The College of Basic Sciences offers preparation for careers in biochemistry, biological sciences, chemistry, computer science, geology and geophysics, microbiology, and physics and astronomy. Students are also provided with strong academic backgrounds for professional study in medicine, dentistry, pharmacy, and many other careers that require in-depth study of science.

The departments within the college, the various curricula, and the degrees that may be earned are shown in the following chart. These curricula provide broad general education as well as knowledge of the structure of science. Students in the college may also choose curricula that provide premedical or predental preparation, including curricula in biochemistry, biological sciences, chemistry with a preprofessional concentration, computer science with a life sciences concentration, and physics with a medical physics concentration. Classroom and laboratory study may be supplemented by contact with active research programs.

The Department of Computer Science offers work leading to the bachelor's and doctoral degrees in computer science and is a participating department in the University's graduate program leading to the Master of Science in Systems Science degree. The other departments of the college offer work leading to the bachelor's, master's, and doctoral degrees.

For specific information concerning undergraduate degree programs, refer to the curricula offered by the departments on the following pages. Detailed information about graduate degree programs may be obtained from the Graduate Bulletin.

ADMISSION REQUIREMENTS

Students who contemplate entering this college should give special attention to the mathematics and science courses they select and should consult a representative of the department they plan to enter prior to completing their initial registration. Students will be admitted to the college when they:

- have earned 24 or more semester hours of credit in courses numbered 1000 or above;
- have maintained a grade point average of at least 2.00 on both LSU and overall averages;
- have passed all courses in mathematics and science with grades of “C” or better or received special approval of the dean of the college;
- have passed ENGL 1001 or the equivalent with a grade of “C” or better;
- have earned credit in either MATH 1022, 1023, 1550 or 1551 with a grade of “C” or better.
- entry into any of the three majors (biochemistry, biological sciences, and microbiology) in the Department of Biological Sciences requires earned credit in BIOL 1201 and 1202; CHEM 1201; and MATH 1550.

Students may not be enrolled in correspondence course work the semester they intend to graduate.

DEGREE REQUIREMENTS OF THE COLLEGE

The college offers the bachelor's degree in several curricula designed to give students a thorough education in a particular scientific discipline. In addition, a core of material representing a broad exposure to the human cultural heritage is an integral part of the curricula in the college. That core consists of the following course work.

**English** • Nine semester hours including ENGL 2000 and six hours chosen from English courses on the general education
humanities list or Honors 2002, 2004, 2012, 2013, 2202, 2204, 3001, 3003. Degree credit will not be allowed for ENGL 1001 or 1004.

**Mathematics** • A minimum of five semester hours of calculus (Mathematics 1550). Some curricula require additional credits in mathematics. Degree credit will not be allowed for mathematics courses numbered below 1550.

**Foreign Language** • Students may satisfy the college foreign language requirement by passing 8 to 10 semester hours in a single foreign language. Ordinarily, courses numbered 1001 and 1002, or 1101 and 1102, or 1001 and 2051 are chosen. For example, students choosing Latin will take LATN 1001 and 2051 (10 semester hours), but students choosing French will take FREN 1001 and 1002 (eight semester hours) and the additional two semester hours will be added to free electives.

International students whose native language is not English and who did not attend an English-speaking high school may satisfy the foreign language requirement as follows:
- As shown above (in a language other than the student's native language); or
- By passing nine hours in his or her native language in courses that may be taken for credit by native speakers of the language; or
- By taking nine semester hours of English and/or speech (CMST) above the minimum requirements in the curriculum for the BS degree. The courses must be pre-approved by the dean and must be taken at LSU. At least three hours must be at the 2000 level or above.

**Sciences** • Fourteen hours including two semesters of study in the biological sciences, and a year-course in a physical science. Either the biological or physical sciences must include laboratory credits. Courses selected to meet this requirement must be chosen from courses offered by departments in the College of Basic Sciences.

**Social Sciences and Humanities** • Fifteen semester hours in most curricula of the college. These hours are in addition to the English and foreign language requirements described above. Nine to twelve hours of the required social sciences/humanities courses must be chosen from the list of general education courses in the following way: three hours in the arts, three hours in the humanities (depending on the curriculum), and six hours in the social sciences.

Following is a listing of the more important academic policies of the college offered to guide students toward degrees:
- All students must complete a program of study established by the department concerned and approved by the faculty and the dean of the college.
- No college curriculum in the college requires less than 120 semester hours; some curricula require more. Students in all degree programs of the college must earn at least 24 of the total number of hours required for the degree at this University (all System campuses).
- Students in all degree programs of the college must earn in residence on the LSU campus (Baton Rouge) at least 18 of the hours offered toward their degrees in courses offered by departments in the College of Basic Sciences. In all degree programs, at least nine of these 18 hours must be in courses numbered above 3000 and offered by the department administering the major program. Students majoring in the Biological Sciences Department must have nine semester hours in courses numbered above 3000 in their major. Research courses cannot be used in the residence requirement of nine hours numbered above 3000. Courses used to satisfy all residence requirements must be passed with a grade of “C” or better.
- Correspondence courses and courses in which credit was earned through credit examination may not be used to satisfy the college residence requirement. A maximum of 3 semester hours in research courses may be used in the 18-hour residence requirement.
- The following courses must be passed with a grade of “C” or better: (1) all required science, computer science, and mathematics courses; (2) all restricted, second discipline, and advanced sciences electives; and (3) English 2000. If a student makes a “D” or “F” in a course requiring a “C,” the course must be taken and not dropped the next semester the student is in residence and the course is offered.
- Nonparticipation courses in kinesiology may be taken for elective credit. A maximum of three semester hours will be allowed in kinesiology participation (activity) courses. Twelve semester hours of ROTC may be allowed for degree credit, with no more than six of the twelve semester hours in courses numbered below 3000. However, the sum of basic (1000-2000 level) ROTC course credits and kinesiology activity course credits allowed toward the degree may not exceed six semester hours.
- Students are expected to make reasonable and satisfactory progress in a degree program. Consequently, sequential scheduling of courses in the major field is necessary, and required courses in English and mathematics must be scheduled each semester until they are satisfactorily passed. If necessary, a required course may be dropped once, but normally, not a second time.
- Application for the bachelor's degree must be made in writing and approved by the dean of the college during the semester prior to the semester in which the degree is to be awarded.

