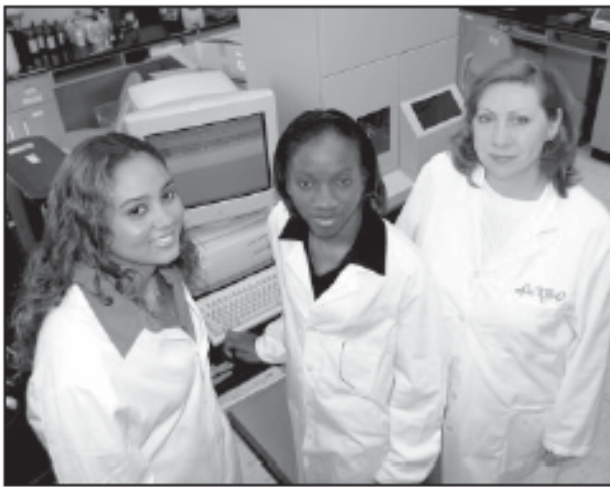


Division of Natural Sciences & Mathematics



DIVISION OF NATURAL SCIENCES AND MATHEMATICS

The Claflin Imperative: Preparing Students for Leadership and Service in a Multicultural, Global and Technological Society

□ **Department of Biology**

□ **Department of Chemistry**

□ **Department of Mathematics and Computer Science**

The Division endeavors to prepare students to meet the requirements for entry into medical, dental or other health professional schools and graduate school. The Division also offers programs of study for obtaining certification in the teaching of biology and mathematics and dual-degree programs in Engineering, Engineering Technology, Physical Therapy, Occupational Therapy, and Pre-Chiropractic Studies. The Division seeks to provide its graduates with knowledge and understanding that prepares them for leadership and service in a multicultural, global and technological society.

General Objectives of the Division

The Division of Natural Sciences and Mathematics strives to provide instruction and experiences that will produce students who:

1. can demonstrate a general knowledge and understanding of the spectrum of information in science, engineering, mathematics and related disciplines;
2. can display a knowledge and understanding of major issues and contemporary problems relating to a global and multicultural society in science, engineering, mathematics and related disciplines;
3. can speak and write coherently and think critically, logically and quantitatively;
4. can use technology and analytical skills to evaluate and interpret reports and design methodology for solving problems in science, engineering, mathematics and related disciplines;
5. are prepared for leadership and service and to pursue post baccalaureate studies in their respective disciplines; and
6. have gained an educational experience that includes a firm grounding in technology and also knowledge of scientific and aesthetic accomplishments of the forerunners of the college, state, nation and the world.

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Pre-Professional Requirements

Students who are planning to enter professional schools upon graduation should consult the pre-professional adviser and secure a statement of the requirements for admission. Most dental and medical schools require Bachelor of Science degrees for admission. However, a few professional schools admit students who have completed a minimum of 90 semester hours of college work of defined character. Every student majoring in the Division of Natural Sciences and Mathematics is required to complete the General Education courses, the General Education Exam, the Senior Exit Exam, the Student Portfolio and either a proposal or thesis prior to graduating from Claflin.

Minor

A minor requires at least 18 hours of Biology, Chemistry, Computer Science or Mathematics courses. These courses are in addition to

those required for general education.

Dual-Degree and Other Special Programs

Departments in the Division of Natural Sciences and Mathematics cooperate with other institutions of higher education to grant dualdegrees as follows:

Department of Biology / Department of Chemistry

Health Careers and Other Special Programs

The Departments of Biology and Chemistry work closely with the Health Careers Opportunity Program, the South Carolina Alliance for Minority Participation, the South Carolina Independent Colleges and Universities, the Savannah River Site, the USDA and Forest Service Field Station, the Experimental Programs to Stimulate Cooperative Research, the Honors College and the Center for Excellence in Science and Mathematics to make paid summer internships, academic year paid research assistantships, publication opportunities and other professional associations available to students. Special preparation for graduate and professional school admissions tests (e.g., GRE, DAT, MCAT, PCAT, etc.) is available. Paid laboratory assistantships are also available.

The Division of Natural Sciences and Mathematics has its own Pre-Health Professions Advisory Committee for students planning to enter the health professions. Any student preparing to be a physician, chiropractor, dentist, pharmacist, occupational therapist, physical therapist, or veterinarian will be advised by this committee during the application process. Specific programs have been implemented with

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the Medical University of South Carolina (MUSC), Sherman College of Straight Chiropractic and other prestigious institutions to grant early admissions, dual degrees (e.g., 3+3), etc., to students with good academic records.

Dual-Degrees

Students may receive dual degrees in the following areas from Claflin and from the College of Health Professions of the MUSC through Claflin's Department of Biology:

Occupational Therapy (3+3)

Physical Therapy (3+3)

Students may also receive a dual degree in the following area from Claflin and from the Sherman College of Straight Chiropractic through Claflin's Department of Biology:

Doctor of Chiropractic (3+3)

Dual Degree Programs: Bachelor of Science Degree with a Major in Biology from Claflin University and a Master of Science Degree from MUSC.

Specific Requirements

Students must meet the general departmental requirements. These curricula also specifically require students to complete, with a grade of "C" or above, the following number of semester hours as specified in their respective programs and to have a minimum 2.8 GPA in science/math courses.

A. Occupational Therapy

Semester Hours

Biology.....	30
Chemistry.....	15
Math/Physics.....	4
*General Education.....	51
Total	100

B. Physical Therapy

Semester Hours

Biology.....	35
Chemistry.....	16
Math/Physics.....	11
*General Education.....	45
Total	107

* This total includes ENGL 101-102, ASMB 10, 102, 201 and 202 and some specific prerequisites for admission to MUSC.

