

4251-2-3 American Literature Prior to the Nineteenth Century. (1,1,1)

4261-2-3 English Literature of the Nineteenth Century. (1,1,1)

4271-2-3 American Literature of the Nineteenth Century. (1,1,1)

4281-2-3 English Literature of the Twentieth Century. (1,1,1)

4291-2-3 American Literature of the Twentieth Century. (1,1,1)

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Journalism

Note: ENGL 102 is the prerequisite for all Journalism courses.

Journalism Courses (JOUR)

210 High School Publications. (3)
Prerequisite: ENGL 102.

Instruction in all phases of the management and production of high school publications. (F)

220 News Reporting I. (3)
Prerequisite: ENGL 102.

An introductory survey of journalism with application in a classroom-laboratory of the techniques of news gathering, news writing and editing, and the ethics and responsibilities of a reporter. (F)

221 News Reporting II. (3)
Prerequisite: JOUR 220.

A continuation of news writing with an emphasis on advanced stories. (S)

330 Copy Editing and Design. (3)
Prerequisites: JOUR 220-221 or consent of instructor.

The principles and techniques of editing and improving copy, writing headlines, and producing attractive page makeup and display of copy. (F)

332 Graphics and Visual Communication. (3)
Prerequisite: JOUR 330 or consent of instructor.

The preparation of copy and illustrations for mass reproduction with special attention to typography, layout, design, and desktop publishing. Specific techniques of copy prepara-

tion for brochures, newsletters, and other means of printed communication. (S)

334 Feature Writing. (3)
Prerequisites: JOUR 220-221 or consent of instructor.

Principles and techniques of feature writing with extensive study in interpretive reporting, critical analysis. (S)

340 Public Relations. (3)
Prerequisites: ENGL 102 and CART 101.

An introductory survey of the principles and techniques of communication between an organization and its internal and external publics.

350A-D Journalism Practicum. (1-4)
Prerequisites: JOUR 220- 221, and consent of instructor.

May be repeated for a maximum of four hours. Provides on-campus and/or off-campus experience in handling communication assignments. Supervised by a journalism instructor. Portfolio requirement. Contracts to be drawn up at outset of course. Credit will be on a pass/fail basis. (F,S)

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Foreign Languages

Courses in foreign languages are designed to meet the needs of three kinds of students.

As options to fulfill General Studies requirements (see pages 21-24), the foreign language courses give students an opportunity to examine "from the inside" a culture which is different from their own, and also enable them to view their native language from a broader perspective by comparing it with another.

In those academic fields which require the study of a foreign language, these courses help students to attain a very basic reading and speaking knowledge of the language most useful in their fields.

Foreign language courses also are offered to meet the demands of students who have a personal interest in or professional need for an acquaintance with

a specific language.

With the increasing internationalization of our population, and a growing appreciation of our cultural and ethnic diversity, we recognize that languages other than English are not really “foreign” to the United States. In addition to many Native American and immigrant languages, Spanish is spoken as a first or second language by an estimated 17 million people in the U.S., and by over 350 million people in 20 countries in the world. In certain states and in most U.S. cities, a practical knowledge of Spanish has become essential to practice careers such as medicine, law and law enforcement, social work, nursing, and teaching. Spanish on the transcript can be a deciding factor in hiring decisions. French is still an international language, favored in diplomacy and business, and is spoken by an estimated 130 million people in 37 countries and territories.

Given our own national demographic needs and constant evidence of the global and interdependent nature of environmental and economic problems in our world, the acquisition of foreign language skills is assuming ever greater urgency, in order to foster clearer communication and better understanding in diplomacy, ecology, business and economics.

A second year of college-level language study is extremely valuable, for it includes review, reinforcement, and enhancement of skills all too often forgotten after only one year of study. And it is usually only at this level that one begins to get a “feel” for the language and the culture it embodies, and to be able to use the language as a tool for further learning.

Since language learning is far more efficient if continuous between high school and college courses, or between the semesters or years in college, it is wise not to postpone language courses.

- Students with no high school credit in the language being taken may substitute 101 *and* 102 credit in that language for two courses in General Studies. Both 101 and 102 must be passed before General Studies credit can be given.
- Students with *one year* of high school credit in the language being taken may take 101 in that language for credit but may not substitute 101 for a General Studies course. They may take any courses above 101 for credit and substitution for up to two courses in General Studies.
- Students with *two or more years* of high school credit in the language being taken may take 101 or 102 of that language for credit but may not substitute for General Studies courses. They may take 201 and/or 202 for credit and may substitute for one or two General Studies courses.

French Courses (FREN)

101 Elementary French I. (3)

The most basic patterns of French grammar. Basic vocabulary and development of beginning skills in reading, writing, speaking, and comprehending the French language. Emphasis on the present tense. (F)

102 Elementary French II. (3)

Prerequisite: FREN 101 or one year of high school French or consent of instructor.

Further development of elementary skills in reading, writing, speaking, and comprehending. Expansion of tenses, moods, and sentence complexity. (S)

201 Intermediate French I. (3)

Prerequisite: FREN 101-102 or equivalent, or two years of high school French, or consent of instructor.

Readings in Francophone cultures and literature; review and expansion of French grammar and vocabulary; practice in writing, speaking, and comprehending the language. (F)

202 Intermediate French II. (3)

Prerequisite: FREN 101-102 and 201 or equivalent, or three years of high school French, or consent of instructor.

Further readings in Francophone cultures and literature; review and enhancement of French grammar and vocabulary; practice in writing, speaking, and comprehending the language. (S)

German Courses (GER)

The following courses are not always offered. Check current schedule of courses for availability of these courses.

101 Elementary German I. (3)

The basic patterns of German grammar. Emphasis on basic vocabulary and on developing skills in reading, writing, speaking, and comprehending the German language. (F)

102 Elementary German II. (3)

Prerequisite: GER 101 or one year of high school German or consent of instructor.

Further development of skills in reading, writing, speaking, and comprehending. (S)

Spanish Courses (SPAN)

101 Elementary Spanish I. (3)

The most basic patterns of Spanish grammar. Emphasis on basic vocabulary and on developing skills in reading, writing, speaking, and comprehending the Spanish language. Emphasis on the present tense. (F)

102 Elementary Spanish II. (3)

Prerequisite: SPAN 101 or one year of high school Spanish or consent of instructor.

Further development of skills in reading, writing, speaking, and comprehending. Expansion of tenses, moods, and sentence complexity. (S)

201 Intermediate Spanish I. (3)

Prerequisite: SPAN 101-102 or equivalent, or two years of high school Spanish, or consent of instructor.

Readings in Hispanic cultures and literature; review and expansion of Spanish grammar and vocabulary; practice in writing, speaking, and comprehending the language. (F)

202 Intermediate Spanish II. (3)

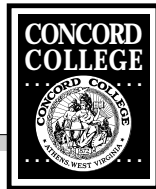
Prerequisite: SPAN 101-102 and 201 or equivalent, or three years of high school Spanish, or consent of instructor.

Further readings in Hispanic cultures and literature; review and enhancement of Spanish grammar and vocabulary; practice in writing, speaking, and comprehending the language. (S)

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The Division of Natural Sciences

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THE DIVISION of Natural Sciences includes the Department of Biology, page 106; the Department of Mathematics (mathematics and computer science), page 109; the Department of Physical Sciences (chemistry, environmental geosciences, physics and medical technology), page 114; and courses in the Natural Sciences, listed on this page.

In addition to the Bachelor of Science degree and the Bachelor of Science in Education degree, the Division offers the Bachelor of Science in Medical Technology degree, page 120, and the Bachelor of Science in Computer Information Systems, page 109.

Pre-professional studies in medicine and dentistry (pages 105-106) may be combined with any of the Bachelor of Science programs.