**MINOR FIELD REQUIREMENTS**

A student in the College of Basic Sciences may earn a minor in a second field under the following conditions:
- The minor must include at least 17 semester hours of course work, of which at least six semester hours must be taken on this campus and at least three of the six hours must be at the 3000 or 4000 level.
- Each course used in the minor must be passed with a grade of “C” or better.
- Courses used for the minor may not be taken on a pass/fail basis.
- All minors must be approved by the dean.

The department offering the minor may impose additional requirements; the specific requirements of the department must be stated in the catalog.

Students in other colleges who wish to obtain a minor in one of the departments of the
College of Basic Sciences must meet the same requirements listed above.

**COLLEGE PROBATION**

A student in the College of Basic Sciences who fails to earn a 2.00 semester average in a regular semester or a summer term will be placed on college probation. In addition, students who fail to meet the college academic requirements noted in the section on degree requirements, or who enter the college with deficiencies may be placed on college probation. At the discretion of the dean, a student who is on college probation and fails to meet the academic requirements, including earning a 2.00 or better semester average, may be declared ineligible to continue in the college. A student on college probation who does earn a 2.00 or better semester gpa, who remediates course deficiencies, and who makes satisfactory progress in the degree program will be removed from college probation.

**PREMEDICAL AND PREDENTAL COUNSELING**

Counselors are available to help students with applications to medical and dental schools. This application process begins one and one-half years prior to professional school entry. Students are strongly advised to attend one of the premedical/preental information meetings concerning the professional school application process in the fall of the junior year.

Students with a 3.00 gpa who have been enrolled as full-time students for at least one year at LSU-Baton Rouge prior to making application to medical or dental school are eligible to use the LSU Premedical/Preental Committee. The deadline for using the LSU Premedical/Preental Committee is May 1 of the year prior to entry. Information about using the committee may be obtained in the Dean’s office, 338 Choppin Hall, or by attending the Premedical/Preental Information meeting held in the fall semester.

**TEACHER PREPARATION PROGRAM FOR GRADES 6-12**

The departments of Biological Sciences, Chemistry, and Physics & Astronomy offer undergraduate degree programs with an area of concentration in secondary education (middle school and high school). Students in the program may receive a BS in biological sciences, chemistry or physics and qualify for teacher certification. The curricula have been developed cooperatively with faculty in the College of Education and include courses taught jointly by faculty in the College of Basic Sciences and the College of Education. Students completing these degree programs and meeting any additional requirements of the Louisiana Department of Education will be eligible for certification in the state of Louisiana as teachers in grades 6-12.

Admission to any secondary education concentration requires a minimum gpa of 2.50 and passing scores on the PRAXIS I assessments or minimum ACT composite of 22 or minimum SAT composite of 1030. Students who have an interest in middle and high school teaching should choose to take EDCI 201 as one of their general education social sciences courses in the freshman or sophomore year. Details of the programs and requirements for admission, continuation, graduation and certification can be obtained from Student Services counselors in the College of Basic Sciences. The curriculum for each eligible major is listed in the departmental sections of this catalog as a secondary education concentration. Students are required to achieve passing scores on the PRAXIS I assessment or minimum composite of 22 or minimum SAT composite of 1030 prior to enrollment in 3000-level EDCI courses. They are expected to take the required PRAXIS II assessments during the last semester of course work prior to student teaching. They must pass all required sections of the PRAXIS II Series prior to graduation.

A second option for students interested in middle/high school science teaching is to pursue a traditional bachelor’s degree in science and then complete a master’s degree in the LSU College of Education. The master’s degree program (Holmes Program) begins in June and requires 15 months of course work and classroom leading to both the master’s degree and teaching certification. Information about the program and potential scholarship assistance is available through the College of Education.

**ENROLLMENT IN TWO DEGREE PROGRAMS**

With the dean’s approval, a student may be enrolled in two degree programs concurrently. A student can enroll as a dual registrant using one of the following procedures:

- **Dual Enrollment Within the College of Basic Sciences**—By completing residence and academic requirements for two degree programs, a student may earn one bachelor of science degree with two majors. By completing residence and academic requirements, and earning 30 hours over the degree requiring the fewer number of hours, a student will earn two separate bachelor’s degrees.
- **Dual enrollment in the College of Basic Sciences and a Second Academic College**—By completing residence and academic requirements for two degree programs and earning 30 hours more than the degree requiring the fewer number of hours, a student can earn two bachelor’s degrees. The student must be accepted for admission to both colleges and must adhere to the regulations of both colleges. In addition, the student must declare a home college where registration will be initiated and permanent files maintained. It is the student’s responsibility, however, to maintain contact with the second college to ensure that satisfactory progress is being made toward that degree.

