (3 Cr)
P: PSY B370. Spring.
An intensive survey of research and theory on the behavior of small groups and the research methods by which groups are studied.

B376 PSYCHOLOGY OF WOMEN (3 Cr)
P: 3 hours of psychology. Spring.
A survey of topics in psychology as related to the biological, social and psychological development of women in modern society.

B380 ABNORMAL (3 Cr)
P: 3 hours of psychology. Equiv. to IU P324 and PU 350. Every semester.
Various forms of mental disorders with emphasis on cause, development, treatment, prevention, and interpretation.

B382 PRACTICUM IN COMMUNITY PSYCHOLOGY (3 Cr)
P or C: PSY B370 or B380 and consent of instructor.
Experience in working with individuals who may have a wide range of psychological problems. Focus is upon both the individual and helping agency as factors in the community.

B423 LABORATORY IN PHYSIOLOGICAL PSYCHOLOGY (3 Cr)
P: PSY B211 and PSY B320. Equiv. to IU P426.
Experiments and demonstrations in physiological psychology.

B424 THEORIES OF PERSONALITY (3 Cr)
P: 9 hours of psychology. Equiv. to IU P319 and PU 423. Fall, Spring.
Methods and results of the scientific study of personality including the development, structure, and functioning of the normal personality.

B425 LABORATORY IN PERSONALITY (3 Cr)
P: PSY B211 and PSY B424 and PSY B305. Equiv. to PU 424.
Demonstrations and experiments in personality research.

B427 ADVANCED LABORATORY IN PHYSIOLOGICAL PSYCHOLOGY (3 Cr)
P: B423.
Experiments and demonstrations in physiological psychology.

B431 LABORATORY IN SENSATION AND PERCEPTION (3 Cr)
P: PSY B211, B305, and either B324 or B334. Equiv. to IU P424 and PU 312.
Experiments and demonstrations in sensation and perception with an emphasis on their physiological basis.

B445 LABORATORY IN LEARNING (3 Cr)
P: PSY B211 and PSY B344. Equiv. to IU P436 and PU 312. Fall.
Experiments and demonstrations involving learning and cognitive processes.

B450 HISTORY AND SYSTEMS (3 Cr)
P: 12 hours in psychology. Equiv. to IU P458 and PU 480. Spring.
Historical bases of modern empirical, applied, and theoretical psychology; influence of systems on development of modern psychology.

B452 SEMINAR IN PSYCHOLOGY (1, 2, or 3 Cr)
P: Consent of instructor.
Topics in psychology and interdisciplinary applications. May be repeated, provided different topics are studied, for a maximum of 6 credits.

B457 LABORATORY IN MOTIVATION (3 Cr)
P: PSY B211 and PSY B356. Equiv. to IU P436 and PU 312. Fall.
Experiments and demonstrations in motivation.

B461 LABORATORY IN DEVELOPMENTAL PSYCHOLOGY (3 Cr)
P: PSY B211, PSY B305, and PSY B360. Eqyiv. to IU P429. Fall, Spring.
Principal research methods in developmental psychology and their application to selected problems.

B462 BEHAVIOR MANAGEMENT (3 Cr)
P: Consent of instructor. Equiv. to IU P468. Fall, Spring.
Conducted as a seminar and a practicum for psychology majors and teachers in the principles and methods of behavior management.

B464 PSYCHOLOGY OF LANGUAGE (3 Cr)
P: 9 hours of psychology, or permission of instructor. Spring.
Survey of important topics in the psychology of language. Included are historical treatments, generative grammar, development of language, experimental psycholinguistics, and semantics.

B466 SEMINAR IN CHILD PSYCHOLOGY (3 Cr)
P: B360 or equivalent and one of the following as P or C: PSY B362, B382 (with major focus upon children), B461, B462, or permission of instructor.
Integration of practical experience with relevant psychological literature.

B471 LABORATORY IN SOCIAL (3 Cr)

P: PSY B211 and PSY B305 and P or C: PSY B370. Equiv. to IU P421 and PU 346. Fall, Spring.

Observational, correlational, and experimental studies in social psychology.

B472 PRACTICUM IN GROUP DYNAMICS (3 Cr)

P: 6 hours of Psychology and consent of instructor. Equiv. to IU P321 and PU 348. Fall, Spring.

Application in the field of group dynamics through experience as a participant in group sensitivity training.

B492 READINGS AND RESEARCH IN PSYCHOLOGY (1-3 Cr)

P: Consent of instructor. Equiv. to IU P495 and PU 498. Every semester.

Independent readings and research on psychological problems.

B499 HONORS RESEARCH (credit arranged)

P: Consent of departmental honors committee. Equiv. to IU P499 and PU 499. Every semester.

Independent readings and research resulting in a research paper.

GRADUATE COURSES

(500 level courses open to Seniors also)

500 STATISTICAL METHODS APPLIED TO PSYCHOLOGY, EDUCATION, AND SOCIOLOGY (3 Cr)

P: PSY B105 and one year of high school algebra or equivalent. Fall and Spring.

Descriptive statistics and an introduction to sampling statistics. Applied to psychological, sociological, and educational data.

505 MENTAL MEASUREMENT (3 Cr)

P: 6 hours of Psychology, including PSY500 or equivalent.

Introduction to the general area of mental measurement. Theory and content of measuring devices in the fields of intelligence, interests, personality, and special aptitudes.

549 INTRODUCTION TO VOCATIONAL REHABILITATION (3 Cr)

P: 9 hours of psychology.

Philosophy, procedures, and practices underlying the vocational rehabilitation movement, including the historical, social, cultural, and economic factors and recent legislation that have contributed to its rapid development.

552 PSYCHOLOGICAL COUNSELING THEORY AND PRACTICE IN REHABILITATION (3 Cr)

P: 9 hours of psychology.