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Dual Degree Program: Bachelor of Science Degree with a Major in Biology from Claflin University and Doctor of Chiropractic from Sherman College of Straight Chiropractic.

Specific Requirements

Students must meet the general departmental requirements. These curricula also specifically require students to complete, with a grade of “C” or above, the following number of semester hours as specified in their respective programs and have a minimum 2.8 in Science/Math courses.

Doctor of Chiropractic

Semester Hours

Biology.....	23
Chemistry.....	12
Math/Physics.....	19
*General Education.....	48
Total	102

* This includes ENGL 101-102 AND ASMB 101, 102, 201 and 202.

Additional Requirements for Health Professions Dual Degrees

Students wishing to follow a Dual Degree Program in Health Professions must also do the following:

1. Qualify for a major in Biology.
2. Inform the Head of the Department of Biology during the first semester of matriculation (or as soon as their decision has been made) of their intent to opt for a special dual-degree program.
3. Earn a 2.5 cumulative GPA or higher by the end of the freshman year, and have a GPA of 2.8 or higher in science/math course. Apply to the Pre-Health Advisory Committee (PHAC) for admission into the selected program.
4. The PHAC will verify the students’ GPA and inform them in writing of their acceptance into the selected program.
5. Apply to specific post-baccalaureate institutions.

MUSC

To apply to MUSC’s College of Health Professions (admission is competitive and not guaranteed), the student must:

- a. obtain the written recommendation and written document

- tation (i.e., verification of a 2.8 GPA or higher in science/math courses and completion of required Claflin courses) from the PHAC;

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ence/math courses and completion of required Claflin courses) from the PHAC;

b. complete an application to MUSC's College of Health Professions for the program of interest.

SHERMAN COLLEGE OF STRAIGHT CHIROPRACTIC

Before applying to Sherman College of Straight Chiropractic, the student must:

a. obtain the written recommendation and written documentation (i.e., verification of a GPA of 2.5 or higher in science/math courses and completion of required Claflin courses) from the PHAC; and

b. fill out an application to Sherman College of Straight Chiropractic for the program.

6. Upon acceptance into MUSC's College of Health Professions or Sherman College of Straight Chiropractic, successfully complete the bachelor's degree requirements for the selected program.

7. Apply for Claflin University's B.S. degree in Biology (Candidates must complete the Claflin application for graduation form and must be approved by the faculty in the same manner as all other degree candidates.)

8. Have a letter and transcript sent notifying Claflin University's Department of Biology and the Office of Admissions and Records of the completion of the first year in the selected Health Professions Program. The Claflin Bachelor of Science degree will then be awarded.

Students who fail to complete the first year of the MUSC or Sherman College of Straight Chiropractic program and who return to Claflin must take the courses needed for the completion of the degree requirements for the B.S. degree in Biology, as indicated in the Claflin curriculum guide for the specific dual-degree program selected. Curriculum guides that allow for the timely completion of the prerequisites for admission to the specific Dual-Degree Programs are maintained in the Department of Biology.

Department of Biology

Department of Biology

The Department of Biology offers a 3+3 dual degree program with the Sherman College of Straight Chiropractic (SCSC) leading to the Bachelor of Science degree in Biology with a minor in Chemistry (from Claflin University) and the Doctor of Chiropractic degree (from
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SCSC). This program will consist of two stages: 1) three years of chiropractic studies (prerequisites) at Claflin University totaling 102 semester hours and 2) chiropractic studies at SCSC which will lend 35 semester hours of transfer credit toward the B.S. degree at Claflin.

A "C" grade or better is required in each prerequisite course. A minimum 2.5 grade point average is required. Students in the program will receive a Bachelor of Science degree from Claflin after successful completion of the first year (fall and spring) of studies at SCSC.

After successful completion of all requirements for graduation from SCSC, students will be granted the Doctor of

Chiropractic degree.

1. General Education Requirements. 48 hrs.
2. Major Courses in Biology 23 hrs.
BIOL 111-112, Freshman Seminar. 1
BIOL 211-212, Sophomore Seminar..... 1
BIOL 311-312, Junior Seminar. 1
BIOL 122, General Biology II. 4
BIOL 202, Botany 4
BIOL 210, Genetics..... 4
BIOL 302, Human Anatomy 4
BIOL 310, Molecular Biology 4
3. Core Courses in Chemistry, Mathematics, Statistics and
Physics. 31 hrs.
CHEM 122, General Chemistry II4
CHEM 231, Organic Chemistry I 4
CHEM 232, Organic Chemistry II.4
MATH 112, Pre-calculus.4
MATH 201, Calculus I4
STAT 311, Statistics.3
PHYS 201, General Physics I 4
PHYS 202, General Physics II.4

Department of Mathematics and Computer Science

The Department of Mathematics and Computer Science offers 3+2 dual-degree programs with Clemson University and South Carolina State University. Upon successful completion of these programs, students will receive a B.S. degree in Engineering from Clemson University or a B.S. degree in Engineering Technology from SCSU and a B.S. degree in Applied Mathematics from Claflin.

Dual-Degree Programs: Bachelor of Science Degree with a Major in Applied Mathematics from Claflin University and a Bachelor of Science Degree with a Major in Engineering from Clemson University.

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Specific Requirements

Students must meet the general departmental requirements. These curricula also specifically require students to complete with a grade of “C” or above the following number of semester hours as specified in their respective programs and have a minimum 2.8 GPA of 2.8 in science/math courses.