The Bachelor of Science in Education

The degree of Bachelor of Science in Education, with certification to teach general science, requires successful completion of 128 semester hours including (1) the Program of General Studies; (2) the Professional Semester for the certificate chosen (page 56); and (3) the requirements associated with the following certificates:

Certificate for Grades 5-12 (page 69). Students may complete a single field in general science 5-12; however, it is highly recommended that this field be combined with at least one of the other fields described under the Bachelor of Science in Education, section II (page 53).

Certificate for Grades 5-8 (page 69). Students may combine a subject specialization in general science 5-8 with (1) the Multi-Subjects Program K-8 (page 58); (2) a specialization for grades 9-12 (page 67-71); or (3) a specialization for grades 5-12 (page 60-72).

Natural Sciences

Natural Sciences Courses (NSC)

300A Science and Human Affairs. (3)

Consideration of topics of current concern. Subtopics, announced by instructor, may vary from semester to semester. Three hours lecture-discussion.

300B Life on Earth. (3)

A general survey of life on Earth with emphasis on the evolutionary origins of various animal groups. Thirteen one-hour programs from the television series *Life on Earth* will be utilized in the course.

300C Biogeography. (3)

Prerequisites: *BIOL 101-102 or consent of instructor.*

Geologic and geographic development of the Appalachian Mountains and their floral and faunal communities. May be used as a Biology elective.

300D Science and Religion. (3)

Prerequisites: *Two laboratory science courses or consent of instructor.*

Science in relation to diverse world views. A comparative study in the history and philosophy of science and religion.

414 Special Methods in the Teaching of the Natural Sciences. (3)

Observation, discussion, and participation are utilized in order to provide prospective teachers a working knowledge of appropriate methods and media for teaching concepts and laboratory techniques and phenomena of the various areas of the natural sciences. (F)

Medicine and Dentistry

Students who plan to study medicine or dentistry should complete the Bachelor of Science degree, with a major in biology, chemistry, or mathematics, and they should complete the following

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courses in order to enhance their chances for acceptance into medical school.

BIOL 101-102, General Biology I and II; 202, Animals as Organisms; 302, Cell and Molecular Biology; 401, Genetics;

CHEM 101-102, Introductory Chemistry I and II; 103B, Biophysical Techniques; 331-332, Organic Chemistry I and II; 341, Biochemistry;

PHYS 101, Introductory Physics; 102, Intermediate Physics;

MATH 103, College Algebra; 104, College Trigonometry

Note: In addition to the courses above, students preparing to enter dental school should take ART 323, Jewelry II.

Department of Biology

Programs in the Department of Biology are designed to help prepare students for careers in biology teaching, biological specialties, and health related areas. For each of these careers there is a need to understand the explanatory principles of biology and basic methods of biological investigation. Required and elective course work help achieve these objectives.

Students choosing their work in biology may pursue either (1) the Bachelor of Science degree with a biology (pre-professional) major, (2) the Bachelor of Science degree with a biology (general) major, or (3) the Bachelor of Science in Education degree.

The pre-professional major is designed for students planning on going to medical school or pursuing a career in another health related area and for individuals interested in molecular biology and/or physiology. The general major is intended for students who are interested in field-oriented biology, such as natural history, fish and game,

national and state parks and refuges, etc., or in other areas with less emphasis on the molecular level.

A minor field in biology is available for students who are majoring in other disciplines.

A student must earn a grade average of 2.00 (C) in all courses required for the major, minor, or any certification option. Other courses taken in the Department will be included in the average.

The Bachelor of Science

The degree of Bachelor of Science, with a major in biology, requires successful completion of 128 semester hours including (1) the Program of General Studies which must include six hours in one foreign language (page 23); (2) one of the biology programs listed on this page; and (3) a program of electives or a minor* as worked out with the student's advisor.

Major in Biology (General)

- 31 hours in biology—BIOL 101**, 102**, 201, 202, 301, 302, 372, 401, 450 or 451;
- 8 hours in chemistry—CHEM 101, 102, 103B, 331 (recommended);
- 8 hours in physics—PHYS 101, 102;
- 8 to 10 hours in mathematics—MATH 103 and two courses from 104, 105, 108, or 200 and higher;
- 16 hours of science electives (at least 8 hours in biology; NSC 300C may be substituted for three of these hours).

Major in Biology (Pre-Professional)

- 31 hours in biology—BIOL 101**, 102**, 201, 202, 301, 302, 335 (recommended), 372, 401, 450 or 451;
- 16 hours in chemistry—CHEM 101, 102, 103B, 331, 332, 341 (recommended);

- 8 hours in physics—PHYS 101, 102;
- 8 to 10 hours in mathematics—MATH 103 and two courses from 104, 105, 108, or 200 and higher;
- 10 hours of science electives (at least 6 hours in biology; NSC 300C may be substituted for three of these hours).
- Science electives for both programs may come from courses listed under Biology, Chemistry, Physics, Geology, Mathematics (course numbers 200 and higher), Natural Science 300C or D, Geography 300, or Psychology 370 and/or 402.

*Minors recommended for biology majors are those in chemistry, physics, mathematics, computer science, or statistics.

*Students with a strong background in biology should consider taking the CLEP examination in biology for credit for Biology 101 and 102.

Minor in Biology

BIOL 101, 102, and twelve additional hours in Biology. Geography 300, Psychology 370, Psychology 402, Natural Science 300C or Natural Science 300D may be substituted for three of these hours.

The Bachelor of Science in Education

The degree of Bachelor of Science in Education, with certification to teach biology, requires successful completion of 128 semester hours, including (1) the Program of General Studies; (2) the Professional Semester for the certificate chosen; and (3) the requirements associated with the following certificate.

Certificate for Grades 9-12 (page 70). Students with a field in Biology 9-12 are encouraged to complete a teaching field in General Science.

Biology Courses (BIOL)

101 General Biology I. (4)

Cellular metabolism; structures and functions of animals and plants; characteristics of scientific thought. Three hours lecture, two hours laboratory. (F)

102 General Biology II. (4)

Prerequisite: *BIOL 101 recommended but not required.*

Cellular reproduction; basic genetics; evolution; ecology; human implications of these topics. Three hours lecture, two hours laboratory. (S)

201 Ecology and Field Methods. (4)

Prerequisites: *BIOL 101 and 102 or consent of instructor.*

Taxonomy, ecological principles, major terrestrial and aquatic ecosystems, fundamentals of human ecology, quantitative field study techniques. Three hours lecture, two hours laboratory. This course cannot be used to fulfill a General Studies requirement. (F)

202 Animals as Organisms. (4)

Prerequisites: *BIOL 101 and CHEM 101.*

Form, function, behavior, development, and classification in the major animal groups. Three hours lecture, three hours laboratory. (S)

205 Tropical and Marine Biology. (2)

Prerequisites: *BIOL 101 and/or 102 and permission of instructor.*

Introduction to tropical marine and terrestrial ecosystems. Will include a one- to two-week field study.

215 Medicinal Plants and Ethnobotany. (4)

Prerequisites: *BIOL 101, 102, or consent of instructor.*

The use of plants as medicines, poisons, and hallucinogens which provide the basis for modern medicine and pharmacology. Examines the interactions of plants and traditional peoples. Three hours lecture, two hours laboratory.

220 Biology and Cultures of Belize. (4)

Prerequisites: *BIOL 101 and/or 102 and permission of instructor.*

A comprehensive study of Belize, Central America, including a one to two week expe-

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dition to the country to investigate the coral reefs, tropical rain forests, and indigenous cultures.

225 Special Topics. (1-5)

Prerequisites: *To be specified by instructor.*

Courses in diverse areas of biology. Specific topics to be announced; these indicated by appropriate title on student transcript. May be taken for credit repeatedly.