**PASS-FAIL OPTION**

**Students in the College of Basic Sciences** may register for courses in the college on a pass-fail basis under the following conditions:

- Only students with a 2.50 average or better may participate.
- Only free elective courses may be taken on a pass-fail basis. Required courses, restricted electives, and courses germane to the major and the career for which the student is preparing may not be taken on a pass-fail basis. Registration for a course on a pass-fail basis will not be permitted until the required work in the same area has been satisfactorily completed. A student may not take courses offered by the Honors College on a pass-fail basis.
- Eligible students may take one course per semester up to a total of 12 hours toward the degree on a pass-fail basis.
- A student must have permission (by signature on a petition form) from the dean of this college, the instructor of the course, and the student’s department chair.
- Pass-fail registration must be completed before the final day for adding courses.

**Students from other colleges** who wish to register for courses in this college on a pass-fail basis will present a petition form to the dean of the college. If the petition is approved, the student will then present the form to the instructor concerned for the appropriate action.

Courses offered by the College of Basic Sciences that are not part of the student’s curriculum or are normally considered important in preparation for the student’s career will not be approved on a pass-fail basis.

**PHI BETA KAPPA**

Seniors and juniors with gpa of at least 3.60 and 3.90, respectively, are considered for membership in Phi Beta Kappa, the oldest scholastic honor society in the United States. Excellence in a variety of intellectual disciplines, rather than proficiency in a single field of study, is the major criterion for election. The academic record should include satisfactory completion of the general education requirement, including two courses in English or American literature or literature in a foreign language (if not the major field); six-hour sequences in both a life science and a physical science, with an additional two hours of related laboratory work in one of these fields; upper division courses (3000 level or above) in at least two different humanities or social sciences outside the major; and electives that show a commitment to a liberal education. Sophomores and juniors with high gpa should consult with Phi Beta Kappa officers or college counselors for more specific information. Specific requirements are described on the Phi Beta Kappa Web site www.lsu.edu/student_organizations/phibetakappa/.

**PHI KAPPA PHI**

Founded in 1897 at the University of Maine, Phi Kappa Phi is the nation’s oldest, largest, and most respected honor society for all academic disciplines. Its chapters are on nearly 300 campuses in the United States, Puerto Rico, and the Philippines. Each year, approximately 30,000 members are initiated. Some of the organization’s more notable members include former President Jimmy Carter, writer John Grisham, NASA astronaut Wendy Lawrence, and Netscape founder James Barksdale. The LSU chapter was founded in 1930 as the 43rd chapter. At the present time, the national office is located on this campus in the French House.

The mission of Phi Kappa Phi is to recognize and promote academic excellence in all fields of higher education and to engage the community of scholars in service to others. Phi Kappa Phi is unique because it recognizes...
superior scholarship in all academic fields, rather than restricting membership to a limited field. Juniors in the top 7.5 percent and seniors and graduate students in the top ten percent of their classes may be invited to become members of Phi Kappa Phi. New LSU Phi Kappa Phi members are initiated and honored in the spring semester each year and wear identifying ribbons on their academic gowns at commencement exercises. Additional information about the Society may be found at www.phikappaphi.org.

**COOPERATIVE EDUCATION PROGRAM**

Please see the section “Cooperative Education” in the “Student Life and Academic Services” section of this catalog.

**DEPARTMENTS AND CURRICULUM**

**DEPARTMENT OF BIOLOGICAL SCIENCES**

CHAIR • Bricker
ASSOCIATE CHAIR • Moore, Professor
ASSOCIATE CHAIR • Bruch, Associate Professor
OFFICE • 202 Life Sciences Building
TELEPHONE • 225-578-2601
FAX • 225-578-2597
WEB SITE • www.biology.lsu.edu

BOYD PROFESSORS • Blackwell
BOYD PROFESSOR EMERITA • Tucker

PROFESSORS EMERITI • Braymer, Chang, Dietz, Fischer, Kent, J. M. Larkin, W. Lee, Meier, Shih, Socolovsky, Weidner, Woodring, Younathan


ASSOCIATE PROFESSORS • Aebischer, Bartlett, Bruch, Bunin, DiMango, Ding, Gayda, Gleason, Grove, Hallberg, Kim, J. C. Larkin, LiCata, Longstreth, Pettis, Rainey, Waldrop, Wischusen, Zhao


INSTRUCTORS • Brininstool, D. Brown, Drost, Farar, Gregg, Hawkins, Hrinicovich, Jolissaint, McCoy, P. Moroney, Pollock, Pomarico, Sullivan, Telles, Thompson, Withers

ADJUNCT FACULTY • Austin, Bruemfield, Carlson, Cooper, Dagg, Finelli, Fitzsimons, Guala, Hales, Hork, Keusolans, LaRockey, Mendelssohn, Mynatt, O’Reilly, Peet, Prowell, Remsen, Sheldon, Smith, Soper, Wilson, Ye, York

The Department of Biological Sciences offers a comprehensive background in biology for teacher preparation, graduate studies, and for professional programs in medicine, dentistry, pharmacy, and veterinary medicine. The department offers bachelor of science degrees in biochemistry, biological sciences and microbiology. All degrees require a core of departmental courses that include BIOL 1201, 1202, 1208, 2051, 2153, and either 4087 or 4093 and 4094. In addition, all students are required to take 20–25 hours of electives from courses numbered 3000 and above in biological sciences that include two courses with laboratories and at least one course from three of four departmental groupings (described below). Students seeking the bachelor of science degree in biological sciences may fulfill the requirement for 20 hours of electives with courses from all areas of the department while students seeking the biochemistry and microbiology degrees take courses specific to those degrees. All students in the department may earn a maximum of six hours of BIOL 3999. A maximum of three hours of BIOL 3999 may be taken as advanced biochemistry, biological sciences, or microbiology electives. BIOL 3999 may not be used as a laboratory course. Students may earn more than one degree in the department but biological science courses numbered 3000 and above (excluding the core biochemistry courses) may only be applied to one degree. Majors in the department are ineligible for the departmental minor.