A five-year Dual-Degree Program between Claflin and Clemson University was established in the fall 1999-2000 academic year. Students enrolled at Claflin who are interested in this dual degree curriculum will complete a program of study that includes the general education courses required by Claflin and also the required pre-engineering courses for three years at Claflin. Upon completion of the B. S. degree in engineering at Clemson, dual-degree students will receive credit for one year of coursework transferred back to Claflin from Clemson and be awarded a bachelor’s degree in Applied Mathematics from Claflin. This dual-degree program is designed to offer Claflin students who are interested in engineering careers a broad choice of the various fields of engineering. The list of course requirements

that must be completed at Claflin before a transfer to Clemson University is shown below. While a student in the dualdegree program is still enrolled at Claflin, it may be advisable, depending on his/her interest, to enroll in some summer courses at Clemson University or any other institution with EAC/ABET accreditation in Engineering.

1. General Education Requirements	54 hrs.
2. Major Courses in Engineering	12 hrs.
ENGR 101, Engineering Graphics	3
ENGR 102, Intro. to Engineering	3
ENGR 215, Statics	3
ENGR 216, Dynamics	3
3. Core Courses in Mathematics, Physics and Computer Science	45 hrs.
CHEM 121, General Chemistry I	4
CHEM 122, General Chemistry II	4
CSCI 224, Digital Logic	3
CSCI 226/240, C/C++ Program	3
MATH 201, Calculus I	4
MATH 202, Calculus II	4
MATH 212, Linear Algebra	3
MATH 301, Calculus III	3
MATH 302, Differential Equations	3
MATH 306, Vector Analysis.....	3
PHYS 203, Principles of Physics I	4
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PHYS 204, Principles of Physics II	4
STAT 341, Intro. to Prob. and Statistics I ...	3

Dual-degree candidates at Claflin are eligible to seek B. S. degrees in the following majors at Clemson University:

- a. Biosystems Engineering
- b. Chemical Engineering
- c. Ceramic Engineering
- d. Civil Engineering
- e. Computer Engineering
- f. Electrical Engineering
- g. Industrial Engineering
- h. Mechanical Engineering

Dual-Degree Programs: Bachelor of Science Degree with a Major in Applied Mathematics from Claflin University and a Bachelor of Science Degree with a Major in Engineering Technology from South Carolina State University.

Specific Requirements

Students must meet the general departmental requirements. These curricula also specifically require students to complete with a grade of “C” or above the semester hours specified in their respective programs and to have a minimum GPA of 2.8 in science/math courses.

A. General Objectives

The five-year Dual-Degree Program was established jointly by Claflin and South Carolina State University. Upon completion of this fiveyear program, the student will earn a Bachelor of Science degree in

Applied Mathematics from Claflin and a Bachelor of Science degree in Engineering Technology from South Carolina State University.

The program is designed to meet the following objectives:

1. The student will be able to recognize the application of mathematics to physics and engineering.
2. The student will have analytical reasoning and communication skills sufficient to solve and report solutions to engineering problems.
3. The student will be able to enter graduate programs in diverse areas of engineering and applied mathematics.
4. The student will function effectively in industries which demand a strong knowledge of mathematics and various aspects of engineering.

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B. Objectives Especially Related to Applied Mathematics

Students should be able to do the following:

1. Enter graduate programs in applied mathematics, numerical computations, operations research, applied statistics or actuarial science.
2. Demonstrate knowledge and understanding of mathematics which can be applied in solving problems in industry, business or government service. Students in this dual-degree program will spend their first three years at Claflin and then enter a twoyear Engineering Technology program at South Carolina State University to specialize in any of the following.

- Civil Engineering Technology
- Electrical Engineering Technology
- Industrial Engineering Technology
- Mechanical Engineering Technology

The following requirements are to be completed at Claflin before a transfer to South Carolina State University.

1. General Education Requirements 54 hrs.
2. Major Courses in Engineering Technology 18 hrs.
 - ENGT 150, Engineering Graphics 3
 - ENGT 170, Intro. to Engineering Tech. 3
 - ENGT 212, Statics 3
 - ENGT 213, Strength of Materials 3
 - ENGT 230, Circuit Analysis 3
 - ENGT 310/CSCI 226, 240, Engineer. Comp. ... 3
3. Core Courses in Mathematics, Physics and Computer Science 39 hrs.
 - CHEM 121, General Chemistry I 4
 - CSCI 224, Digital Logic 3
 - MATH 112, Precalculus 4
 - MATH 201, Calculus I 4
 - MATH 202, Calculus II 4
 - MATH 212, Linear Algebra 3
 - MATH 301, Calculus III 3
 - MATH 302, Differential Equations 3
 - PHYS 203, Principles of Physics I 4
 - PHYS 204, Principles of Physics II 4
 - STAT 341, Intro. to Prob. and Statistics I. 3

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DEPARTMENT OF BIOLOGY

The Claflin Imperative: Preparing Students for Leadership and Service in a Multicultural, Global and Technological Society

The Department of Biology endeavors to offer a curriculum that provides Claflin students with knowledge and understanding of and appreciation for the intricacies of living organisms and their interactions with the environment. Instruction and experiences are designed to prepare students to become informed and productive citizens ready for leadership and service in our multicultural, global and technological society. Relevant contemporary issues are incorporated into a program designed to prepare its majors for careers in the biological, biotechnical or bioinformatical sciences and related areas, including entry into graduate and professional schools (medicine, dentistry, allied health, etc.) or the teaching of biology in secondary schools.

The Bachelor of Science degree with a major in Biology and a Minor in Chemistry is designed to prepare students to enter health care fields and/or to earn a Ph.D., M.D., Pharm.D., DMD, DVM, ID, PT, OT, DO, etc.

The Bachelor of Science degree with a major in Bioinformatics is designed to prepare students for careers in this newly developing field that applies computer science and statistical methodologies to the biology subfields of genomics and proteomics. Students completing the major would be eligible for jobs in a wide range of disciplines or ready for graduate degree programs in the field.