230 Ornithology. (3)

Prerequisites: *BIOL 101, 102, or consent of instructor.*

Anatomy, taxonomy, evolution, biogeography, flight, migration, behavior, reproduction, and field identification of birds. Two hours lecture and two hours laboratory.

231 Herpetology. (3)

Prerequisite: *BIOL 101, 102, or consent of instructor.*

Anatomy, taxonomy, evolution, life history, biogeography, physiology, and identification of amphibians and reptiles. Two hours lecture, two hours laboratory.

240 Parasitology. (4)

Prerequisite: *BIOL 101.*

General principles of parasitology, including morphology and life histories of animal parasites: diagnostic techniques, including tissue preparation. Three hours lecture, three hours laboratory.

245 Entomology. (3)

Prerequisites: *BIOL 101, 102, or consent of instructor.*

Biology of insects, including morphology, physiology, behavior, ecology, and classification. Two hours lecture, two hours laboratory.

260 Local Flora. (3)

Principles of identifying, classifying, naming, and preserving plants, with emphasis on the local flora. One hour lecture, five hours laboratory.

301 Plants as Organisms. (4)

Prerequisites: *BIOL 101, 102, CHEM 101, 102.*

Form and function in the major plant groups, with emphasis on evolutionary trends. Three hours lecture, three hours laboratory. (F)

302 Cell and Molecular Biology. (3)

Prerequisites: *BIOL 101, concurrent or prior registration in CHEM 102 and 103B.*

Biology, chemistry, and physics of living sys-

tems at the cellular and molecular levels. Three hours lecture. (S)

330 Microbiology. (4)

Prerequisites: *BIOL 101, CHEM 102, 103B; CHEM 331 recommended.*

The biology of micro-organisms and of the immune system, applied microbiology, laboratory procedures. Three hours lecture, three hours laboratory. (S)

335 Human Anatomy and

Physiology. (4)

Prerequisites: *BIOL 101, 102, CHEM 101, or consent of instructor.*

Structure and function of the human integumentary, skeletal, muscular, nervous, endocrine, cardiovascular, lymphatic, respiratory, digestive, excretory, and reproductive systems. Clinical applications and the anatomical and physiological changes associated with diseases. Three hours lecture, three hours laboratory. (F)

355 Histology. (4)

Prerequisite: *BIOL 101.*

A detailed study of the tissues of vertebrate animals, with emphasis on functional anatomy and tissue preparation. Recommended for students planning a career in medicine or medical technology. Three hours lecture, three hours laboratory.

360 Comparative Vertebrate Anatomy. (3)

Prerequisite: *BIOL 202 or consent of instructor.*

Anatomy of the chordates as related to evolution and function. Two hours lecture, two hours laboratory.

365 Developmental Biology. (3)

Prerequisite: *BIOL 202 or consent of instructor.*

Morphogenesis and causal mechanisms in development; laboratory emphasizes vertebrate embryology. Two hours lecture, two hours laboratory.

370 Evolution. (3)

Prerequisites: *BIOL 101 and 102; BIOL 401 recommended but not required.*

Modern theories of chemical and organic evolution: evidence, processes, results. Philosophical, religious, and educational implications. (S)

372 Introduction to Research. (3)

The nature of science and scientific research, research design, analysis of research reports,

philosophy and ethics of scientific investigations. (S)

373 Research. (2)

Prerequisite: *BIOL 372 or consent of Department Chairperson.*

This course is the first part of a two-semester research project providing experience in searching out and reviewing pertinent literature, preparing a research proposal, doing the research, and presenting both oral and written research reports, the latter subject to rigorous editing. Publication of the results of outstanding projects is encouraged. A grade for this course is not given until completion of BIOL 374. (F,S)

374 Research. (2)

Completion of work begun in BIOL 373. (F,S)

401 Genetics. (4)

Prerequisites: *BIOL 101, 302, or consent of instructor; BIOL 102 recommended.*

Mendelian, cytological, microbial, molecular, and population genetics.

Three hours lecture, three hours laboratory. (F)

420 Immunology. (4)

Prerequisites: *BIOL 101, concurrent or prior registration in BIOL 302, or consent of instructor.*

Immunochemistry of antigens and antibodies, serological reactions, chemistry of complement, control of immunity, and the host immune response. Lab will consist of serological and immunobiological techniques. Three hours lecture, three hours laboratory.

425 Special Topics. (1-5)

Prerequisites: *To be specified by instructor.*

Courses in diverse areas of biology. Specific topics to be announced; these indicated by appropriate title on student transcript. May be taken for credit repeatedly.

450-451 Biology Seminar. (1,1)

Prerequisite: *Junior or senior standing. Either course may be taken first.*

Detailed reports on specific topics in Biology and related fields. Emphasis on justification of assertions. Topics that involve controversy help illuminate the nature of science. In each semester of enrollment, each student will present one seminar and lead the discussion. Some seminars by guest speakers. Visitors are welcome. (Both courses can be repeated for credit.) (450 in S, 451 in F)

480-481 Honors Courses. (3,3)

Juniors and seniors who qualify for Honors Courses are offered the opportunity to study with individual members of the faculty. This is specialized study apart from conventional classroom work. Interested students should contact the Department Chairperson for further information. (F,S)

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Department of Mathematics

Programs offered by the Department of Mathematics are designed to prepare students for mathematics and/or computer science related vocations—including the teaching of mathematics and computer science. The programs also prepare the student for continuing study in these subject areas beyond the undergraduate level.

The Department of Mathematics offers the following options: (I) the Bachelor of Science degree program with (a) a Comprehensive Mathematics major, (b) a Computer Science major, or (c) a Mathematics major with a minor; (II) the Computer Information Systems degree program; and (III) the Bachelor of Science in Education degree program with certification specializations for (a) grades 5-8 and (b) grades 5-12. Programs are planned in consultation with an advisor from the Department of Mathematics.

Minors for non-education degree programs are offered in Mathematics, Statistics, and Computer Science. Formal recognition is given to students who successfully supplement a degree program with an emphasis in Pre-Actuarial Science. Students may not enroll in a mathematics course unless a minimum score of 19 is earned on the mathematics section of the Enhanced ACT test, or a minimum score of 430 on the quantitative portion of the PRSAT test, or sufficient scores on the numerical



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test and elementary algebra test of the ASSET test. Students not meeting these minimal requirements must successfully complete the development program consisting of MATH 090 and/or 091.

Students electing one of the programs of this Department must have at least one unit in high school geometry. A deficiency in high school geometry may be removed by successful completion of MATH 200, Introductory Geometry.

A grade point average of 2.00 (C) or higher in all required courses is needed for successful completion of any of the programs, including minors, certifications, or concentrations of this Department. For noneducational programs, grades obtained in MATH 101, 110, 305, and 414 cannot be used to meet this minimal 2.00 grade point average requirement.

The Bachelor of Science

The degree of Bachelor of Science, with a major in mathematics, requires successful completion of 128 semester hours, including (1) the Program of General Studies which must include six hours of one foreign language; (2) one of the mathematics programs listed below; (3) a minor (where required); and (4) a program of electives.

Majors in Mathematics

COMPREHENSIVE MATHEMATICS—51-56 HOURS*

MATH 103, 104, 201, 220, 250, 251, 252, 303, 307, 309, 310, 320, 451; six other hours from 202 and above excluding 305 and 414; nine other hours selected from 403, 404, 451, 452, 460, 470, and, with consent of chairman, 420. Recommended: eight hours of physics; six other hours of computer programming.

(Continued in next column.)