An undergraduate minor in biological sciences is available to students majoring in curricula outside the Department of Biological Sciences. Required courses are BIOL 1201, 1202, 1208, 1209, 2051, 2153, 4087, and at least three more hours of biological sciences in a course at the 3000-level (excluding BIOL 3999) or above (total of 23 hours).

**Admission into the Department of Biological Sciences**

In addition to admission to the College of Basic Sciences, entry into any of the three majors (biochemistry, biological sciences, and microbiology) in the Department of Biological Sciences requires earned credit in BIOL 1201 and 1202; CHEM 1201; and MATH 1550.

**CURRICULUM IN BIOCHEMISTRY**

**TOTAL SEM. HRS. • 125**

**FRESHMAN YEAR**

<table>
<thead>
<tr>
<th>COURSE</th>
<th>HOURS</th>
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<tbody>
<tr>
<td>Biological Sciences 1201, 1202, 1208, 1209</td>
<td>8</td>
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<tr>
<td>Chemistry 1201, 1202, 1212</td>
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</tr>
<tr>
<td>English 1001</td>
<td>3</td>
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<tr>
<td>Mathematics 1550, 1552</td>
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<tr>
<td>General education arts course</td>
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**SOCIAL SCIENCE/HUMANITIES COURSES**

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<td>Social science/humanities courses</td>
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**JUNIOR YEAR**

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<td>Biological Sciences 4001, 4009, 4093, 4094</td>
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<tr>
<td>Approved biochemistry elective</td>
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<tr>
<td>Foreign language courses</td>
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<tr>
<td>Six hrs. chosen from 2000-level or above</td>
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<tr>
<td>Approved electives</td>
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**SENIOR YEAR**

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<td>General education social science course</td>
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4253, 4262, 4600; 4) organismal diversity: BIOL 4020, 4041, 4053, 4054, 4084, 4105, 4125, 4126, 4141, 4142, 4145, 4146, 4154, 4162, 4163, 4600, 4653.

Areas of Concentration

† Marine Biology (18-19 hrs.)

Students may obtain an area of concentration in Marine Biology by meeting the requirements of the biological sciences degree, incorporating the following courses into their program of study:

Required courses (18-19 hrs.) OCS 1005; BIOL 4262; BIOL 4090, or 4145 or 4146; and 8-9 hrs chosen from BIOL 3040, 3999, 4020, 4090, 4101, 4112, 4114, 4154, 4155, 4253, 4254, 4262, 4263, 4308, 4600 and 4653.

‡ Secondary Education (47 hrs.)

Students may obtain an area of concentration in Secondary Education by meeting the requirements of the biological sciences degree, incorporating the following courses into their program of study. This concentration require 23 hrs. of BIOL courses numbered 3000 and higher.

Required courses: EDCI 2001, 3001, 3002, 4003, 4004, 4005; BIOL 3001, 3002, 4003, 4004, and 17 hrs. chosen from the approved biological sciences electives numbered 3000 and higher.

CURRICULUM IN MICROBIOLOGY

TOTAL SEM. HRS. • 125

FRESHMAN YEAR • SEM. HRS.

Chemistry 1201, 1202, 1208, 1209 8
English 1001 4
General education arts course 3
Total 15

SOPHOMORE YEAR • SEM. HRS.

Biological Sciences 2051, 2153 8
Chemistry 2261, 2262 6
Three hrs. chosen from English or Honors courses at the 2000-level and above from general education humanities list 3
English 2000 3
Foreign language courses 8-10
Approved electives 2-0
Total 30

JUNIOR YEAR • SEM. HRS.

Biological Sciences 3116, 4110 6
Chemistry 2364 4
Physics 2001, 2002, 2108, 2109 8
Three hours chosen from English, or Honors courses at 200 level and above from general education humanities list 3
Approved microbiology electives 3
General education social sciences course (sophomore level or above) 3
Approved electives 3
Total 31

SENIOR YEAR • SEM. HRS.

Biological Sciences 4246, 4125 or 4256 6
Biological Sciences 4087 or 4093 and 4094 4-6
Approved microbiology electives 6
Social sciences/humanities courses 6
General education social sciences course 3
Approved electives 8-6
Total 33

Approved microbiology electives must come from the following list and must include two laboratory courses: BIOL 3090, 3999 (3), 4053, 4054, 4084, 4090, 4105, 4106, 4123, 4124, 4125, 4127, 4132, 4162, 4163, 4190, 4200, 4256, 4400.

DEPARTMENT OF CHEMISTRY

CHAIR • Maverick
OFFICE • 232 Choppin Hall
TELEPHONE • 225-578-3361
FAX • 225-578-3459
WEB SITE • http://chemistry.lsu.edu

BOYD PROFESSORS • Pryor, Warner
BOYD PROFESSOR EMERITUS • McGlynn
CHASELLOR EMERITUS • Wharton
PROFESSORS EMERITI • Baddley, Berg,
Carpenter, Day, Fischer, Gale, Good, Kestner, Koenig, R. Nauman, Newkome, Robinson, Runnels, Selbin, Tranyham, Wharton, Williams
PROFESSORS • Butler, Cartledge, Daly,
Dellinger, Hales, Hall, Hammer, Marzilli,
Maverick, McCarty, Murray, Polakoff, Pryor, Education
ASSOCIATE PROFESSORS • Chan, Crowe,
Gilman, Hopkins, Spivak, Taylor, Watkins
ASSISTANT PROFESSORS • Chen, R. Cook,
Gamo, Nesterov, Schmidt, Thomas, Toleoka
INSTRUCTORS • Allen, E. Cook, Dávila,
Hogan, Kolniak, McMasters, T. Nauman,
Rupnick
ADJUNCT FACULTY • Bricker, Kurtz, Laine,
LiCata, McGuire, McLaughlin, Negulescu,
Overton, Podlaha, Scott

Students obtain a thorough working knowledge of the fundamentals of chemistry, supplemented by study in physics, mathematics, and other sciences. The curriculum is further enriched by the requirement of a broad social sciences degree and humanities. The department offers special lecture and laboratory courses for its majors.