The Bachelor of Science degree with a major in Biotechnology is designed to prepare world-class scientists to participate in the shaping of our future. These students will be leaders in the biotechnology industry, in academia and in government. Students will learn about topics ranging from the latest developments in recombinant DNA technology to non-technical issues that students must understand to bring biotechnology products to market, such as bioethics, government regulatory policies, drug-approval policies and patent law.

The Bachelor of Science degree with a major in Biology Education is designed for students who plan to be certified to teach biology at the secondary level (grades 9-12).

The Bachelor of Science degree with a major in Environmental Science is designed for students who desire to enter graduate school or professions as an environmental specialist with government, academia, industry, etc.

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General Objectives

The Department of Biology provides instruction and experiences that will produce students who:

1. can demonstrate a general knowledge and understanding of the spectrum of information in the biological sciences and related disciplines, including both historical roots of the various biological disciplines and modern theories and technologies;
2. can speak and write coherently and think critically and logically, using higher-level thinking skills to analyze data, design

experimental methodologies and solve problems in all areas of life;

3. display a knowledge and understanding of major issues and contemporary problems related to our biosphere and the life it supports;
4. apply the principles and techniques inherent in the various biological disciplines to the problems of contemporary multicultural society in an effort to improve the quality of their lives and the lives of those in their local and global communities; and
5. are prepared for leadership and service and to pursue study in biology or related areas at the graduate or professional level and/or seek gainful employment in academia, industry, private agencies or governmental agencies.

Requirements for Majors

Students majoring in Biology, Bioinformatics, Biotechnology, Biology Education or Environmental Science must complete all General Education requirements and also satisfy the requirements of the major program in which they are enrolled. In addition, each student must:

1. fill out (at the end of the year wherein BIOL 121, BIOL 122, CHEM 121 and CHEM 122 — CHEM 111 and 112 for Bioinformatics majors — have been completed with a grade of “C” or better) a Departmental Application for Major form and submit this form for approval and acceptance by the Biology Department and the Division of Natural Sciences and Mathematics;
2. have a GPA of 2.5 or better to be accepted into any of the major programs offered by the Department of Biology (Note: Acceptance into a major or minor program is prerequisite to enrollment in courses above BIOL 200);

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3. complete with a grade of “C” or better all Biology, Chemistry, Mathematics, Physics, Computer Science and English courses required for their degree;
4. successfully complete the General Education Exit Exam, which is to be taken at the end of the sophomore year (minimum of 45 semester hours completed);
5. achieve a passing score on the Departmental Senior Exit Examination;
6. write and present to the Division of Natural Sciences and Mathematics a senior research proposal (any student may opt to substitute a senior thesis for the proposal requirement); and
7. have a 2.0 overall GPA before applying for graduation, at which time he/she should consult with his/her academic adviser and complete an Application for Graduation form by the deadline as indicated in the current academic calendar.

Additional Requirements for Biology Education Majors

In addition to meeting the above requirements, students majoring in Biology Education must:

1. apply for separate admission to the Teacher Education Program;
2. take and pass the Praxis I and Praxis II and have the scores

reported to Claflin University;

3. complete with a grade of “C” or better the required Education courses; and

4. complete all requirements of the Teacher Education Program.

Specific Objectives for the Major in Biology

Upon completion of this program, students are expected:

1. to be able to discuss the organization of life on earth, beginning at the subatomic level and progressing through to the biosphere;

2. to have developed skills of accuracy and precision in thinking, communication and experimental manipulation and observation;

3. to be able to employ the scientific method to analyze chemical and biological problems rationally and quantitatively;

4. to understand the intersection of principles of physics, chemistry and biology in life processes; and

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5. to reconcile scientific information with moral doctrines.

Curriculum Summary

Major in Biology

General Education 57

Note: The following courses substitute for requirements in the General Education Program:

1. MATH 112, Pre-calculus (4 hrs.), replaces MATH 111, College Algebra (3 hrs.).

2. BIOL 121, General Biology I (4 hrs.), replaces BIOL 102, Biology, Health and Environment (3 hrs.), and BIOL 102Lab (1 hr.).

3. CHEM 121, General Chemistry I (4 hrs.), replaces CHEM101, Physical Science (3 hrs.), and CHEM 101 Lab (1 hr.).

Major Courses

BIOL 111-412, Biology Seminars.4

BIOL 122, General Biology II4

BIOL 202, Botany4

BIOL 210, Genetics4

BIOL 302, Human Anatomy4

BIOL 309, Cell Biology4

BIOL 310, Molecular Biology4

BIOL 342, Microbiology4

BIOL 404, Human Physiology4

BIOL 405, Ecology.4

BIOL 450, Bio-technical Methods.4

Total 44

Support Courses

CHEM 122, General Chemistry II4

CHEM 231, Organic Chemistry I4

CHEM 232, Organic Chemistry II4

CHEM 401, Biochemistry I.4

Restricted CHEM elective 2 to 4

MATH 201, Calculus I.4

PHYS 201, Physics I.4

PHYS 202, Physics II4

STAT 311, Elements of Statistical Methods.3

Total 35

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Major in Bioinformatics

Specific Objectives for the Major in Bioinformatics

Upon completion of this program, students are expected:

1. to understand the ways that computer algorithms can be used to analyze genomics and proteomics databases to push forward our understanding of the biology of species;
2. to be able to employ the scientific method to analyze chemical and biological problems rationally and quantitatively;
3. to have developed skills of accuracy and precision in thinking, communication and experimental manipulation and observation;
4. to reconcile scientific information with moral doctrines.

Curriculum Summary

General Education 56

Note: The following courses substitute for requirements in the General Education Program:

1. MATH 205, Discrete MATH (3 hrs.), replaces MATH 111, College Algebra (3 hrs.).
2. BIOL 121, General Biology I (4 hrs.), replaces BIOL 102, Biology, Health and Environment (3 hrs.), and BIOL 102Lab (1 hr.).
3. CHEM 111, Principle of Chemistry I (4 hrs.), replaces CHEM101, Physical Science (3 hrs.), and CHEM 101 Lab (1 hr.).
4. CSCI, Intro to Computer Programming (3 hrs.), replaces CSCI 200, Computer Concepts (3 hrs.).