Theories of counseling and their applicability to the individual counselor and his prospective counseling situation. The use of various tools in counseling.

553 INTRODUCTION TO COMMUNITY RESOURCES FOR VOCATIONAL REHABILITATION (3 Cr)

P: Consent of instructor.

Survey of rehabilitation-related agencies and services in Indiana and the issues involved in their utilization. Includes site visits.

554 PSYCHOSOCIAL ASPECTS OF DISABILITY (3 Cr)

P: 9 hours of psychology.

An examination of the effect of the socio-emotional impact of traumatic injury or chronic illness (on human functioning) and its role in the rehabilitation process.

555 MEDICAL ASPECTS OF DISABILITY (3 Cr)

P: 9 hours of psychology including PSY549.

Provides medical information for rehabilitation counselors and introduces students to medical terminology. Includes knowledge of the etiology, prognosis,

methods of treatment, effects of disabling conditions, and implications for the rehabilitation counselor. Counselor relationships with other health related personnel are emphasized.

557 PSYCHOLOGY OF THE URBAN ENVIRONMENT (3 Cr)

P: PSY500 or equivalent.

Introductory course on the effects of the urban environment on human behavior. Theories and empirical studies concerning environmental stresses in urban settings will be discussed with a major emphasis given to field studies. Implications of theory and research findings for urban planning will be specified.

565 INTERPERSONAL RELATIONS (3 Cr)

P: 9 hours of psychology.

Review of major current theoretical formulations of the interpersonal relationship, including a discussion of some of the more prominent research. Focus is primarily upon two-person interpersonal relations.

570 INDUSTRIAL PSYCHOLOGY (3 Cr)

Fall and Spring.

Survey of the applications of psychological principles and of research methodology to the various human problems in industry, such as: personnel selection and appraisal; the organizational and social context of human work; the job and work situation; human errors and accidents; and psychological aspects of consumer behavior.

572 ORGANIZATION PSYCHOLOGY (3 Cr)

A survey of basic behavioral science research and thinking as these contribute to the understanding of individual, dyadic, group, intergroup and other large organization behavioral phenomena. The topics covered include motivation, perception, attitudes and morale, communication, leadership, conflict, problem solving, behavior change, and organizational effectiveness.

574 PSYCHOLOGY OF INDUSTRIAL TRAINING (3 Cr)

P: 3 hours of psychology.

Utilization of psychological measurement techniques in assessing training needs and evaluating training effectiveness and the application of learning research and theory to industrial training.

577 HUMAN FACTORS IN ENGINEERING (3 Cr)

Survey of human factors in engineering with particular reference to human functions in man-machine systems, and consideration of human abilities and limitations in relation to design of equipment and work environments.

578 OCCUPATIONAL ANALYSIS (3 Cr)

P: PSY570.

Survey of systematic study of human work, including techniques of analysis of jobs and occupations for personnel and related purposes. Survey of occupational research and related topics. Practice in job analysis.

585 PSYCHOLOGICAL FOUNDATIONS OF CONSUMER BEHAVIOR (3 Cr)

P: 3 hours of psychology.

A survey of the concepts and methods of psychology as they apply to the study of consumer behavior.

590 INDIVIDUAL RESEARCH PROBLEMS (1-3 Cr)

P: 12 hours of psychology and the consent of the instructor. Every semester.

Opportunity for students to study particular problems in any field of psychology or initiate themselves into research techniques under the guidance of a member of the staff.

600 STATISTICAL INFERENCE (3 Cr)

P: PSY500 or equivalent.

Emphasis is given to principles underlying both parametric and nonparametric inference.

601 CORRELATION AND EXPERIMENTAL DESIGN (3 Cr)
P: PSY600.
Continuation of PSY600 with emphasis upon the design and analysis of experiments.

608 ADVANCED TECHNOLOGY OF TESTS AND MEASUREMENTS (3 Cr)
P: PSY600 and PSY505 or equivalent. (Formerly numbered PSY610).
Theory and technique relating to the construction and utilization of measuring devices such as intelligence, special aptitude, interest, achievement, and personality tests.

624 HUMAN LEARNING AND MEMORY (3 Cr)
P: Consent of instructor. (Formerly numbered PSY630).
Theory of and experimental findings in human learning and memory.

640 SURVEY OF EXPERIMENTAL SOCIAL PSYCHOLOGY (3 Cr)
Critical analysis of current research and theories in social psychology with particular emphasis on the translation of theory into testable propositions.

646 SPECIAL TOPICS IN SOCIAL-PERSONALITY PSYCHOLOGY (3 Cr)
P: Consent of instructor.
A seminar covering such topics as attitudes, attitude change, small group behavior, psychological bases of group structure and social interaction.

R679 PRACTICUM IN COUNSELING PSYCHOLOGY — REHABILITATION (3 Cr)
P: PSY549 and consent of instructor.
Supervised practice of counseling procedures in a rehabilitation setting.

680 ANALYSIS OF PUBLISHED RESEARCH IN INDUSTRIAL PSYCHOLOGY (3 Cr)
P: PSY570 or equivalent.
A survey of the various areas of industrial psychology (personnel, social-industrial, human factors, and consumer) with particular reference to current research as reflected in current journals and texts. Course provides opportunity for critical evaluation of research investigations, familiarity with sources of material, and experience in the preparation of manuscripts.

681 SEMINAR IN INDUSTRIAL PSYCHOLOGY (3 Cr)
P: PSY680 and consent of instructor.
Intensive analysis of application of various research and statistical methods to human problems in industry.

683 SEMINAR IN INDUSTRIAL-SOCIAL PSYCHOLOGY (3 Cr)
P: PSY570, PSY572, or equivalent.
Study of research and theory emphasizing social perception, attitudes, supervisory behavior, employee participation, motivation, and organizational structure.