COMPUTER SCIENCE/

MATHEMATICS—59-64 HOURS*

MATH 103, 104, 201, 202, 215, 220, 240, 250, 251, 252, 271, 307, 320, 355, 356, 361, 362, 410, 445, 460; PHYS 319. Recommended: six hours of statistics. *(Note: PHYS 101 and 102 or consent of instructor is required for PHYS 319.)*

MATHEMATICS—36-41 HOURS*

MATH 103, 104, 201, 250, 251, 252, 303, 307, 309, 310, 320, 451; three hours from 403, 404, 451, 452, 460, 470, and, with consent of chairman, 420. Recommended: eight hours of physics and three additional hours of computer programming. *(Note: a minor is required—computer science and statistics are acceptable options.)*

Minors and Areas of Emphasis in Mathematics

MINOR IN COMPUTER SCIENCE—18 HOURS

MATH 201, 202, 211, 215, 355; three additional hours of mathematics above 104, excluding 305 and 414.

MINOR IN MATHEMATICS—21 - 26 HOURS*

MATH 103, 104, 201, 250, 251, 252, 307; three hours from 290 and above, excluding 305 and 414.

MINOR IN STATISTICS—18 HOURS

MATH 105, 303, 320, 404, 451, and three hours of computer programming.

AREA OF EMPHASIS IN PRE-ACTUARIAL SCIENCE—24-29 HOURS*

MATH 103, 104, 105, 250, 251, 252, 303, 320, 404.

Note: *The student is prepared for preliminary actuarial examinations. (This concentration is included within a mathematics major-statistics minor program.)*

The Bachelor of Science in Computer Information Systems

The Bachelor of Science in Computer Information Systems requires the successful completion of 128 semester hours, including the Program of General Studies and the following courses: ACCT 205, 206; MGT 305; MKT 305; MATH 103, 105, 108, 201, 202, 211, 212, 215, 220, 250, 271, 356, 361, 430, 490, 491. Recommended: MATH 240, 355, 410, 445.

The Bachelor of Science in Education

The degree of Bachelor of Science in Education, with certification to teach mathematics, requires successful completion of 128 semester hours, including (1) the Program of General Studies; (2) the Professional Semester for the certificate chosen (page 56); and (3) the requirements associated with one of the following certificates:

CERTIFICATE FOR GRADES 5-8.

Students may combine a middle school program in mathematics 5-8 (page 64) with (1) the Multi-Subjects Program (pages 58); or (2) a specialization for grades 9-12 (pages 67-71); or (3) a specialization for grades 5-12 (pages 60-72).

CERTIFICATE FOR GRADES 5-12 (PAGE 64).

Students may complete a single field in mathematics 5-12; however, it is highly recommended that this field be combined with at least one other field.

**Note: For students who major in Computer Information Systems or who major, minor, or select any teaching option in mathematics, if the "equivalent proficiency" is established in MATH 101, 103, and/or 104, the program requirements are reduced by the corresponding number of hours.*

Mathematics Courses (MATH)

090 Basic Mathematics. (3)

A beginning course in mathematics focusing on operations with whole numbers, fractions, decimals, proportions, percents and the real number system; solving equations and problems; and basic geometry. Grade of C required. (Non-graduation credit) (F,S)

091 Basic Algebra. (3)

Prerequisite: MATH 090, if indicated by diagnostic testing.

An introduction to basic algebra skills, including solving equations, systems of equations, and equalities; fractional expressions; exponents, powers, and roots; quadratic equations and functions; and geometry skills. Grade of C required. (Non-graduation credit) (F,S)

101 General Mathematics. (3)

Prerequisite: Math ACT score of 19 or higher.

Selected topics from problem solving, set theory, and algebra. Elementary topics in computer science are introduced. (F,S)

103 College Algebra. (3)

Prerequisite: Math ACT score of 19 or higher.

Polynomial, rational, exponential, and logarithmic functions. Graphing functions, operations with matrices, sequences, series, permutations and combinations included. (F,S)

104 College Trigonometry. (2)

Prerequisite: MATH 103 or equivalent proficiency.

Circular functions, trigonometric identities, applications to triangle, complex numbers. (F,S)

105 Elementary Statistics. (3)

Prerequisite: MATH 103 recommended.

Designed for non-mathematics majors. Includes descriptive statistics, introduction to sampling statistics, hypothesis testing, correlation and regression, analysis of variance, and related topics. (F,S)

108 Introduction to Computers. (3)

An introduction to general usage of computers with emphasis on data processing. Topics include computer organization and hardware, input and output devices, data organization and storage, data representation, and a brief introduction to programming. (F,S)

110 Mathematics for Elementary School Teachers. (3)

Prerequisite: *MATH 101 or equivalent proficiency.*

This course is designed for prospective early and middle childhood teachers and includes the study of sets, relations, numeration systems, elementary theory, and the structure of the real number system. A grade of C or better is necessary for teacher certification programs requiring this course. (F,S)

200 Introductory Geometry. (3)

Prerequisite: *MATH 101 or equivalent proficiency.*

Includes fundamental concepts of elementary geometry, points, lines, space, separation, simple closed curves. (S)

201 Introduction to Computer Programming I. (3)

Prerequisite: *MATH 103 recommended.*

Fundamental characteristics and properties of computer languages, algorithmic methods of solving problems on the computer. Pascal programming language is taught and used. (F, S)

202 Introduction to Computer Programming II. (3)

Prerequisite: *MATH 201.*

Continuation of MATH 201. (S)

211 Cobol I. (2)

Prerequisite: *MATH 201.*

Basic characteristics and properties of computers and applications of computers to business. (F)

212 Cobol II. (2)

Prerequisite: *MATH 211.*

Continuation of MATH 211. (S)

215 Assembly Language Programming. (3)

Prerequisite: *MATH 201.*

An introduction to machine language and assembly language. Symbolic coding, addressing techniques, and operation of assemblers are included. (F)

220 Discrete Mathematics. (3)

Prerequisite: *MATH 103 and 201.*

Topics include the study of functions and relations, graphs and trees, combinatorics, sets, analysis of algorithms, and formal logic. (S)

240 Programming in C++. (3)

Prerequisite: *MATH 202.*

Advanced programming techniques using C++ object-oriented programming language. Topics include the underlying C language, the use of objects (abstract and concrete classes, class interfaces, and class templates), dynamic storage structures, and an introduction to software engineering frameworks using the C++ language. (S)

250 Calculus with Analytic Geometry I. (4)

Prerequisites: *MATH 103 and 104 or equivalent proficiency.*

An introduction to differential calculus, including the necessary techniques of inequalities, sets, relations, and analytic geometry. Limits, continuity, and differentiation of algebraic functions. Some applications of differentiation. (F,S)

251 Calculus with Analytic Geometry II. (4)

Prerequisite: *MATH 250.*

A study of the definite and indefinite integrals, elements of analytic geometry to include: conic sections, polar coordinates, and vectors in two and three dimensions. (F,S)

252 Calculus with Analytic Geometry III. (4)

Prerequisite: *MATH 251.*

Techniques and applications of integration, vectors in three-dimensional analytic geometry. Elements of infinite series and multiple integration. Introduction to differential equations. (F,S)

260 Introduction to the Theory of Numbers. (3)

Prerequisite: *MATH 103 or consent of instructor.*

Includes numeration systems, primes, divisibility, factorization, indeterminate problems, diophantine equations, and analysis of congruences. (F-95, F-97)

271 Computer Organization and Hardware. (3)

Prerequisite: *MATH 215.*

Organization of computers in terms of input-output, memory, control and processing units. Representation of data, machine arithmetic instruction formats, basic mechanical and electronic characteristics of

computers included, as well as storage devices, control and processing units and computer networks. (S)

275 Special Topics in Computer Science.

A series of 1-credit, 5-week mini-courses in topics related to computer science.

290 History of Mathematics. (3)

Prerequisite: MATH 103 or consent of instructor.

A survey of the development of mathematics from prehistoric times to the present, with emphasis on the mathematical theories and techniques of each period, with their historical evolution. (F-96, F-98)

303 Mathematical Probability and Statistics I.

(3) Prerequisite: MATH 252.