Chemistry majors must select one of the following areas of emphasis for their sophomore year. Undecided majors and those who are considering chemistry as a possible major are strongly encouraged to take CHEM 1002 in their second semester. This course will alert them to the various career opportunities in chemistry in time to make an appropriate decision. The different concentrations can be grouped according to whether or not they prepare the student for an active career in chemistry or for another profession, such as medicine, dentistry, veterinary medicine, or education.

Active Careers in Chemistry • These concentrations are recommended for students who seek a professional career in chemistry or to plan to pursue graduate studies in chemistry or a closely related field. The areas of concentration listed in this section are certified by the American Chemical Society. Students successfully completing those concentrations will receive a certificate upon graduation. The biological chemistry concentration strengthens the student’s knowledge of the chemistry and structure of living systems. The chemical physics concentration emphasizes understanding systems based on fundamental physical, mathematical, and theoretical principles. The chemistry concentration provides a broad background in chemistry. It is recommended to students who desire a career in chemistry but do not yet know which branch of chemistry best suits them. The environmental chemistry concentration is recommended for preparation as a chemical professional or for entrance to graduate study in chemistry, but with an environmental emphasis. The materials concentration makes the connection between chemistry and a wide range of practical materials used to fabricate electronic, optical, and other devices. The polymeric chemistry concentration is designed for students with career objectives in the science of synthetic or biological macromolecules, including plastics.

The secondary education concentration leads to certification as a chemistry teacher in grades 7-12.

Chemistry for Other Professions • The preprofessional concentration is designed primarily for students who will apply for graduate education in another profession, such as medicine, dentistry, or veterinary medicine. The chemistry and a second discipline concentration allows students to develop their interests and abilities in other disciplines outside of chemistry, whether or not graduate education in chemistry is contemplated. Students may choose second disciplines such as computer science, geology, engineering, business administration, history, foreign languages, political science, and others.

Undergraduate Minor in Chemistry • Requirements are a minimum of 20 semester hours of chemistry, including at least two laboratory courses and at least three semester hours at the 3000 or 4000 level, but excluding CHEM 3900.

CURRICULUM IN CHEMISTRY

TOTAL SEM. HRS. • 128

*With the dean’s approval, CHEM 1202, 1212 may be substituted for CHEM 1422, 1431. CHEM 2001 may be substituted for CHEM 2003; and CHEM 2261, 2262, and 2364 may be substituted for CHEM 2461, 2462, and 2463.

The biological, preprofessional, and general education concentrations also require Biology Sciences 1208 and 1209 laboratories.

FRESHMAN YEAR • SEM. HRS.

Biological Sciences 1201 and 1202** 6-8
Chemistry 1201 or 1421; 1422; 1431* 8
English 1001 3
General education arts course 3
Mathematics 1550, 1552 3
Approved electives or area requirements 8-10
Total 32

SOPHOMORE YEAR • SEM. HRS.

Chemistry 2001, 2003, 2246, 2462, 2463* 12
Computer science programming course 3
English 2000 3
Physics 2101, 2102 8
Approved electives or area requirements 6
Total 32

JUNIOR YEAR • SEM. HRS.

Chemistry 3491, 3492, 3493 6
Six hrs. chosen from 2000-level or above English or Honors courses from the general education humanities list 3
Foreign languages courses 8-10
General education social sciences courses (one course at the sophomore level or above).................................. 6
Approved electives or area requirements. . . 5-3

SENIOR YEAR SEM. HRS.
Approved social sciences/humanities courses. ........................................ 6
Approved electives or area requirements. . . 24
30

Areas of Concentration

♦ Biological Chemistry (28 hrs.)

Students completing this concentration will receive American Chemical Society certification.
Sophomore Year • MATH 2057, and 2065, 2085 or 2090 (3-4 sem. hrs.).
Junior Year • BIOL 2051 or 2153 (4 sem. hrs.).
Senior Year • CHEM 3900 in an approved biochemical chemistry project or BIOL 3999 including a comprehensive written report filed with the Department of Chemistry's Undergraduate Office; CHEM 4552, 4553, 4564, and 4570 or 4571; BIOL 4093, 4094, 4385 (21 sem. hrs.). This concentration also requires BIOL 1208 and 1209 to be taken in the freshman year.

♦ Chemical Physics (29 hrs.)

Students completing this concentration will receive American Chemical Society certification.
Sophomore Year • MATH 2057, and 2065, 2085 or 2090 (6-7 sem. hrs.).
Junior Year • 3 hrs. of Physics electives.
Senior Year • CHEM 3900 in an approved physical chemistry research project, 4552, 4553, and 4570 or 4571; BIOL 4087 or 4093 and 4094; 3 hours of chemistry electives; 3 hrs. of physics electives. (20-22 sem. hrs.)

Physics electives: PHYS 2221, 2231, 2411, 4123, 4125, 4141, 4142, 4251, 4261.
Chemistry electives: CHEM 4581, 4594, 4596, 4597.

♦ Chemistry (25 hrs.)

Recommended for preparation as a chemical professional or for entrance to graduate study in chemistry. Students completing this concentration will receive American Chemical Society certification.

Sophomore Year • MATH 2065, 2085 or 2090 (3-4 sem. hrs.).
Junior Year • BIOL 4087 or 4093 and 4094 (4-6 sem. hrs.)
Senior Year • CHEM 3900 in an approved polymer research project, 4552, 4553, 4570, or 4571; 6 sem. hrs. of chemistry electives. (18 sem. hrs.)