688 HUMAN SEXUALITY IN THE REHABILITATION PROCESS (3 Cr)
P: Graduate standing in Rehabilitation Psychology or consent of instructor.
The course provides updated knowledge regarding attitudes and practice related to biological, psychosocial, and attitudinal aspects of human sexuality. A special emphasis is given to sexual concerns experienced by the physically disabled and to increasing students' ability to conduct effective clinical discussion of sexual issues with rehabilitation clients.

690 CAREER DEVELOPMENT, SELECTION, AND PLACEMENT IN REHABILITATION (3 Cr)
P: PSY505, 549, and 578 and consent of instructor.
A survey of current methods and criteria used in job development, selective placement, and follow-up of handicapped and deprived individuals.

691 SEMINAR IN REHABILITATION COUNSELING (3 Cr)

P: Consent of instructor.

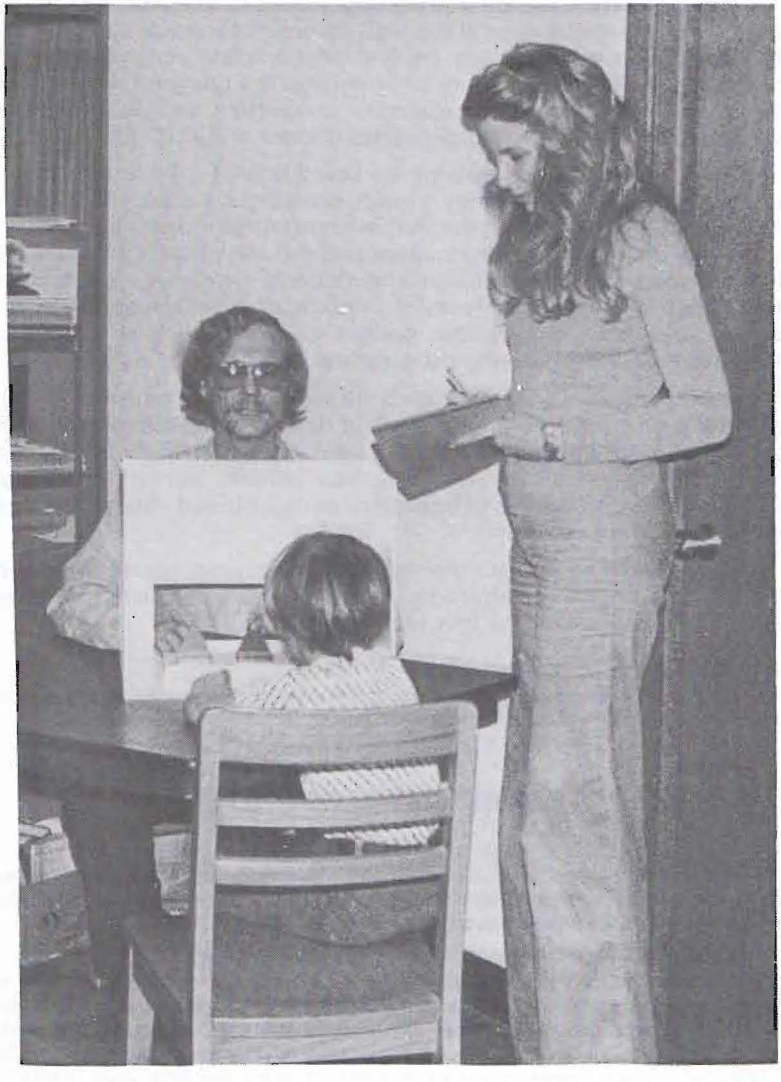
Current trends, problems, and developments in rehabilitation. Students pursue a special interest and mutually share information and experience with the group. Individual reports and group discussions.

R697 INTERNSHIP IN VOCATIONAL REHABILITATION COUNSELING (0 Cr)

P: Open only to Vocational Rehabilitation Counseling students.

Opportunities for application of theory in practice of rehabilitation counseling and case management in a rehabilitation setting under supervision of the Psychology Department and agency.

698 RESEARCH M.S. THESIS



RELATED DEPARTMENTAL PROGRAMS AND COURSES

AGRICULTURE

(Including Forestry)

Students at IUPUI are offered the opportunity to complete the first two years' requirements for most of Purdue's Bachelor of Science in Agriculture degrees. Students must then transfer to complete requirements for graduation in either Agriculture or Forestry at the Lafayette campus. The Department of Biology has academic, counseling and administrative responsibility for all agricultural courses offered at IUPUI.

The first two years of training are based upon a solid foundation of mathematics, chemistry, biology, physics, economics, and English. Much of this foundation is laid during the freshman year when the program of study is basically the same for all agriculture students. An effort is made during the freshman year to familiarize the students with the opportunities throughout Agriculture and Forestry. Electives are permitted to enable the student to explore the various options in which he may choose to concentrate his efforts during the remaining years.

At the sophomore level, students are asked to select an option within agriculture or forestry so that they might develop a sequence of courses leading to a more clearly defined career objective. Each option has substantial opportunities for electives which permit additional specialization in main areas of interest or permit a broad choice in liberal arts or general education.

Students should contact the Agricultural Program counselor in the Biology Department soon after admission to IUPUI to formulate a tentative sequence of courses for the first year to two.

101 AGRICULTURAL LECTURES
To acquaint new students in agriculture with the important problems and opportunities in the various fields of agriculture.

Agricultural Economics

100 INTRODUCTORY AGRICULTURAL BUSINESS AND ECONOMICS
The role and characteristics of farm and off-farm agricultural business in our economy; introductory economic and business principles involved in successful organization, operation, and management.

330 MANAGEMENT METHODS FOR AGRICULTURAL BUSINESS
Management of the nonfarm firm, with emphasis on businesses selling to farmers and handling their products; topics deal primarily with tools for management decisions and the decision-making process. Major areas of study include: principles of decision making, legal forms of business organization, basics of financial analysis, inventory and quality control, short and long range planning, and other tools for management decision.