Major Courses

BIOL 111-412, Biology Seminars. 4
BIOL 122, General Biology II 4
BIOL 210, Genetics. 4
BIOL 310, Molecular Biology 4
BIOL 341, Applied Bioinformatics I4
BIOL 350, Computational Molecular Biology3
BIOL 441, Applied Bioinformatics II 4_

Total 27

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Support Courses

CHEM 112, Principles of Chemistry II 4
MATH 201, Calculus I 4
MATH 202, Calculus II 4
MATH 212, Linear Algebra 3
STAT 341, Introduction to Probability and Statistics I 3
STAT 341, Introduction to Probability and Statistics II 3
STAT 421, Applied Statistics/ Experimental Design 3
STAT 423, Applied Regression/ANOVA 3
CSCI 240, Introduction to Object Oriented
Programming, C++ 3
CSCI 335, Numerical Methods 3
CSCI 415, File Processing/ Databases 3

CSCI 400, Senior Design Project	3
CSCI 455, Special Topics in Computer Science	3
CSCI 436, Computer Networks	3
Total 45	

Major in Biotechnology

Specific Objectives for the Major in Biotechnology

Upon completion of this program, students are expected:

1. be able to articulate the ways in which biotechnology can positively impact the quality of life for humans and other species;
2. to have developed skills of accuracy and precision in thinking, communication and experimental manipulation and observation;
3. to be able to employ the scientific method to analyze chemical and biological problems rationally and quantitatively;
4. to understand the intersection of principles of physics, chemistry and biology in life processes; and
5. to reconcile scientific information with moral doctrines. to understand the ethical implications of biotechnology and its potential for contribution to society as well as its potential for misuse.

Curriculum Summary

General Education 57

Note: The following courses substitute for requirements in the General Education Program:

1. MATH 201, Calculus I (4 hrs.), replaces MATH 111, College Algebra (3 hrs.).

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2. BIOL 121, General Biology I (4 hrs.), replaces BIOL 102, Biology, Health and Environment (3 hrs.), and BIOL 102Lab (1 hr.).
3. CHEM 121, General Chemistry I (4 hrs.), replaces CHEM101, Physical Science (3 hrs.), and CHEM 101 Lab (1 hr.).
4. CSCI, Intro to Computer Programming (3 hrs.), replaces CSCI 200, Computer Concepts (3 hrs.).

Major Courses

BIOL 111-412, Biology Seminars.	4
BIOL 122, General Biology II	4
BIOL 202, Botany.	4
BIOL 210, Genetics.	4
BIOL 309, Cell Biology	4
BIOL 321 Introduction to Immunology	4
BIOL 310, Molecular Biology	4
BIOL 342, Microbiology	4
BIOL 350, Computational Molecular Biology	3
BIOL 341, Bioinformatics I.	4
BIOL 442, Advanced Microbiology	4
BIOL 451, Instrumental Methods in Biology.	4
Total 47	

Support Courses

CHEM 122, General Chemistry II	4
CHEM 231, Organic Chemistry I	4
CHEM 232, Organic Chemistry II.	4
CHEM 401, Biochemistry I	4

CHEM 402, Biochemistry II	4
PHYS 201, Physics I.	4
PHYS 202, Physics II	4
STAT 311, Elements of Statistical Methods.	3
Total	31

Specific Objectives for the Major in Biology Education

In addition to meeting the general departmental objectives and the specific objectives for students majoring in Biology, Biology Education Majors are expected:

1. to qualify for the South Carolina teaching certificate in biology;
2. to exhibit the ability to manage a classroom, to assess effectively student performance, and to plan, organize and effectively use a variety of materials necessary to relate biological principles to secondary students with varied abilities and learning styles; and

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3. to express a willingness to continue to develop professionally in order to keep pace with new developments in the biological sciences through professional development activities.

Curriculum Summary

Major in Biology Education

General Education 50

Note: The following modifications to the General Education Program apply to the Major in Biology Education:

1. MATH 112, Pre-calculus (4 hrs.), replaces MATH 111, College Algebra (3 hrs.).
2. BIOL121, General Biology I (4 hrs.), replaces BIOL 102,Biology, Health and the Environment (3 hrs.), and BIOL102 Lab (1 hr.).
3. CHEM 121, General Chemistry I (4 hrs.), replaces CHEM101, Physical Science (3 hrs.), and CHEM 101 Lab (1 hr.).
4. EDUC 401, Technology for Teachers (2 hrs.), replaces CSCI 200, Computer Concepts (3 hrs.).
5. EDUC 204, History, Principles and Philosophy of Education (3 hrs.) replaces PHIL 201, Ethics (3 hrs.).
6. PSYC 201, Introduction to Psychology (3 hrs.) replaces SOCI 201, Introduction to Society (3 hrs.); there is no option for ECON 200.