Chemistry electives: CHEM 3900 (additional hrs.), 4010, 4011, 4160, 4561, 4562, 4563, 4570 or 4571, 4572, 4581, 4594, 4597.

♦ Chemistry and a Second Discipline (24 hrs.)

In addition to CHEM 3900, 4552, 4553, and 4570 or 4571, an approved second discipline concentration consists of at least 15 sem. hrs. of electives in one area outside the Department of Chemistry. In general, the area courses are to form a coherent sequence. This does not mean that all courses must be from the same department, but that there must be a logical plan for education in depth. When possible, students should take the same courses required for a major in the same area. There should be at least three courses numbered 3000 or above. Courses should be taken from no more than two departments. Selection of the concentration should be completed and approved by the department and dean's office by the end of the sophomore year.

♦ Environmental Chemistry (24 hrs.)

Students completing this concentration will receive American Chemical Society certification.
Sophomore Year • MATH 2057 (3 sem. hrs.).
Junior Year • BIOL 4087 or 4093 and 4094 (4-6 sem. hrs.).
Senior Year • CHEM 3900 in an approved environmental chemistry project, 4150, 4552, 4553, 4570 or 4571; and 6 hrs. chosen from environmental electives (17 sem. hrs.).

Environmental Electives: EVEG 4135, ENVS 4500, 4477, OCS 4040, 4165.

♦ Materials (29 hrs.)

Students completing this concentration will receive American Chemical Society certification.
Sophomore Year • MATH 2065, 2085 or 2090; ME 2733 (6-7 sem. hrs.).
Junior Year • BIOL 4087 or 4093 and 4094 (4-6 sem. hrs.).
Senior Year • CHEM 3900 in an approved area of materials research project; 4010, 4552, 4553, 4564, 4570 or 4571; ME 3701, 4723 (20 sem. hrs.).

♦ Polymers (24 hrs.)

Students completing this concentration will receive American Chemical Society certification.
Sophomore Year • MATH 2065, 2085 or 2090; ME 2733 (6-7 sem. hrs.).
Junior Year • BIOL 4087 or 4093 and 4094 (4-6 sem. hrs.).
Senior Year • CHEM 3900 in an approved polymer research project, 4010, 4011, 4552, 4553, 4564, and 4570 or 4571 (17 sem. hrs.).

♦ Preprofessional Chemistry (24 hrs.)

Sophomore Year • 3 hrs. from preprofessional electives;
Junior Year • BIOL 4093 (3 sem hrs.);
Senior Year • CHEM 4552, 4553, and 4570 or 4571; BIOL 4094, 4385, 5 hours from preprofessional electives (18 sem. hrs.).
Preprofessional Electives: BIOL 2051, 2153, 3156, 3152 or 4160; CHEM 3900 or BIOL 3999 in an approved project.
This concentration also requires BIOL 1208 and 1209 to be taken in the freshman year.

♦ Secondary Education

Students may obtain an area of concentration in secondary education leading to certification as a teacher in grades 7-12 by meeting the requirements of the chemistry degree and incorporating the following courses in their program of study. In addition, the student should include EDCI 2001 as one of the social science courses offered for the degree. Students should plan their curriculum so that the second semester of the senior year can accommodate 15 hrs. that are required to be taken concurrently (EDCI, 4004, 4005, CHEM 4504).

Junior Year • CHEM 3001, 3002, and EDCI 3001, 3002 (8 sem. hrs.)
Senior Year • BIOL 4087, CHEM 4570 or 4571; 3 hrs. CHEM electives; CHEM 4003, 4004, and EDCI 4003, 4004, 4005 (29 hrs.)

Chemistry electives: CHEM 4010, 4110, 4150, 4160, 4552, 4553, 4561, 4562, 4563, 4564, 4570 or 4571, 4581, 4594, 4597.

DEPARTMENT OF COMPUTER SCIENCE

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PROFESSORS • Carver, P. Chen, Iyengar, Kraft, Sterling, Triantaphyllou
ASSOCIATE PROFESSORS • Allen, J. Chen, Kannan, Kundu
ASSISTANT PROFESSORS • Baumgarter, Durrest, Karki, Kosar, Park, Ullmer, Wilson
INSTRUCTORS • Blanks, Brenner, Douglas, Duncan, Edgeworth, Guillot
VISITING FACULTY • Branton

The undergraduate computer science curriculum is structured around basic courses in computer science and mathematics. The curriculum is designed to allow a flexible plan of study via the mandatory selection of one of three concentrations: networking, software engineering, and computer science and a second discipline. A concentration should be declared at the beginning of the sophomore year. If the second discipline concentration is selected, an approval form must be completed and approved by the department and the dean's office.

Computer science students will not receive degree credit for the following courses: CSC 4602; ELRC 4006; EXST 2000, 2095, 2201, 3001, 4001; IDS 2000, 2001, 3001, 3002; PSYC 2011, 4111; and SOCL 2201. Computer science students may not receive credit for both IE 3302 and ISDS 2000, or for both IE 4510 and ISDS 2001.

An undergraduate minor in computer science is available. Required courses are CSC 1253, 1254, 2259, 3102, 3501, and 3 hrs. of computer science electives 3000-level and above; and 4101 or 4103 (total of 21 hours).

CURRICULUM IN COMPUTER SCIENCE

TOTAL SEM. HRS. • 123

1. See college list of approved general education natural sciences courses.
2. If a ten-hour foreign language sequence is taken, the extra two hours will be counted toward approved electives.
3. Students who have completed the prerequisites may substitute MATH 3355 or EE 3140 or EXST 4050.
4. The computer science senior elective
chapter (three semester hours) must be an approved 4000-level computer science course.