Agronomy

105 CROP PRODUCTION

Fundamental Principles of crop production and distribution. An introduction to basic soil relations, current field crop production practices, agricultural meteorology, turfgrass management, and plant breeding.

255 SOIL SCIENCE

P: One year college chemistry.

Differences in soils; soils genesis; physical, chemical and biological properties of soils; relation of soils to problems of land use and pollution; soil management relative to tillage, erosion, drainage, moisture supply, temperature, aeration, fertility and plant nutrition. Introduction to fertilizer chemistry and use.

Animal Science

101 ANIMAL AGRICULTURE

Importance of livestock in the field of agriculture, and the place of meats and other animal products in the human diet.

221 INTRODUCTORY ANIMAL NUTRITION

Prerequisite: CHM C101 or equiv.

Classification and function of nutrients, deficiency symptoms, digestive processes, characterization of feedstuffs, and formulation of diets for domestic animals.

Biochemistry

207 BIOCHEMISTRY

Prerequisite: CHM C102 or equivalent.

Introduction to the chemistry, function, and metabolism of compounds found in the living organism.

Forestry And Conservation

103 INTRODUCTION TO NATURAL RESOURCE CONSERVATION

A broad treatment of the scientific basis for forestry and associated natural resources. For students majoring in forestry and conservation and those interested in a natural resources course as an elective.

582 CONSERVATION OF NATURAL RESOURCES

Prerequisite: at least junior standing.

Classroom and laboratory instruction in natural resource conservation. Designed for teachers of vocational agriculture, biological sciences, general sciences, home economics, and social studies.

Horticulture

101 FUNDAMENTALS OF HORTICULTURE

Study of the biology and technology of horticultural plants and products. Laboratories include: field trips to horticultural farms and industries, experiments to demonstrate both the theoretical and practical aspects of horticultural plant growth and development, and exercises in landscape design.

AGRICULTURE—M.S.

(Extension Education)

These programs are administered by an interdisciplinary committee on the Lafayette campus. The committee is chaired by D. C. Pfendler (Associate Dean, School of Agriculture).

Admission to graduate programs with a primary area in extension education leading to the degree of Master of Science will be approved and the program coordinated at the West Lafayette campus. These programs are developed on an individual basis for persons engaged in or anticipating participation in development of human, community, or natural resources, such as extension agents, members of extension or community policy boards, personnel of social and welfare agencies, and those engaged in continuing adult education.

The curriculum is under the general supervision of an interdisciplinary committee and is broadly selective from a wide range of courses offered in the areas of agriculture, home economics, industrial management, social sciences, education, and civil engineering. After initial counselling by members of the interdisciplinary committee, members of the advisory and examining committees for students in the program will be selected from departments within which the student selects his courses.

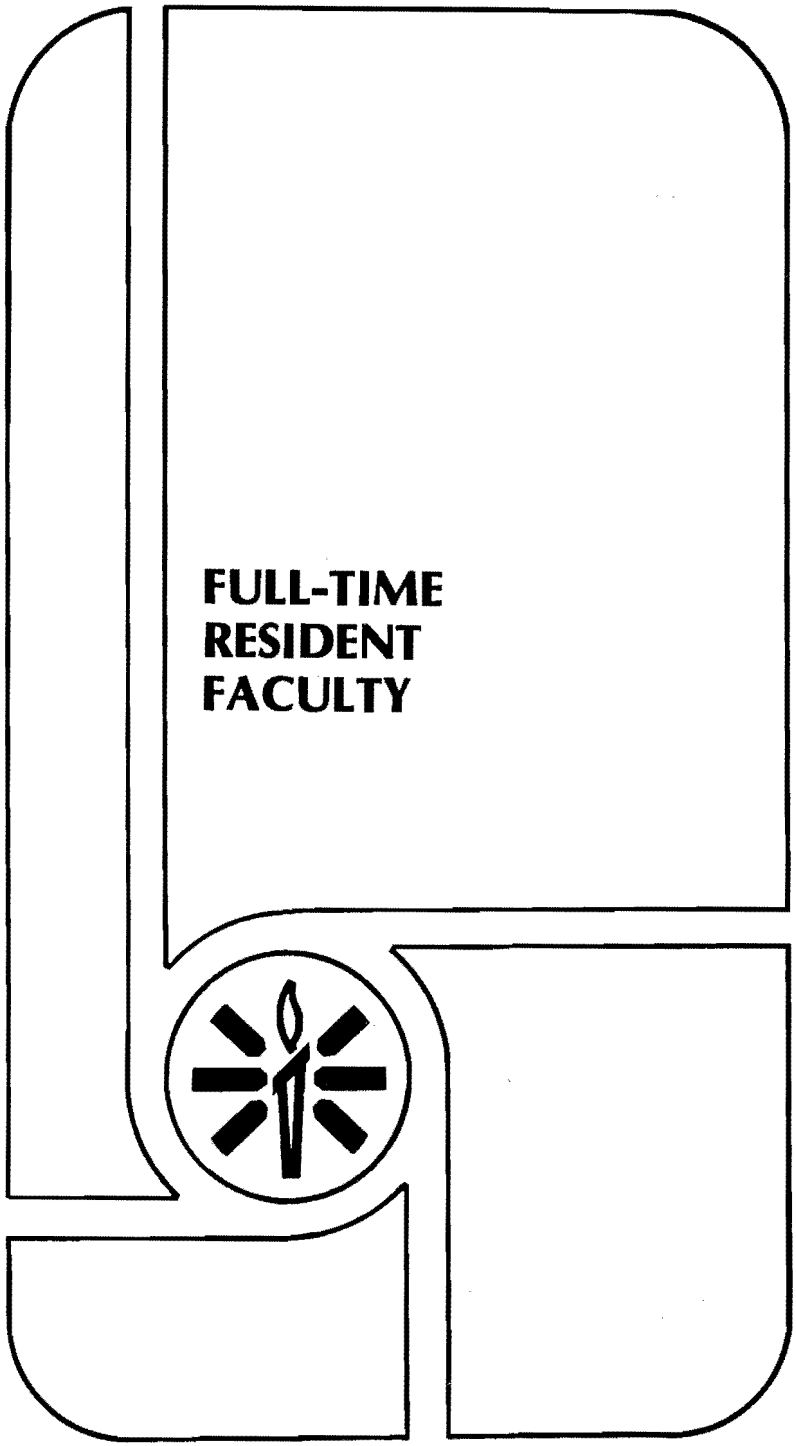
For further information concerning the program, contact Professor Pfendler in Lafayette (729-2402).