Biology Courses

BIOL 111-212, Biology Seminars.	2
BIOL 122, General Biology II	4
BIOL 202, Botany	4
BIOL 210, Genetics.	4
BIOL 302, Human Anatomy	4
BIOL 309, Cell Biology	4
BIOL 342, Microbiology	4
BIOL 404, Human Physiology	4
BIOL 405, Ecology	4
BIOL 450, Bio-technical Methods	4
Total	38

Education Courses

EDUC 104, Introduction to Education.	3
EDUC 317, Introduction to Exceptional Students	3
EDUC 326, Human Growth and Development.	3

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EDUC 328, Methods and Materials of Teaching Biology in Sec Schools.	3
EDUC 338, Diagnostic-Prescriptive Teaching.	2
EDUC 327, Classroom Management	2
EDUC 405, Educational Psychology.	3
EDUC 409, Reading in the Content Area	3
EDUC 450S, Student Teaching.	12

Total 34

Support Courses

CHEM 103, Earth Science	3
CHEM 122, General Chemistry II	4
PHYS 201, Physics I	4
PHYS 202, Physics II	4
STAT 311, Elements of Statistical Methods.	3

Total 18

Specific Objectives for the Major in Environmental Science

In addition to meeting the general departmental objectives and the specific objectives for students majoring in Biology, Environmental Science Majors advised in the Department of Biology are expected:

1. to have acquired the basic knowledge and skills essential to an understanding of biology, chemistry and the environment;
2. to have developed the ability to interpret the properties and reactions of chemicals at molecular levels and the interaction of these chemicals with the environment;
3. to be able to employ scientific methods to analyze chemical and environmental problems rationally and quantitatively; and
4. to have developed an understanding of the impact of chemistry and biology in meeting mankind's needs and of protecting the environment now and in the future.

Curriculum Summary

Major in Environmental Science

General Education 57

Note: The following courses substitute for requirements in the General Education Program:

1. MATH 112, Pre-calculus (4 hrs.), replaces MATH 111, College Algebra (3 hrs.).
2. BIOL 121, General Biology I (4 hrs.), replaces BIOL102, Biology, Health & Environment (3 hrs.), and BIOL102 Lab (1 hr.).

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3. CHEM 121, General Chemistry I (4 hrs.), replaces CHEM 101, Physical Science (3 hrs.), and CHEM 101Lab (1 hr.).

Major Courses

ESCI 221, Principles of Environmental Science.	4
ESCI 222, Environmental Policies and Regulations. ..	3
ESCI 321, Technology and Environmental Interaction.	4
ESCI 322, Environmental Management.	4

ESCI 422, Environmental Toxicology and Health.	4
BIOL 111-412, Biology Seminars.	4
BIOL 122, General Biology II	4
BIOL 309, Cell Biology	4
BIOL 342, Microbiology	4
BIOL 405, Ecology	4
CHEM 122, General Chemistry II	4
CHEM 201, Analytical Chemistry	4
CHEM 231, Organic Chemistry I	4
CHEM 232, Organic Chemistry II	4
CHEM 305, Physical Chemistry I.	4
CHEM 404, Instrumental Chemistry	4

Total 63

Support Courses

MATH 201, Calculus I.	4
PHYS 201, Physics I.....	4
PHYS 202, Physics II	4
STAT 311, Elements of Statistical Methods.	3
Elective	3

Total 18

Minor in Biology

For a minor in Biology, the student must take 18 hours of Biology beyond BIOL 121.

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Curriculum Leading to the Bachelor of Science Degree with a Major in Biology and a Minor in Chemistry -- 136 Semester Hours.

FRESHMAN YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

EDUC 101, Orientation I.....	1	EDUC 102, Orientation II.....	1
BIOL 121, General Biology I	4	BIOL 122, General Biology II.....	4
CHEM 121, General Chemistry I.	4	CHEM 122, General Chem. II.....	4
MATH 112, Pre-Calculus.....	4	MATH 201, Calculus I.....	4
ENGL 101, Composition.....	3	ENGL 102, Composition.....	3
BIOL 111, Freshman Seminar I....	0.5	BIOL 112, Freshman Seminar II.	0.5
ASMB 101, Assembly.....	0.5	ASMB 102, Assembly.....	0.5

17 17

SOPHOMORE YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

BIOL 202, Botany.....	4	BIOL 210, Genetics.....	4
CHEM 231, Organic Chemistry I.	4	CHEM 232, Organic Chem. II.....	4
PHYS 201, College Physics I.....	4	PHYS, College Physics II.....	4
ENGL 201, Intro. to Literature.....	3	CSCI 200, Computer Concepts....	3
PHED 101-107, Phys. Ed.....	1	PHED 101-107, Phys. Ed.....	1
BIOL 211, Sophomore Seminar I.	0.5	BIOL 212, Sophomore Sem. II....	0.5
ASMB 201, Assembly.....	0.5	ASMB 202, Assembly.....	0.5

17 17

JUNIOR YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

BIOL 309, Cell Biology.....	4	BIOL 310, Molecular Biology.....	4
BIOL 302, Human Anatomy.....	4	BIOL 342, Microbiology.....	4
CHEM 401, Biochemistry I.....	4	ENGL 202, Public Speaking.....	3
FREN/SPAN 203.....	3	FREN/SPAN 204.....	3
BIOL 311, Junior Seminar I.....	0.5	HIST 101, Afr. Am. Heritage.....	3
*HNTH 391, Honors Thesis I.....	1	BIOL 312, Junior Seminar II.....	0.5
15.5/16 *HNTH 392, Honors Thesis II.....	1		

17.5/18
SENIOR YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

BIOL 405, Ecology.....	4	BIOL 404, Human Physiology.....	4
BIOL 450, Biotech Methods.....	4	PHIL 201, Ethics.....	3
CHEM Elective.....	2 to 4	SOCI 201 or ECON 200.....	3
STAT 311, Elmts. of Stats.....	3	RLGN 201, Biblical Literature.....	3
HIST 301, Surv. of World Hist....	3	ARTS 201, Art Appreciation	
BIOL 411, Senior Seminar I.....	0.5 or		
18.5/19 MUSC 203, Music Appreciation.....	3		
BIOL 412, Senior Seminar II.....	0.5		
*HNTH 491, Honors Thesis III..	2		

16.5/18
*This course is required for Honors students.

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Curriculum Leading to the Bachelor of Science Degree with a Major in Bioinformatics-131 Semester Hours.