Includes distributions of random variables, conditional probability, correlation coefficient, selected distributions, and interval estimation. (S)

305 Mathematics for the Public Schools. (3)

Prerequisite: MATH 110 or 220 and 60 semester hours previously earned.

A study of techniques appropriate for the teaching of mathematics. Student projects may be required. Grade of C (or better) necessary for teacher certification program when course is required. (F,S)

307 Introduction to Abstract Algebra. (3)

Prerequisite: MATH 103.

Includes symbolic logic, sets, structure of number systems, introduction to group theory, survey of algebra and proofs of theorems. (F)

309 College Geometry. (3)

Prerequisite: MATH 250.

A careful treatment of Euclidean and Non-Euclidean geometries with emphasis on a transformational point of view. (S)

310 Abstract Algebra. (3)

Prerequisite: MATH 307.

A reasonably careful treatment of the structure of algebra, sets, relations, functions, with primary emphasis on group theory, rings, integral domains, and fields. (S)

320 Linear Algebra. (3)

Prerequisite: MATH 250.

Techniques in solving systems of linear

equations employing the concepts of linear transformations, matrices and determinants. Other topics covered include vector spaces and eigenvalue theory. (S)

340 Mathematical Explorations. (1)

Prerequisite: MATH 250 or consent of instructor.

Interesting but non-routine problems will be considered, especially those solvable with simple methods. May be repeated up to four times. (F,S)

355 Data Structures. (3)

Prerequisite: MATH 202.

Implementation of abstract data types, stacks, linear and circular lists, queues, trees, hashing functions, memory management, sorting, and searching algorithms. (F)

356 Data Base Management. (3)

Prerequisite: MATH 202.

Design, evaluation, and use of data base systems. Topics include file organization and maintenance, information retrieval, query languages, security and the relational, hierarchical, and network approaches to data base management. (S)

361 Operating Systems. (3)

Prerequisites: MATH 202 and 271.

Introduction to software organization for program, storage, and process management. Topics include concurrent processes, virtual memory, placement, and scheduling algorithms. (F)

362 Programming Languages and Translators. (3)

Prerequisite: MATH 220, 307, and 355.

Formal definitions of programming languages, including specifics of syntax and semantics. Includes introduction to design, structure, and use of translators for programming languages, and related automata theory topics. (S)

403 Applied Mathematics. (3)

Prerequisite: MATH 252 and 320.

Topics include solving linear and nonlinear differential equations, systems of linear differential equations, fundamental existence theorems, numerical solutions, and the use of Laplace transforms. (S)

404 Mathematical Probability and Statistics II. (3)

Prerequisite: MATH 303.

Continuation of MATH 303. Includes introduction to limiting distributions, hypothesis

testing, sufficient statistics, analysis of variance and non-parametric statistics. (F)

410 Software Engineering. (3)

Prerequisite: MATH 202.

An introduction to rigorous frameworks for the engineering of software systems. Several engineering frameworks are examined, with discussion on the offerings and limitations of each approach. A relatively modern and futuristic view of software engineering serves as the basis for developmental projects in the course. (F)

414 Special Methods in the Teaching of Mathematics. (2)

Prerequisites: MATH 305 and consent of instructor.

Observation, methods, and media appropriate to the teaching of mathematics. (F)

420 Special Topics. (3)

Prerequisite: Consent of instructor.

Extended study beyond introductory courses in number theory, abstract algebra, geometry, topology, complex variables, or other topics of interest.

430 Microcomputer System Design. (3)

Prerequisites: MATH 356 and 361.

Information and systems concepts, and management of information processing. (F)

445 Distributed Processing and Networks. (3)

Prerequisite: MATH 361.

Introduction to distributed processes, its advantages and disadvantages relative to microcomputerization of information processing. (S)

451 Advanced Calculus. (3)

Prerequisite: MATH 252.

Utilizes the concepts of limit points and cluster points in the study of functions of one variable. Properties of continuous and differential functions. Riemann and Darboux integration, and sequences and series of functions are discussed. (F)

452 Real Analysis. (3)

Prerequisite: MATH 252.

The study of metric and Banach spaces; integration theory including Riemann, Lebesgue, and Stieltjes integrals; and functional analysis.

460 Numerical Analysis. (3)

Prerequisites: MATH 201, 252, and 320.

Solutions of problems by numerical methods. Includes error analysis, polynomial approximations, numerical integration, and differentiation. (F)

470 Independent Study. (1-6)

Prerequisites: More than 11 hours in mathematics courses numbered 300 or above.

Application must be made and approved by a committee before the student can register for independent study (page 29). Students work on mathematical problems outside the scope of normal courses under minimal supervision. Student must give an oral presentation and a written summary of project. (F,S)

480 & 481 Honors Courses. (3,3)

Juniors and seniors who qualify for Honors Courses are offered the opportunity to study with individual members of the faculty. This is specialized study apart from conventional classroom work. Application must be made and approved by a committee before the student can register for the honors course (page 28). (F,S)

490 & 491 Practicum I & II. (3,3)

Prerequisites: Math major with junior or senior standing and consent of instructor.

Field experience in data processing environments. Provides opportunity to relate principles to practical applications in the computer and/or computer information-processing fields. Student must submit a written report. (F,S)

Department of
Physical Sciences

Programs in chemistry, physics, geology and environmental science are designed to enable the student to understand the fundamental principles of these disciplines, to develop an attitude of scientific objectivity, and to acquire basic laboratory techniques and skills.

Students choosing a major in chemistry may pursue either (I) the Bachelor of Science degree with a chemistry (comprehensive) major, a program designed for the preparation of profes-

sional chemists, (II) the Bachelor of Science degree with a chemistry (pre-professional) major, a program designed for those who wish to pursue a health-related profession, or (III) the Bachelor of Science in Education degree.

The Department also offers an interdisciplinary studies program leading to the Interdisciplinary Bachelor of Science Degree in Environmental Geosciences.

In addition, the Bachelor of Science in Medical Technology degree (page 120) is administered by Faculty in the Department of Physical Sciences.

Minor programs are available in chemistry, geology and physics for students pursuing majors in other disciplines.

The student must earn a grade average of 2.00 (C) in all courses required for the major, minor, or any certification option, including all other courses taken in the Department.

Students considering a major or minor or teaching field in chemistry or a minor in physics should take the appropriate mathematics course in the first semester of the freshman year as indicated by the mathematics placement test.

Chemistry I and II, The Bachelor of Science

The degree of Bachelor of Science requires successful completion of 128 semester hours, including (1) the Program of General Studies which must include six hours of one foreign language, and (2) one of the two chemistry programs listed below.

CHEMISTRY (COMPREHENSIVE)

38 hours in chemistry—CHEM 101, 102, 103A, 210, 220, 331, 332, 351, 352, 401, 402, 413; six hours of 425A-F; 18-23 hours in mathematics—MATH 103*, 104*, 201, 250, 251, 252, and three hours from MATH 202, 320, 403; 10 hours in physics—PHYS 101, 102, and

319 or 320.

CHEMISTRY (PRE-PROFESSIONAL)

29 hours in chemistry—CHEM 101, 102, 103A, 210, 220, 331, 332, 351, 352, six hours of 425A-F; 7-12 hours in mathematics—MATH 103*, 104*, 201, 250; 10 hours in physics—PHYS 101, 102, and 319 or 320.

*These courses will be waived for those students establishing "equivalent proficiency" as determined by the Department of Mathematics.

Minor in Chemistry

24 hours in chemistry—CHEM 101, 102, 103A or 103B, 331, 351; ten hours of chemistry electives; 8 hours of physics—PHYS 101, 102

The Bachelor of Science in Education

The degree of Bachelor of Science in Education, with certification to teach chemistry, requires successful completion of 128 semester hours, including (1) the Program of General Studies, (2) the Professional Semester for the certificate chosen (pages 56), and (3) the requirements associated with the following certificate.