ASTRONOMY

The Department of Physics has academic, counselling, and administrative responsibility for the courses in Astronomy offered at IUPUI. Course listings are included with the course listings of the Department of Physics.

INTERDISCIPLINARY COURSES

SCI 201 CITIZEN AND SCIENCE (3 Cr)
P: None. Spring.
This is an interdisciplinary course offered in collaboration with the Poynter Center. It deals with science as an institution, the relation of science to technology and the influence of science on society. These topics are treated through examples taken from the life sciences and from the physical sciences.


FULL-TIME
RESIDENT
FACULTY

RESIDENT FACULTY

ALIPRANTIS, C. D., Assistant Professor of Mathematics (1975); B.S., 1968, University of Athens; M.S., 1971; Ph.D., 1973, California Institute of Technology. Specialty: Functional Analysis.

ALTON, ELAINE V., Associate Professor of Mathematics-Education (1964); A.B., 1946, New York State; M.Ed., 1951, St. Lawrence University; M.A., 1958, University of Michigan; Ph.D., 1965, Michigan State University. Specialty: Mathematics Education.

BARD, MARTIN, Assistant Professor of Biology (1975); B.S., 1968, City College of New York; Ph.D., 1971, University of California, Berkeley. Specialty: Biochemical Genetics.

BEESON, DONALD, Assistant Professor of Mathematics (1975); B.S., 1963, Indiana Institute of Technology; M.A., 1966, Wayne State University; Ph.D., 1974, University of Illinois. Specialty: Applied Mathematics.

BITTINGER, MARVIN, Associate Professor of Mathematics-Education, (1968); B.S., 1963, Manchester College; M.S., 1965, Ohio State University; Ph.D., 1968, Purdue University. Specialty: Mathematics Education.

BOAZ, PATRICIA A., Associate Professor of Chemistry (1967); B.S., 1944, Vassar; Ph.D., 1951, State University of Iowa. Specialties: General Chemistry, Physical Chemistry, and Geochemistry.

BOSCHMANN, ERWIN, Associate Professor of Chemistry (1968); B.A., 1963, Bethel College (Kansas); M.S., 1965, Ph.D., 1968, University of Colorado. Specialties: General Chemistry, Inorganic Chemistry, and Bioinorganic Chemistry.

BRIDGES, HARRY B., Assistant Professor of Mathematics (1966); B.S.Ed., 1931, South East Missouri State University; M.S., 1935, University of Illinois; B.S.E.E., 1939, Missouri School of Mines. Specialty: Applied Mathematics.

BRINGLE, ROBERT GORDON, Assistant Professor of Psychology (1974); B.A., 1969, Hanover College; M.S., 1972, Ph.D., 1974, University of Massachusetts. Specialties: Social Psychology, Program Evaluation, Methodology.

BURKINSHAW, OWEN, Assistant Professor of Mathematics (1972); B.S., 1966, M.S., 1968, Ohio University-Athens; Ph.D., 1972, Purdue University. Specialty: Functional Analysis.

CADY, WAYNE ALLEN, Assistant Professor of Chemistry (1972); B.S., 1966, Calvin College, Michigan; Ph.D., 1972, University of Illinois. Specialties: General Chemistry and Physical Chemistry.

COURTIS, WILLIAM, Assistant Professor of Biology (1971); B.S., 1960, M.S., 1964, University of Miami, Coral Gables; Ph.D., 1972, Southern Illinois University. Specialties: Microtechnique, Cytology, Quantitative Cytochemistry.

CROWN, J. CONRAD, Professor of Mathematical Sciences (1969); B.S., 1943, Polytechnic Institute of Brooklyn; M.S., 1962, Ph.D., 1965, University of Connecticut. Specialty: Numerical Analysis.

CUTSHALL, THEODORE W., Associate Professor of Chemistry (1961); B.S.Ch.E., 1949, Purdue University; M.S., 1959, Ph.D., 1964, Northwestern University. Specialty: Organic Chemistry.

EVENBECK, SCOTT EDWARD, Assistant Professor of Psychology (1972); A.B., 1968, Indiana University; M.A., 1971, Ph.D., 1972, University of North Carolina. Specialties: Social Psychology, Program Evaluation, Methodology.

FICKLIN, FRED L., Assistant Dean (1973); B.S., 1963, Greenville College; M.S., 1966, Butler University; Ed.D., 1973, Indiana University.

FIFE, WILMER K., Chairman and Professor of Chemistry (1971); B.S., 1955, Case Institute of Technology; Ph.D., 1960, Ohio State University. Specialties: General Chemistry, Organic Chemistry, and Biochemistry.

FLAKE, GOLDEN A., Professor of Physics (1947); B.Ed., 1933, Eastern Illinois University; M.S., 1946, Northwestern University. Specialty: Physics Teaching.

FLEENER, DON E., Associate Professor of Psychology (1966); B.S. (Ed.), 1949, Indiana Central University; Ph.D., 1967, Indiana University. Specialties: Infancy, Child Development.

FORTIER, ROBERT H., Associate Professor of Psychology (1966); B.S., 1947, Ph.D., 1952, Western Reserve University. Specialties: Child Psychology, Personality.