FRESHMAN YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

EDUC 101, Orientation I.....	1	EDUC 102, Orientation II.....	1
ENGL 101, English Comp. I.....	3	ENGL 101, English Comp. II.....	3
BIOL 121 General Biology I.....	4	BIOL 122 General Biology II.....	4
CHEM 111, Princ. of Chem. I... ..	4	CHEM 112, Princ. of Chem. II.	4
MATH 205 Discrete Mathematics	3	CSCI 226, Intro to Programming.	3
BIOL 111, Freshman Seminar I....	0.5	BIOL 112, Freshman Seminar II.	0.5
ASMB 101, Assembly.....	0.5	ASMB 102, Assembly.....	0.5

16 16
SOPHOMORE YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

ENGL 201, Literature.....	3	ENGL 202, Public Speaking.....	3
BIOL 210, Genetics.....	4	PHIL 201, Ethics.....	3
HIST 101, Af. Am. Heritage.....	3	BIOL 310, Molecular Biology.....	4
MATH 201, Calculus I.....	4	CSCI 227, Introduction to C++... ..	3
PHED 101-107, Phys. Ed.....	1	MATH 202, Calculus II.....	4
BIOL 211, Sophomore Seminar I.	0.5	BIOL 212, Soph. Seminar II.....	0.5
ASMB 201, Assembly.....	0.5	ASMB 202, Assembly.....	0.5

16 18
JUNIOR YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

BIOL 341, App. Bioinfo. I.....	4	RLGN 201, Biblical Literature.....	3
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MATH 212, Linear Algebra.....3 SOCI 201/ECON 200.....3
 BIOL 350, Comp. Molec. Bio.....3 CSCI 335, Numerical Methods... ..3
 PHED 101-107, Phy. Education... ..1 STAT 342, Intro Prob. & Stat II3
 STAT 341 Intro Prob. & Stat I... ..3 FREN/SPAN 204, Foreign Lang.3
 FREN/SPAN 203, Foreign Lang.3 BIOL 312, Junior Seminar II..... ..0.5
 BIOL 311, Junior Seminar I..... ..0.5 *HNTH 392, Honors Thesis II.... ..1
 *HNTH 391, Jr. Hons. Sem. I..... ..1 16.5/17
 17.5/18

SENIOR YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

ART 201/MUSC 203.....3 HIST 301, Surv. of World Hist.3
 CSCI 415, Database Design & Anal.3 STAT 423, Ap. Reg. & ANOVA3
 CSCI 400, Senior Design Project.. 3 BIOL 441, Ap. Bioinfo. II..... ..4
 CSCI 455 Special Topics3 Elective.....3
 STAT 421, Ap. Stat. & Exp. Des.3 CSCI 436, Computer networks... ..3
 BIOL 411, Senior Seminar I.....0.5 BIOL 412, Senior Seminar II..... ..0.5
 15.5/15 *HNTH 491, Sr. Honors Thesis.. ..2
 16.5/18

*This course is required for Honors students.

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**Curriculum Leading to a Bachelor of Science Degree with a Major in Biotechnology
 --137 Semester Hours.**

FRESHMAN YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

EDUC 101, Orientation I.....1 EDUC 102, Orientation II.....1
 BIOL 121, General Biology I4 BIOL 122, General Biology II.....4
 CHEM 121, Gen. Chemistry I.....4 CHEM 122, Gen. Chemistry II... ..4
 MATH 201, Calculus I.....4 STAT 311, Elmrs. of Stat.3
 ENGL 101, Composition I.....3 ENGL 102, Composition II.....3
 BIOL 111, Freshman Seminar I.... ..0.5 BIOL 112, Freshman Seminar II.0.5
 ASMB 101, Assembly.....0.5 ASMB 102, Assembly.....0.5
 17 16

SOPHOMORE YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

BIOL 202, Botany.....4 BIOL 210, Genetics.....4
 CHEM 231, Organic Chemistry I.4 CHEM 232, Organic Chem. II... ..4
 PHYS 201, College Physics I.....4 PHYS, College Physics II.....4
 ENGL 201, Intro. to Literature.....3 CSCI 227, Introd to Prog.3
 PHED 101-107, Phys. Ed.....1 PHED 101-107, Phys. Ed.....1
 BIOL 211, Soph. Seminar I.....0.5 BIOL 212, Soph. Seminar II..... ..0.5
 ASMB 201, Assembly.....0.5 ASMB 202, Assembly.....0.5
 17 17

JUNIOR YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

BIOL 309, Cell Biology.....4 BIOL 310, Molecular Biology.... ..4
 BIOL 321, Intro to Immunology... ..4 BIOL 342, Microbiology.....4
 CHEM 401, Biochemistry I.....4 ENGL 202, Public Speaking.....3

FREN/SPAN 203.....3 FREN/SPAN 204.....3
 BIOL 311, Junior Seminar I.....0.5 CHEM 401, Biochemistry II.....4
 *HNTH 391, Jr Honors Thesis I... ..1 BIOL 312, Junior Seminar II.....0.5
 15.5/16 *HNTH 392, Jr Honors Thesis II1
 18.5/19

SENIOR YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

BIOL 350, Comp. Molec. Biol.3 BIOL 443, Adv. Microbiology... ..4
 BIOL 451, Instr. Meth. in Biores.4 PHIL 201, Ethics.....3
 BIOL 341, Bioinformatics I.....4 SOCI 201 or ECON 200.....3
 HIST 101, Afri. Amer. Heritage.... ..3 RLGN 201, Biblical Literature.... ..3
 HIST 301, Surv. of World His.3 ARTS 201, Art Appreciation
 BIOL 411, Senior Seminar I.....0.5 or
 17.5/17 MUSC 203, Music Appreciation.3
 BIOL 412, Senior Seminar II.....0.5
 *HNTH 491, Honors Thesis III... ..2
 16.5/18

*This course is required for Honors students.