FRESHMAN YEAR  SEM. HRS.
Computer Science 1200, 1350, 1351........  7
English 1001................................  3
English or Honors course at the 2000-level or above on the general education humanities list.............  3
Mathematics 1550, 1552 .......................  9
Biological or physical sciences sequence*..........................  6
General education arts course..................  3
General education humanities communication studies course........  3

SOPHOMORE YEAR  SEM. HRS.
Computer Science 2259, 3102, 3380...........  9
Computer science elective 2000-level or above or computer science area requirement...........................................  3
English or Honors course at the 2000-level or above on the general education humanities list.............  3
English 2000................................  3
Mathematics 2090..............................  4
General education biological or physical sciences sequence with labab ...........................................  8
General education social sciences course........  3

JUNIOR YEAR  SEM. HRS.
Computer Science 2262, 3501, 4101...........  9
Computer science electives 3000-level or above or computer science area requirement..........................  3
Foreign language coursesb*........................  8
Industrial Engineering 3302..................  3
General education social sciences course (at the sophomore level or above)..........................  3
Approved elective or area requirements..................  6

SENIOR YEAR  SEM. HRS.
Computer science 4103, 4330.................  6
Computer science senior elective* or computer science area requirement..........................  3
Approved electives or area requirements.................  12
General education arts courses..................  3
Social sciences/humanities course..................  3

Areas of Concentration

♦ Computer Science and Second Discipline (24 hrs.)

In addition to three credit hours each from a CSC 2000-level or above elective, a CSC 3000-level or above, and a CSC senior elective, an approved second discipline concentration consists of 15 sem. hrs. of electives in one area outside of the Department of Computer Science. All courses must be taken from a single department except when a university minor is obtained. Courses in the second area are to form a coherent sequence; where possible students should take courses required of a major in that department. Ordinarily, there should be at least two courses numbered 3000 or above. Courses chosen from Information Systems and Decision Sciences must be numbered ISDS 3100 or above. The approval form must be submitted no later than the sophomore year with the consent of the departmental advisor and the dean’s office.

♦ Networking (18 hrs.)

Required courses (9 hrs.)—CSC 4304, 4501, 4601. Approved area electives (9 hrs.)—IE 4510; MATH 3355, 4023, 4024, 4025, 4153, 4171, 4325, 4470; other electives subject to approval.

♦ Software Engineering (18 hrs.)

Required courses (9 hrs.)—CSC 2000-level or above area elective; CSC 4351, 4402. Approved area electives (9 hrs.)—CSC 4304, 4370, 4890; EE 4760; IE 4461; ISDS (max. of 6 hrs.) from 4110, 4111, 4112, 4113, 4114, 4125, 4141, 4501, 4502, 4511; other electives subject to approval.

DEPARTMENT OF GEOLOGY & GEOPHYSICS

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PROFESSORS • Baks, Blum, Byerly, Chan, Duro, Engel, Tompkin
ASSOCIATE PROFESSORS • Anderson, Bart, Lorenzo, Schaefer
ASSISTANT PROFESSORS • Bao, Blanford, Darby, Engel, Tompkin
ADJUNCT FACULTY • Bentley, Hesp, Karki, Nunn, Roberts, Schiebout, White

The geology curriculum prepares undergraduates for graduate study in geology and geophysics and related fields and for a wide range of professional careers, including teaching, research, resource exploration and development, and environmental management and remediation. The curriculum has two areas of concentration: geology and environmental geology.

All geology students follow the same basic curriculum during the first five semesters of study. Students during this time receive a firm foundation in mineralogy, petrology, structural geology, and sedimentology, as well as basic courses in biology, computer science, chemistry, physics, and mathematics. Emphasis is on fundamental geologic processes operating on and within the earth. Laboratory and field studies are integrated into the curriculum at all levels and include a six-week field geology course at the department’s permanent field camp in the Colorado Front Range.

The curriculum is designed to leave much of the final three semesters of study relatively unstructured so that students, with the guidance and approval of the department, can develop a program of advanced course work most appropriate to their career objectives. Students selecting the geology area of concentration take, in addition to the first five semester group of courses, paleontology, a basic course in either geophysics, geochronology or tectonics, and six hours of geology electives. Students selecting the environmental geology area of concentration take physical hydrogeology, nine hours of approved environmental geology electives, and nine hours of approved electives in chemistry, mathematics, and other disciplines relevant to environmental problems. Both areas of concentration are designed to provide students with a sound foundation in basic geology and to prepare them for entry into a graduate program or directly into a professional career.

Graduate and undergraduate majors in geology must pay a $35 field service fee each semester. Students not majoring in geology who schedule courses requiring field trips will be assessed a pro rata part of the amount above as determined by the department chair. Part-time students enrolled in seminar courses only and students registered for thesis or dissertation only are exempt from the fee. Additional information concerning fees for field geology courses is available from the Geology Field Camp Director, Department of Geology & Geophysics.

An undergraduate minor in geology is available (17 hrs.). Required courses are GEOL 1001, 1003, 1601, 1602. At least three of the additional hours must be taken at the 3000 or 4000 level (excluding GEOL 3909) and on this campus. Honors courses offered are Geology 1002 and 1004.

CURRICULUM IN GEOLOGY

TOTAL SEM. HRS. • 123

* See area requirements.