Certificate for Grades 9-12 (page 71). Students may complete a single field in Chemistry 9-12; however, it is highly recommended that this field be combined with another field such as General Science 5-12 (page 69-70).

Chemistry Courses (CHEM)

101 Introductory Chemistry I. (4)

Prerequisites: MATH 101 (or equivalent) and ENGL 101 previously or concurrently.

An introductory course designed to give a general knowledge of the principles of chemistry. Three hours lecture, two hours laboratory. (F)

102 Introductory Chemistry II. (3)

Prerequisite: CHEM 101.

A continuation of Chemistry 101. CHEM 103A or 103B should be taken concurrently.

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Three hours lecture. (S)

103A Qualitative Analysis. (1)

Prerequisite: CHEM 102 previously or concurrently.

A laboratory course dealing with semi-micro qualitative analysis of ions. Three hours laboratory. (S)

103B Biophysical Techniques. (1)

Prerequisite: CHEM 102 previously or concurrently.

A laboratory course which introduces basic chemical techniques used by the biologist and the medical technologist; not open to chemistry majors. Three hours laboratory. (S)

210 Chemical Laboratory Safety. (1)

Prerequisite: CHEM 102.

The basics of safety in the chemical laboratory are studied. One hour lecture. (S-2000, S-2003)

220 Literature Searching— Data Treatment. (1)

Prerequisite: CHEM 102.

Techniques of searching the chemical literature are studied; the use of statistics in chemistry is examined. Three hour lab. (S-2000, S-2002)

302 Molecular Biology. (3)

See BIOL 302. (S)

331 Organic Chemistry I. (4)

Prerequisite: CHEM 102.

Introduction to the chemistry of carbon compounds. Laboratory consists of fundamental techniques and preparations. Three hours lecture, three hours laboratory. (F)

332 Organic Chemistry II. (4)

Prerequisite: CHEM 331.

A continuation of CHEM 331. Three hours lecture, three hours laboratory. (S)

341 Biochemistry. (3)

Prerequisite: CHEM 331.

The structures and reactions of organic compounds existing in biological systems are examined. Three hours lecture.

351 Quantitative Analysis. (2)

Prerequisites: CHEM 102, MATH 103.

Gravimetric and volumetric techniques and problem solving are stressed. Two hours lecture. (F)

352 Instrumental Analysis. (3)

Prerequisites: CHEM 331, 351, PHYS 102.

Spectroscopic, chromatographic, and electro-metric methods of analysis are studied. Three hours lecture. (S)

401 Physical Chemistry I. (3)

Prerequisites: CHEM 351 previously or concurrently, CHEM 331, PHYS 102, MATH 251.

A study of thermodynamics, phase equilibria, and electrochemistry. Three hours lecture. (F-2000, F-2002)

402 Physical Chemistry II. (3)

Prerequisites: CHEM 401, MATH 252.

A study of chemical kinetics, quantum chemistry, and spectroscopy. Three hours lecture. (S-2001, S-2003)

408 Quantum Mechanics. (3)

Prerequisites: PHYS 102, MATH 252. See PHYS 408.

413 Inorganic Chemistry. (3)

Prerequisite: Permission of instructor.

Examination of the structure of atoms and the bonding in inorganic compounds, including coordination compounds. Three hours lecture. (F-1999, F-2001)

425A Gravimetric and Volumetric Analysis. (2)

Prerequisite: CHEM 351 previously or concurrently. Six hours laboratory. (F)

425B Spectroscopic Methods. (1)

Prerequisite: CHEM 352 previously or concurrently. Three hours laboratory. (S)

425C Chromatographic Methods. (1)

Prerequisite: CHEM 352 previously or concurrently. Three hours laboratory. (S-2001, S-2003)

425D Physical Properties. (1)

Prerequisite: CHEM 102. Three hours laboratory. (F)

425E Electroanalytical Methods. (1)

Prerequisite: CHEM 351. Three hours laboratory. (S)

425F Thermal Methods. (1)

Prerequisite: CHEM 351. Three hours laboratory. (S-2000, S-2002)

451-452 Independent Laboratory Research. (1-3,1-3)

Prerequisite: Permission of the instructor.

Introduction to chemical research through individual, supervised laboratory problems. May be repeated for up to six hours credit. (F,S)

480-481 Honors Courses. (3,3)

Juniors and seniors who qualify for Honors Courses are offered the opportunity to study with individual members of the faculty. This is specialized study apart from conventional classroom work. Interested students should contact the Department Chairperson for further information. (F,S)

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Physical Science

Interdisciplinary Bachelor of Science in Environmental Geosciences

The Interdisciplinary Bachelor of Science in Environmental Geosciences at Concord was founded to prepare students for professional careers or continued higher education in the many disciplines of Earth and Environmental Sciences.

Students interested in this program are advised to review page 33 of the *Catalog* and contact the Concord Department of Physical Sciences to arrange their program of study.

General Physical Science Courses (PHSC)

103 Introduction to Physical Science I. (4)
Prerequisites: MATH 101 (or equivalent) and ENGL 101 previously or concurrently.
 Development of conceptual models in astronomy and physics. For non-science majors. Three hours lecture, two hours laboratory. (F,S)

104 Introduction to Physical Science II. (4)
Prerequisites: MATH 101 (or equivalent)

and ENGL 101 previously or concurrently.
 Development of conceptual models in chemistry and geology. For non-science majors. Three hours lecture, two hours laboratory. (F,S)

Geology and Environmental Science Courses (GEOL)

101 Physical and Environmental Geology. (4)

Study of Earth processes and the geologic link between people and the physical environment. Emphasizes interactions among the lithosphere, biosphere, hydrosphere, and atmosphere. Topics include common minerals and rocks, plate tectonics, geologic hazards, water pollution, natural resources, and global environmental change. Three hours lecture, two hours laboratory or field. (F)

302 Historical Geology. (4)
Prerequisite: GEOL 101, or GEOG 100, or PHSC 104 recommended.

Study of changes in the Earth's crust, global climate, and life through 4.6 billion years of geological time. Topics include fossils, mass extinctions, and the geologic history of the Appalachian Mountains of West Virginia and Virginia. Three hours lecture, two hours laboratory or field. (S)

304 Field Geology. (6)
Prerequisites: 12 hours in geology including GEOL 302.

Techniques and the practice of geologic field mapping, including surficial, structural, stratigraphic, and bedrock analysis. Includes field studies of the geology of the central Appalachians and the Rocky Mountains or other locations. Additional fee for summer travel may be required.

341 Process Geomorphology. (4)
Prerequisite: GEOL 101 or GEOG 100; MATH 103 or equivalent proficiency recommended.

Study of processes operating on Earth's surface and the evolution and distribution of landforms. Three hours lecture, two hours laboratory. (S-2000, S-2002)

360 Advanced Environmental Geology. (4)
Prerequisites: GEOL 101 or 302, and MATH 104 or equivalent proficiency.

Application of geologic principles focusing on the interactions between people and the

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physical environment. Three hours lecture, two hours laboratory or field, and four full-day field exercises.