FRICKE, GORDON H., Associate Professor of Chemistry (1972); B.A., 1964, Goshen College; M.S., 1966, State University of New York at Binghamton, N.Y.; Ph.D., 1970, Clarkson College of Technology. Specialties: General Chemistry and Analytical Chemistry.

GEMIGNANI, MICHAEL C., Chairman, Department of Mathematical Sciences, Professor of Mathematics (1972); B.A., 1962, University of Rochester; M.S., 1964, Ph.D., 1965, University of Notre Dame. Specialty: Topology.

GERSTING, JOHN M., JR., Associate Professor of Engineering Science and Computer Science (1970); B.S., 1962, Purdue University; M.S., 1964, Ph.D., 1970, Arizona State University. Specialty: Computer Programming.

GERSTING, JUDITH L., Associate Professor of Mathematics (1970); B.S., 1962, Stetson University; M.A., 1964, Ph.D., 1969, Arizona State University. Specialty: Logic.

GOLDBERG, CARLOS I., Assistant Professor of Psychology, (1969); B.A., 1961, Brooklyn College; M.A., 1964, Ph.D., 1969, The City University of New York. Specialties: Social Psychology, Urban Psychology.

HALL, ROBERT D., Assistant Professor of Geology (1974); B.S., 1963, Purdue University; M.S., 1966, University of Colorado; Ph.D., 1973, Indiana University. Specialties: Geomorphology, Environmental Geology, Hydrology, Physical Geology.

HALL, TERRY, Lecturer in Psychology (1975); A.A., 1966, Skagit Valley College; B.A., 1968, M.S., 1970, Western Washington State College. Specialties: Developmental Psychology, Comparative Psychology.

HANFORD, PETER VANCE, Professor of Psychology and Psychiatry (1960); B.S., 1952, M.S., 1953, Ph.D., 1958, Pennsylvania State University. Specialties: Experimental Analysis of Behavior, Motivation.

HAZER, JOHN T., Lecturer in Psychology (1975); B.A., 1970, Miami University; M.A., 1974, Bowling Green State University. Specialties: Industrial Psychology, Selection and Placement.

HUFFMAN, DAVID G., Professor of Mathematics (1975); B. Eng. Sci., 1962, Marshall University; M.S., 1966, Ph.D., 1968, Ohio State University. Specialty: Applied Mathematics.

HUNTER, LAWRENCE W., Assistant Professor of Mathematics and Computer Sciences (1973); B.S., 1965, Stanford University; Ph.D., 1971, University of Wisconsin, Madison. Specialty: Computer Science.

HUTTON, LUCREDA, Assistant Professor of Mathematics (1975); B.S., 1967, Butler University; M.S., 1972, Purdue University; Ed.D., 1975, Indiana University. Specialty: Mathematics Education.

JOHNSTON, ERNEST R., Professor of Mathematics (1955); B.Ed., 1938, M.S., 1939, Illinois State University; Ph.D., 1954, University of Minnesota. Specialty: Complex Analysis.

JUILLERAT, FLORENCE, Assistant Professor of Biology (1966); B.S., 1962, M.S., 1967, Ph.D., 1974, Purdue University. Specialties: Cell Biology, Biology for Teachers, Biology for Non-Majors.

KAMINKER, JEROME ALVIN, Assistant Professor of Mathematics (1973); B.A., 1963, University of California, Berkeley; M.A., 1965, Ph.D., University of California at Los Angeles. Specialty: Algebraic Topology.

KAPLAN, JEROME I., Professor of Physics (1974); B.S., 1950, University of Michigan (Ann Arbor); Ph.D., 1954, University of California, Berkeley. Specialty: Solid State Physics.

KECK, ROBERT WILLIAM, Assistant Professor of Biology (1972); B.A., 1962, M.S., 1964, University of Iowa; Ph.D., 1968, Ohio State University. Specialty: Plant Physiology.

KELFER, DEBORAH ANN, Assistant Professor in Psychology (1973); B.A., 1969, Simmons College; M.A., 1971, Ph.D., 1975, University of Illinois, Chicago. Specialties: Developmental Psychology, Psycholinguistics.

KIRK, RONALD, Assistant Professor of Biology (1968); A.S., 1955, Vincennes University; B.S., 1958, M.S., 1959, Ph.D., 1966, Purdue University. Specialties: Invertebrate Zoology, Entomology, Ecology.

KLEINHANS, FREDERICK W., Assistant Professor of Physics (1972); B.S., 1965, University of Michigan; Ph.D., 1971, Ohio State University. Specialties: Solid State Physics, Biophysics.

KLEYLE, ROBERT M., Associate Professor of Mathematics and Statistics (1973); B.A., 1960, Duquesne University, Pittsburgh; M.S., 1962, University of Pittsburgh; Ph.D., 1968, Harvard University. Specialty: Statistics.

KREMER, JOHN F., Assistant Professor of Psychology (1975); B.A., 1966, St. Meinrad College; M.S., 1969, University of Notre Dame; Ph.D., 1975, Loyola University. Specialties: Clinical Psychology, Social Psychology, Program Evaluation.

KUCZKOWSKI, JOSEPH E., Professor of Mathematics (1966); B.S., 1961, Canisius College; M.S., 1963, Ph.D., 1968, Purdue University. Specialty: Semigroup Theory.

LAUER, JOAN B., Assistant Professor of Psychology (1973); A.B., 1964, Ph.D., 1973, Indiana University. Specialties: Physiological Psychology, Learning.

LEES, NORMAN DOUGLAS, Assistant Professor of Biology (1973); A.B., 1967, Providence College, Providence, R.I., Ph.D., 1973, Northwestern University. Specialties: Microbiology, Molecular Biology.