FRESHMAN YEAR  SEM. HRS.
Approved social science or humanities course ..................  3
Chemistry 1201, 1202, 1212 ...........................  8
Geology 1001, 1003, 1601, 1602 ..................  8
Mathematics 1550, 1552 ................................  9
General education arts course..........................  3

SOPHOMORE YEAR  SEM. HRS.
Approved electives ......................................  3-4
Biological Sciences 1201, 1202 ...........................  6
English 2000 ...........................................  3
English course chosen from general education humanities list or Honors list ..................  3
Geology 2081 ...........................................  3
Geology 2061 (required for geology area of concentration or approved environmental area of concentration) ....  3
General education social sciences courses (one course must be at the sophomore level or above) ..................  3
Physics 1201 or 2101, and 1208 or 2108 .................  5-4

JUNIOR YEAR  SEM. HRS.
Approved electives ......................................  0-3
English courses chosen from general education humanities or Honors list ..................  3
Foreign Language courses ................................ 10-8
General Education arts course.........................  3
Geology 3032 ...........................................  3
Geology 3041 ...........................................  3
Geology 3071 ...........................................  3
Physics 1202 or 2102, and 1209 or 2109 ..................  5-4

SUMMER
(FOLLOWING JUNIOR YEAR)  SEM. HRS.
Geology 3666 ...........................................  6

College of Basic Sciences  147
DEPARTMENT OF PHYSICS & ASTRONOMY

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ASSISTANT PROFESSORS • Diener (Research), Gaarde, Hynes, Kutter, Lee, K. Matthews, Tiglio, Vekhter, Wung

INSTRUCTORS • Ahmad, Campbell, Giampacono, Gregg, Rupnik

An undergraduate minor in physics is available. Required courses are PHYS 1201, 1202, 1208, 1209 (or PHYS 2101, 2102, 2108, 2109), PHYS 2221; and at least three courses in physics above 2200 (excluding PHYS 2401, 2995, 4399, and 4991) of which at least three hours must be at the 4000 level, and/or astronomy above 4000 (excluding ASTR 4997), for a total of 20-22 hours.

Undergraduate students on this campus may choose to minor in nuclear science. The following conditions must be met:

• Approval from the Department of Physics & Astronomy,

• At least 15 credit hours in astronomy, nuclear science, medical physics and health physics, and physics courses, 12 of which must be taken from the following: MDP 2051, 4111, 4331, 4332, 4351, 4995; NS 4570; and PHYS 2203, 2207, 4098, 4271.

The Department of Physics & Astronomy offers master’s degrees for medical physics studies. For additional information, see the section, “Graduate School and Professional Programs” in this catalog.

CURRICULUM IN PHYSICS

TOTAL SEM. HRS. • 129

Students planning to enter graduate school are encouraged to select a modern foreign language.

FRESHMAN YEAR • SEM. HRS.

English 2000. .......................... 3

Three hrs. of English or Honors courses at the 2000-level or above chosen from the general education humanities list. .......................... 3

Mathematics 1550, 1552. .......................... 9

Physics 1201, 1202, 1208, 1209. .......................... 10

English 1001. .......................... 3

General education arts course. .......................... 3

 Approved electives or area requirements. .......................... 3

31

SOPHOMORE YEAR • SEM. HRS.

Three hrs. of English or Honors courses at the 2000-level or above chosen from the general education humanities list. .......................... 3

Mathematics 2057. .......................... 3

Physics 2203, 2207, 2221. .......................... 7

Biological sciences 1001 and 1002 or 1201 and 1202. .......................... 6

Computer science programming course. .......................... 3

General education humanities course. .......................... 3

Approved electives or area requirements. .......................... 4

34

JUNIOR YEAR • SEM. HRS.

English 2000. .......................... 3

Foreign language courses. .......................... 8-10

Physics 2231, 2411, 4098, 4132. .......................... 12

Approved electives or area requirements. .......................... 6-8

32

SENIOR YEAR • SEM. HRS.

Physics 4125. .......................... 3

General education social sciences/humanities course. .......................... 3

Approved electives or area requirements. .......................... 26

32

Areas of Concentration

• Astronomy

Required Courses (28 hrs.) • ASTR 1101, 1102, 4221, 4222, 4261; MATH 2090; PHYS 4123, 4135, 4141.

• Medical Physics

Required Courses (34 hrs.) • CHEM 1201, 1202, 1212, 2060; MATH 2090; BIOL 2160; MEDP 2051, 4111, 4331, 4332, 4351, 4991; KIN 2500; PHYS 2203, 2207, 4098, 4271.

• Physics

Required Courses (28 hrs.) • CHEM 1201, 1202, MATH 2090; PHYS 4123, 4141, 4142, 4399, and two physics electives (4000 level or above)—with permission, a 4000-level mathematics course may be substituted for one.

• Physics and a Second Discipline

Required Courses (28 hrs.) • MATH 2090; at least 24 sem. hrs. from an approved discipline outside of the Department of Physics & Astronomy; any second area may be chosen with consent of the dean and department adviser. The approved area form must be submitted no later than the sophomore year.

• Secondary Education

Students may obtain an area of concentration in secondary education with an emphasis on secondary school teaching by meeting the requirements of the physics degree and incorporating the following courses in their program of study. In addition, the student should include ED CI 2001 as one of the general education social science courses offered for the degree. Some general education courses are taken in different years than in the standard curriculum. Students should plan their curriculum so that the second semester of the senior year can accommodate 15 hours that are required to be taken concurrently (EDCI 4004, 4005, and PHYS 4004). PHYS 4004 substitutes for PHYS 4125 in the physics major curriculum. Two 4000-level physics electives (6 sem. hrs.) substitute for PHYS 4098 and 4132 in the physics major curriculum. Approved electives are 5-7 hours for the major.

Required courses (37 hrs.) • PHYS 2401, 3001, 3002, 4003; EDCI 3001, 3002, 4002, 4003, 4004, 4005; MATH 2090; ASTR 1101, 1102 or CHEM 1201, 1202.