370 Mineralogy. (4)

Prerequisites: *MATH 103 and 104 or equivalent proficiency, GEOL 101, or CHEM 101.*

Study of crystallography, crystal chemistry, and physical mineralogy. Recognition, classification, and occurrence of minerals. Introduction to environmental issues related to minerals. Three hours lecture, two hours laboratory. (F-2000, F-2002)

371 Optical Mineralogy. (2)

Corequisite: *GEOL 370.*

Study of the optical properties of minerals using petrographic and metallurgical microscopes. Introduction to thin-section petrography. One hour lecture, two hours laboratory. (F-2000, F-2002)

375 Igneous, Metamorphic, and Sedimentary Petrology. (4)

Prerequisites: *GEOL 370 and 371.*

Petrogenesis and thin-section petrography of igneous, metamorphic, and sedimentary rocks. Study of igneous and metamorphic processes within various tectonic environments. Three hours lecture, two hours laboratory; one or two weekend field trips required. (S-2001, S-2003)

380 Sedimentary Geology. (4)

Prerequisites: *GEOL 101 previously or concurrently; GEOL 302 recommended but not required.*

Modern principles of stratigraphy and sedimentology. Origin, classification, correlation, and interpretation of sedimentary deposits and rocks. Study of sedimentary processes within various tectonic environments. Lab emphasizes field techniques, analysis, and interpretation. Three hours lecture, two hours laboratory or field. (F-1999, F-2001)

385 Structural Geology and Geophysics. (4)

Prerequisites: *MATH 103 and 104 or equivalent proficiency; GEOL 380.*

Study of mechanisms of rock deformation and the origin of geologic structures within the Earth's continental crust. Introduction to selected geophysical methods used in subsurface analysis. Lab emphasizes geometric problem solving and field studies. Three

hours lecture, two hours laboratory or field. (S-2000, S-2002)

420 Special Topics in Geology or Environmental Science:

• Hydrology. (3)

Prerequisites: *MATH 103 and 104 or equivalent proficiency.*

Earth's hydrologic cycle, the dynamics of surface and subsurface fluids, and aqueous geochemistry.

• Elementary Geophysics. (3)

Prerequisites: *MATH 103 and 104 or equivalent proficiency; GEOL 101.*

Techniques in subsurface analysis including seismic reflection and refraction, methods in potential fields, and the study of earthquakes.

450 Geology Research I. (3)

Prerequisites: *Junior or senior standing and consent of instructor.*

Independent research in geology. Projects will be developed and completed by the student under direction of a faculty advisor. (F, S)

451 Geology Research II. (3)

Prerequisite: *GEOL 450.*

Continuation of research begun in GEOL 450. (F, S)

452 Environmental Science Research I. (3)

Prerequisites: *Junior or senior standing and consent of instructor.*

Independent research in environmental science. Projects will be developed and completed by the student under direction of a faculty advisor. (F, S)

453 Environmental Science Research II. (3)

Prerequisite: *GEOL 452.*

Continuation of research begun in GEOL 452.

Geology Mini Course

1011 Introduction to Cave Geology. (1)

Study of the development of caves, the factors that influence cave diversity, and cave features. Safety in caving is stressed, and students will be required to obtain limited personal caving equipment. (F, S)

Physics

Minor in Physics—24 hours

PHYS 101, 102. Recommended: PHYS 313, 319, 320, 401, 403; three hours of physics electives.

Physics Courses (Phys)

101 Introductory Physics. (4)

Prerequisite: MATH 103 or equivalent proficiency.

An introduction to mechanics, wave motion, and thermodynamics. Three hours lecture, two hours laboratory. (F)

102 Intermediate Physics. (4)

Prerequisite: PHYS 101.

An introduction to electricity and magnetism, optics, and modern physics. Three hours lecture, two hours laboratory. (S)

105 Introductory Astronomy. (4)

Study of the solar system, stars, and stellar systems. Three hours lecture, two hours laboratory.

301 Optics and Wave Phenomena. (3)

Prerequisites: PHYS 102, MATH 252.

Geometrical and physical optics with emphasis on the latter. Two hours lecture, two hours laboratory.

313 Intermediate Modern Physics. (3)

Prerequisites: PHYS 102, MATH 252 previously or concurrently.

Atomic physics, special theory of relativity, nuclear physics, and elementary particles. Two hours lecture, two hours laboratory.

314 Modern Physics. (3)

Prerequisite: PHYS 313.

Introduction to quantum mechanics and special topics. Two hours lecture, two hours laboratory.

315 Thermodynamics and Statistical Mechanics. (4)

Prerequisites: PHYS 102, MATH 252.

Fundamental principles of thermodynamics, kinetic theory of gases, and classical and quantum statistical mechanics. Four hours lecture.

317 Mathematics for Physical Sciences I. (3)

Prerequisite: PHYS 102, MATH 252.

Mathematical techniques useful in the physical sciences, including infinite series, matrices, multiple integrals, vector analysis, Fourier series, calculus of variations, and special functions. Three hours lecture.

318 Mathematics for Physical Sciences II. (3)

Prerequisite: PHYS 317.

A continuation of PHYS 317, including a study of tensor analysis, Legendre polynomials, Bessel functions, functions of a complex variable, Laplace transforms, and partial differential equations. Three hours lecture.

319 Digital Electronics. (2)

Prerequisites: PHYS 102, MATH 103.

A laboratory oriented study of digital electronics with special emphasis on microprocessors. Four hours laboratory. (F)

320 Electronic Instrumentation. (2)

Prerequisite: PHYS 319.

A laboratory oriented study of analog and digital systems. Recommended for science and pre-medical students. Four hours laboratory. (S, on demand).

401 Intermediate Electricity and Magnetism. (3)

Prerequisites: PHYS 102, MATH 252.

Electrostatics, magnetostatic, network analysis, electrodynamics, and an introduction to Maxwell's equations. Two hours lecture, two hours laboratory.

402 Electricity and Magnetism. (3)

Prerequisite: PHYS 401.

Maxwell's equations, solutions of Laplace's equation, and special topics. Two hours lecture, two hours laboratory.

403 Intermediate Mechanics. (3)

Prerequisites: PHYS 102, MATH 252.

The basic principles of mechanics, including study of statics, kinematics and dynamics. Two hours lecture, two hours laboratory.

404 Theoretical Mechanics. (3)

Prerequisite: PHYS 403.

The study of angular momentum, rotational and orbital motion, and the Lagrange and Hamilton equations. Three hours lecture.

408 Quantum Mechanics. (3)

Prerequisites: PHYS 102, MATH 252.

Introduction to the principles of quantum mechanics. Also listed as CHEM 408. Three hours lecture.

451-452 Independent Research. (3,3)**Prerequisite: Consent of instructor.**

Introduction to physics research through individual supervised problems.

480-481 Honors Courses. (3,3)

Juniors and seniors who qualify for Honors Courses are offered the opportunity to study with individual members of the faculty. This is specialized study apart from conventional classroom work. Interested students should contact the Department Chairperson for further information.

Medical Technology

Concord College has an affiliation arrangement with Roanoke Memorial Hospitals, Roanoke, VA, by which Concord offers a Bachelor of Science in Medical Technology. The student interested in a career in medical technology will take three years of academic work at Concord and then apply for a twelve-month internship in residence (the fourth year) at a hospital-based School of Medical Technology. A student should complete 93 credit hours of college-level work before beginning the clinical year internship.

Registration for courses taken during the professional clinical year will occur at the hospital. Concord College does not charge tuition or fees during this clinical year; however, students usually pay a fee and/or tuition to the hospital for these hospital-based courses.

Applicants are selected by the hospital for admission to the professional curriculum based upon a student's academic record, an interview with the hospital personnel, and letters of reference. Keep in mind that acceptance into the professional clinical year is competitive, just as is acceptance into any school of a health-related profession.

Students may request permission to apply to other fully accredited hospital schools of medical technology. If permission is granted, and the student attends that hospital school, Concord College will accept that hospital's course credits.

The Medical Technology advisor at Concord will consult with medical technology majors concerning the process of application to the hospital professional curriculum and with regard to estimated student expenses which will be incurred during the clinical year.

Medical technology students should begin the sequence of courses in biology (BIOL 101) and chemistry (CHEM 101) their first semester in order to avoid later conflicts in scheduling and to be ready for their hospital training after three years of college.