LOH, PETER C., Associate Professor of Mathematics (1968); B.S., 1963, Purdue University; Ph.D., 1968, Stanford University. Specialty: Differential Equations.

LONG, ROBERT IRVIN, Professor of Psychology (1956); A.B., 1950, Indiana University; M.S., 1955, Ph.D., 1956, Tulane University. Specialties: Learning, Individual Differences.

LUKE, JON, Assistant Professor of Mathematics (1975); B.S., 1962, M.S., 1963, M.I.T.; Ph.D., 1966, California Institute of Technology. Specialty: Applied Mathematics.

MEIERE, FORREST T., Chairman and Professor of Physics (1969); B.S., (Physics) and B.S. (Math), 1959, Carnegie-Mellon University; Ph.D., 1964, Massachusetts Institute of Technology. Specialty: High Energy Physics.

METZ, CLYDE R., Associate Professor of Chemistry (1966); B.S., 1962, Rose-Hulman Institute of Technology; Ph.D., 1966, Indiana University. Specialties: General Chemistry and Physical Chemistry.

MIRSKY, ARTHUR, Chairman and Professor of Geology (1967); B.A., 1950, University of California at Los Angeles; M.S., 1955, University of Arizona; Ph.D., 1960, Ohio State University. Specialties: Urban Geology, History of Applied Geology, Paleontology-Stratigraphy, Geowriting, Evolution of the Earth.

MORRIS, BARNETT B., Professor of Psychology (1965); B.A., 1948, Brooklyn College; M.A., 1951, University of Nebraska; Ph.D., 1959, University of Oklahoma. Specialties: Sensation, Perception, Statistics, Testing.

MORRISON, L. KENT, Assistant Professor of Physics (1970); B.S., 1962, Highlands University; M.S., 1964; Ph.D., 1967, University of Washington. Specialty: Elementary Particle Physics.

NEEL, ROBERT G., Chairman and Professor of Psychology (1964); B.A., 1948, M.S., 1949, University of Denver; Ph.D., 1962, University of Michigan. Specialties: Personnel and Industrial Psychology.

NEVILL, WILLIAM A., Dean of the School of Science, Professor of Chemistry (1967); B.S., 1951, Butler University; Ph.D., 1954, California Institute of Technology. Specialty: Organic Chemistry.

NG, BART, Assistant Professor of Mathematics (1975); B.S., 1968, St. Joseph College; M.S., 1970, Ph.D., 1973, University of Chicago. Specialty: Applied Mathematics.

NOVAK, GREGOR M., Associate Professor of Physics (1964); M.S., 1964, University of Chicago; Ph.D., 1975, Indiana University. Specialty: Mathematical Foundations of Physical Theories.

O'DONNELL, MARTIN J., Assistant Professor of Chemistry (1975); B.S., 1968, University of Iowa; Ph.D., 1973, Yale University. Specialty: Organic Chemistry.

PAIK, HAN WON, Assistant Professor of Physics (1962); B.S., 1956, M.S., 1958, Yonsei University, Seoul, Korea; M.S., 1962, Northwestern University; Ph.D., 1970, Indiana University. Specialty: High Energy Physics.

PATTERSON, RICHARD R., Assistant Professor of Mathematical Sciences (1974); B.A., 1961, DePauw University; Ph.D., 1966, University of California, Berkeley. Specialty: Algebraic Topology.

PENNA, MICHAEL A., Assistant Professor of Mathematics (1973); B.A., 1967, Union College, Schenectady, N.Y.; A.M., 1968, Ph.D., 1973, University of Illinois, Urbana. Specialty: Differential Geometry.

PFLANZER, RICHARD GARY, Associate Professor of Anatomy and Physiology (1969); A.B., 1964, Ph.D., 1969, Indiana University. Specialty: Medical Physiology.

RABIDEAU, PETER W., Associate Professor of Chemistry (1970); B.S., Loyola University, 1964; M.S., Case Institute of Technology, 1967; Ph.D., Case Western Reserve University, 1968. Specialty: Organic Chemistry.

RAICHART, DENNIS WAYNE, Assistant Professor of Chemistry (1972); B.A., 1968, Wabash College; Ph.D., 1972, Stanford University. Specialties: General Chemistry, Inorganic Chemistry, and Environmental Chemistry.

RIGDON, ROBERT, Assistant Professor of Mathematics (1975); A.B., 1965, Princeton; Ph.D., 1970, University of California, Berkeley. Specialty: Algebraic Topology.

RIGO, THOMAS, Assistant Professor of Mathematical Sciences (1970); B.S., 1961, Canisius College; M.S., 1963, Purdue University; Ph.D., 1974, Purdue University. Specialty: Computer Programming.

RYTTING, MARVIN, Assistant Professor of Psychology (1975); B.S., 1971, Brigham Young University; M.S., 1973, Ph.D., 1975, Purdue University. Specialties: Personality, Social Psychology, Sociology of the Family.

SAMUELS, ROBERT, Chairman and Professor of Biology (1967); B.A., 1938, M.S., 1940, University of Pennsylvania; Ph.D., 1952, University of California. Specialties: Cell Biology, Protozoology.

SANBORN, RICHARD D., Professor of Biology (1957); A.B., 1943, M.A., 1948, Ph.D., 1950, Harvard University. Specialties: Comparative Physiology, Insect Physiology, Endocrinology.

SEUBERT, JAMES W., Associate Professor of Physics (1968); A.B., 1958, Washington University; M.S., 1964, Ph.D., 1968, Indiana University. Specialty: Nuclear Physics.

SHA'KED, AMI, Assistant Professor of Psychology (1975); B.A., 1971, Bar-Ilan University; M.S., 1973, Ph.D., 1974, University of Wisconsin-Madison. Specialties: Rehabilitation Counseling, Human Sexuality.

STARK, ROBERT J., Assistant Professor of Biology (1974); B.S., 1967, Westminister College; Ph.D., Temple University. Specialties: Developmental Biology, Neurobiology.