The Bachelor of Science in Medical Technology

The degree of Bachelor of Science in Medical Technology requires successful completion of 128 semester hours, including (1) the Program of General Studies; (2) the medical technology program listed below; and (3) the fourth year internship.

Medical Technology Program

BIOL 101, 302, 330, and two of 202, 240, and 401; CHEM 101, 102, 103B, 331, 351, 352, 425A, 425B; PHYS 101, 102 ; MATH 103; PSY 101.

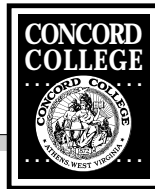
COURSE LISTINGS



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The Division of Social Sciences

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SOCCIAL SCIENCES DISCIPLINES are concerned with examining the development, the structure, the conditions, and the implications of human association. The skills and techniques necessary for this examination are developed within the context of the theoretical bases for the organization of such knowledge. From different perspectives of study, courses in the Division are designed to further the student's understanding of human society, to increase the student's ability to function effectively within that society, and to broaden the student's understanding of the means toward acquiring a meaningful, just, and well-ordered society.

Four degrees are available for students studying in the social sciences.

The student must earn a grade average of better than 2.00 in all courses taken for the major, minor, or any teaching option.

Bachelor of Arts

Majors within this degree may be established in geography, history, political science, psychology, and sociology; see descriptions beginning on the next page.

A minor but no major is available in philosophy; see page 130. An area of emphasis in philosophy with a major in history is available; see page 128.

Also the major and minor requirements are discussed with each discipline.

Bachelor of Science in Education

The degree of Bachelor of Science in Education, with certification to teach social studies, requires successful completion of 128 semester hours, including (1) the Program of General Studies (pages 21-24); (2) the Professional Semester for the certificate chosen (pages 56); and (3) the requirements associated with the following certificate.

Certificate for Grades 5-12 in Social Studies (page 72).

Bachelor of Social Work

See page 137 for details.

Bachelor of Science in Travel Industry Management

See page 141 for details.

Pre-Law

Law schools generally require an applicant to be the holder of a bachelor's degree. Concord College recommends that pre-law students follow the curriculum for the Bachelor of Arts degree. Most law schools require students to submit scores from the Law School Admission Test (LSAT). Detailed information about this test is available from the Director of Student Affairs.

Social Science Courses (SOSC)

2851 Introduction to Library Research. (1)

Designed to develop basic library skills. Special attention will be given to indexes, abstracting services, and search techniques with adaptations to the major fields of individual students. (F,S)

370 Minority and Gender Studies. (3) *Prerequisites: HIST 101, GEOG 201, PSY 101, SOC 101, POSC 104, and PHIL 101, 102, or by consent of instructor.*

An interdisciplinary course that examines, from a historical, geographical, sociological, political, and applied perspective, the societal and personal consequences that minority/gender status has upon people in society.

414 Special Methods in the Teaching of Social Studies. (3)

The study and evaluation of personal and professional qualities, skills, and instructional strategies and materials that result in good teaching. (F,S)

450 Interdisciplinary Seminar. (3) *Prerequisite: Consent of staff.*

The central theme of the problem being investigated will be analyzed through the "eyes" of the various disciplines; with staffing for the seminar coming from the various disciplines of the division. (F,S)

470-471 Independent Study. (3,3) *Prerequisites: Minimum of 15 hours of course work completed in the discipline and consent of instructor and division chairperson.*

Application must be made and approved by a committee before the student can register for the independent study (page 29). Applications may be picked up from the division chairperson.

472A-472B Public Service Internship. (9,6)

The internship is a semester long work-study program in a public service agency. The Public Service Internship Program is open to juniors and seniors and offered both semesters of the academic year. Students interested in applying for the program should contact the office of the Division of Social Sciences.

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Geography

The objective of the geography program is to provide an understanding of the interrelationships between people and their cultural and physical environments. Factual information is combined with geographic theories to identify and explain the complex natural and human patterns found on the Earth's surface. Attention is also given to the geographic tools and techniques used to analyze spatial patterns and processes. Presently included in this group are cartography, photography, field and library research, audio-visual media, quantitative methods, and GIS.

Students seeking the Bachelor of Arts degree may earn a major or a minor in geography as outlined below. Note required grade average on page 123.

The Bachelor of Arts

The degree of Bachelor of Arts, with a major in geography, requires successful completion of 128 semester hours, including (1) the Program of General Studies; (2) the geography program listed below; and (3) a program of electives or a minor as worked out with the student's advisor. Students are encouraged to enroll in foreign language courses. Junior/Senior students may also complete a 3-to-6-hour internship subject to the approval of the geography faculty.

Major in Geography—34 hours

GEOG 100, 201, 300, 311; twelve hours of systematic geography*, Independent Study, and/or Honors Courses; nine hours of regional studies courses; SOSC 2851.

*One of the following courses may be taken in lieu of a systematic geography course: APST 300; BIOL 220; ECON 201 or 202; MATH 105, 201; SOC 310, 399. Two of the following geology courses may be taken in lieu of the corresponding number of systematic geography courses: GEOL 101, 302, 341, 360.

Minor in Geography—15 hours

GEOG 100, 201, and nine hours of geography electives with consultation from student's advisor.

Major in Geography with an Area of Emphasis in Cartography and Geographic Information Systems—31 hours

GEOG 100, 311, 411, 460 (Advanced Cartography), 460 (Advanced Geographic Information Systems); MATH 103, 105, 201; GEOL 101; CIET 110 (offered at Bluefield State College). This concentration will prepare students for careers and graduate work in cartography and Geographic Information Systems. The concentration must be completed in conjunction with the major in Geography.

Area of Emphasis in Pre-Environmental Law—33 hours

POSC 103, 104, 225, 401; GEOG 100, 300, 320; BIOL 101, 102, 201. This area of emphasis will prepare students for graduate work in public policy, public affairs, or environmental law. It can be used to supplement any major.

Minor in Appalachian Studies—21 hours

APST 101; HIST 307; GEOG 250 (Geography of Appalachia); SOC 201; nine hours of Appalachian Studies. (Appalachian Biogeography may be substituted for any one of the above courses.)

Appalachian Studies at Concord College is an interdisciplinary program under the direction of the Geography staff. It is designed to provide students an understanding of the region.

Although the courses are offered primarily as a means by which students may enrich their educational experiences, students may also minor in Appalachian Studies.

The courses in the program will be supplemented by learning opportunities

outside the classroom, including lectures, exhibits, and field trips.

Introductory Geography Courses

Note: GEOG 100 and 201 are the prerequisites for all other courses in geography.

All Geography prerequisites may be waived with the consent of the geography faculty.

100 Principles of Physical Geography. (3)

An introductory course that studies the Earth as the environment of man. It emphasizes the physical pattern of climates, landforms, soils, vegetations, and natural resources. (F,S)

201 Principles of World Cultural Geography. (3)

A survey course covering the culture regions of the world. Emphasis is placed on the geographic themes of place, location, movement, regions, human/environment interaction and landscape. (F,S)

Regional Geography Courses**250 Regional Studies. (3)**

Regional studies focus on selected portions of the Earth's surface. They also focus on the interdependency of nations. Regional geography courses prepare students to be aware of and understand people culturally different from themselves. Courses include the following: Europe, North Africa and the Middle East, Southeast Asia, Latin America, and North America. Regional courses may be taken repeatedly for credit, so long as there is no duplication of the area studied. Region of study will be reported on the student's transcript. (F,S)

Systematic Geography Courses**300 Conservation: The Impact of Man on the Environment. (3)**

A study of the need for conservation, its practice and philosophy. Emphasis will be on the impact of man's activities on the environment.

301 Economic Geography. (3)

A study of the nature, distribution, and spatial dynamics of man's economic activities.