SUER, LORAZE B., Instructor in Mathematics (1961); A.B., 1937, University of Evansville; A.M., 1945, Indiana University. Specialty: Finite Mathematics.

THATCHER, FREDERICK C., Assistant Professor of Physics (1970); B.S., 1961, University of Chicago; M.S., 1964, DePaul University; Ph.D., 1969, University of California, Riverside. Specialty: Solid State Physics.

VASAVADA, K. V., Professor of Physics (1970); B.S., 1958, University of Baroda, India; M.S., 1960, University of Delhi, India; Ph.D., 1964, University of Maryland. Specialties: Elementary Particle Physics, Theoretical Physics.

WARE, JOSEPH ROGER, Associate Professor of Psychology (1972); B.S., 1957, M.S., 1961, University of Louisville; Ph.D., 1972, University of Kentucky. Specialties: Human Factors, Group Dynamics.

WEIHAUPT, JOHN G., Associate Dean for Academic Affairs (IUPUI), Assistant Dean of the Graduate School (Purdue University), Professor of Geology (1973), and Professor of Geosciences (Purdue University); B.S., 1952, M.S., 1953, M.S., 1971, Ph.D., 1973, University of Wisconsin. Specialties: Geophysics, Oceanography, Planetology, Physical Geology.

WELCHER, FRANK J., Professor of Chemistry, (1949); A.B., 1929, M.A., 1930, Ph.D., 1932, Indiana University. Specialties: General Chemistry and Analytical Chemistry.

WILSON, CLAUDE E., Assistant Professor of Chemistry (1971); B.A., 1960, Harpur College, State University of New York; M.A., 1961, Ph.D., 1966, Columbia University, New York. Specialties: General Chemistry and Analytical Chemistry.

WYMA, RICHARD J., Associate Professor of Chemistry (1969); A.B., 1958, Hope College; M.S., 1960, Ph.D., 1964, University of Michigan. Specialties: General Chemistry and Physical Chemistry.

YEN, WEN LIANG, Associate Professor of Physics (1968); B.A., 1960, National Taiwan; M.S., 1962, National Tsing Hua; Ph.D., 1968, Purdue University. Specialty: High Energy Physics.

YOUNKER, JEAN K., Lecturer in Geology (1975); B.S., 1968, M.S., 1971, Michigan State University. Specialties: Geobiology, Paleoecology, Sedimentary Environments, Evolution of the Earth.

YOUNKER, LELAND W., Assistant Professor of Geology (1975); B.A., 1968, M.S., 1971, Ph.D., 1974, Michigan State University. Specialties: Petrology, Tectonics, Geophysics, Physical Geology.

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DEGREE CHECKLIST FOR SCHOOL OF SCIENCE BACHELOR OF ARTS DEGREE. MENTIONED ARE REQUIREMENTS AT THE SCHOOL LEVEL. DEPARTMENTAL REQUIREMENTS MAY INCLUDE ADDITIONAL COURSES IN ALL AREAS.

AREA I. ENGLISH COMPOSITION AND COMMUNICATIVE SKILLS. One course in English composition of at least three credits and one course in speech skills of at least three credits.

Composition _____

Speech _____

AREA II. FOREIGN LANGUAGE. No required courses at school level.

_____ _____

AREA IIIA. ARTS AND HUMANITIES. Four courses of at least twelve credits.*

_____ _____

_____ _____

AREA IIIB. SOCIAL AND BEHAVIORAL SCIENCES. Four courses of at least twelve credits.*

_____ _____

_____ _____

AREA IIIC. PHYSICAL AND BIOLOGICAL SCIENCES. At least four science courses totaling a minimum of twelve credits outside the major department. (At least one of the above must be a laboratory course).**

_____ _____

_____ _____

AREA IIID. MATHEMATICAL SCIENCES. No required courses at school level.

_____ _____

AREA IV. MAJOR. Consult departmental listing for courses required in major as well as courses required in other areas by the department.

_____ _____ _____

_____ _____ _____

_____ _____ _____

*There must be at least one two-course sequence in either IIIA or IIIB.

**Courses not acceptable for IIIC include BIOL L111, L369, Z270, and Z271 as well as all agriculture courses.

DEGREE CHECKLIST FOR SCHOOL OF SCIENCE BACHELOR OF SCIENCE DEGREE. MENTIONED ARE REQUIREMENTS AT THE SCHOOL LEVEL. DEPARTMENTAL REQUIREMENTS MAY INCLUDE ADDITIONAL COURSES IN ALL AREAS.

AREA I. ENGLISH COMPOSITION AND COMMUNICATIVE SKILLS. One course in English composition of at least three credits and one course in speech skills of at least three credits.

Composition _____

Speech _____

AREA II. FOREIGN LANGUAGE. No required courses at school level.

_____ _____

AREA IIIA. ARTS AND HUMANITIES. Two courses of at least six credits.*

_____ _____

AREA IIIB. SOCIAL AND BEHAVIORAL SCIENCE. Two courses of at least six credits.*

_____ _____

AREA IIIC. PHYSICAL AND BIOLOGICAL SCIENCES. At least four science courses totaling a minimum of twelve credits outside the major department. (At least one of the above must be a laboratory course).**

_____ _____

_____ _____

AREA IIID. MATHEMATICAL SCIENCES. At least two courses beyond algebra and trigonometry, totaling a minimum of six credits.***

_____ _____

_____ _____

AREA IV. MAJOR. Consult departmental listing for courses required in major as well as courses required in other areas by the department.

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

*There must be at least one two-course sequence in either IIIA or IIIB.

**Courses not acceptable for IIIC include BIOL L111, L369, Z270, and Z271 as well as all agriculture courses.

***Purdue MA213 and MA214, or their equivalents, are acceptable.

Indiana University
Purdue University
at Indianapolis