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Curriculum Leadubg to the Bachelor of Science Degree with a Major in Biology Education (Grades 9-12) - 139 Semester Hours.

FRESHMAN YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

EDUC 101, Orientation I.....1 EDUC 102, Orientation II.....1
 BIOL 121, General Biology I4 BIOL 122, General Biology II.....4
 CHEM 121, Gen. Chemistry I.....4 CHEM 122, Gen. Chemistry II.. ..4
 MATH 112, Pre-Calculus.....4 CHEM 101, Earth Science.....3
 ENGL 101, Composition I.....3 ENGL 102, Composition II.....3
 PHED 101-107, Phys. Ed.....1 ARTS 201, Art Appreciation
 BIOL 111, Freshman Seminar I.....0.5 or
 ASMB 101, Assembly.....0.5 MUSC 203, Music Appreciation.....3
 18 BIOL 112, Freshman Seminar II.. ..0.5
 ASMB 102, Assembly.....0.5
 19

SOPHOMORE YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

BIOL 202, Botany.....4 BIOL 210, Genetics.....4
 EDUC 104, Intro. to Education.... ..3 EDUC 204, Hist. Prin./ Phil. of Ed.3
 PHYS 201, College Physics I.....4 EDUC 401, Tech. for Teachers... ..2
 ENGL 201, Intro. to Literature.... ..3 PHYS, College Physics II.....4
 PSYC 201, Intro. to Psychology... ..3 PHED 101-107, Phys. Ed.....1
 BIOL 211, Soph. Seminar I.....0.5 HIST 101, Af. Amer. Heritage.. ..3
 ASMB 201, Assembly.....0.5 BIOL 212, Soph. Seminar II.....0.5
 18 ASMB 202, Assembly.....0.5
 18

JUNIOR YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

BIOL 309, Cell Biology.....	4	BIOL 404, Physiology.....	4
BIOL 302, Human Anatomy.....	4	BIOL 342, Microbiology.....	4
BIOL 405, Ecology.....	4	ENGL 202, Public Speaking.....	3
EDUC 326, Human Growth.....	3	EDUC 328, Meth. & Mat. of Teach.	3
RLGN 201, Biblical Lit.....	3	EDUC 338, Diag.-Presc. Teach.	3
*HNTH 391, Honors Thesis I.....	1	EDUC 327, Classroom Mgmt....	2
18/19 *HNTH 392, Honors Thesis II....	1		

19/20

SENIOR YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

BIOL 450, Biotech. Methods.....	4	EDUC 450S, Student Teach.....	12
EDUC 409, Teach. Read. Cont. Area.	3		
EDUC 317, Intro Except. Stud.....	3		
EDUC 405, Educat. Psych.....	3		
STAT 311, Elements of Statistics.	3		
HIST 302, Surv. of World Hist.....	3		
BIOL 411, Senior Seminar III.....	0.5		

19/20

*This course is required for Honors students.

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Curriculum Leading to the Bachelor of Science Degree with a Major in Environmental Science - 138 Semester Hours.

FRESHMAN YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

EDUC 101, Orientation I.....	1	EDUC 102, Orientation II.....	1
BIOL 121, General Biology I	4	BIOL 122, General Biology II.....	4
CHEM 121, General Chemistry I.	4	CHEM 122, General Chem. II.....	4
MATH 112, Pre-Calculus.....	4	MATH 201, Calculus I.....	4
ENGL 101, Composition.....	3	ENGL 102, Composition.....	3
BIOL 111/CHEM 191, Fr. Sem. I	0.5	BIOL 111/CHEM 191, Fr. Sem.II	0.5
ASMB 101, Assembly.....	0.5	ASMB 102, Assembly.....	0.5

17 17

SOPHOMORE YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

CHEM 231, Organic Chemistry I.	4	CHEM 232, Organic Chem. II.....	4
CHEM 201, Analytical Chemistry.....	4	ESCI 222, Env. Pol/Regulations..	3
ESCI 221, Prin. of Env. Science....	4	ENGL 201, Intro to Literature.....	3
CSCI 200, Computer Concepts.....	3	HIST 101, Afr Am. Heritage.....	3
Elective.....	3	RLGN 201, Biblical Literature....	3
BIOL 211/CHEM 291, So. Sem. I	0.5	BIOL 211/CHEM 291, So. Sem.II	0.5
ASMB 201, Assembly.....	0.5	ASMB 202, Assembly.....	0.5

19 17

JUNIOR YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

PHYS 201, College Physics I.....	4	PHYS 202, College Phys. II.....	4
ESCI 321, Tech. & Env. Interact.	4	ESCI 322, Env. Mgmt.....	4
BIOL 309, Cell Biology.....	4	STAT 311, Elmts. of Stat.	3

FREN/SPAN 203.....3 FREN/SPAN 204.....3
 ENGL 202, Public Speaking.....3 PHED 101-107, Phys.Ed.1
 BIOL 311/CHEM 391, Jr Sem. I0.5 HIST 101, Afr.-Am. Heritage.....3
 *HNTH 391, Honors Thesis I.....1 BIOL 311/CHEM 391, Jr Sem. II0.5
 18.5/19 *HNTH 392, Honors Thesis II....1
 15.5/16

SENIOR YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

BIOL 405, Ecology.....4 BIOL 342, Microbiology.....4
 CHEM 305, Physical Chemistry...4 CHEM 404, Instrum. Methods4
 HIST 302, Surv. of World Hist.3 ESCI 422, Env. Toxic. /Health.4
 SOCI 201, Intro. to Soc. ARTS 201, Art Appreciation
 or or
 ECON 200, Surv. of Econ.....3 MUSC 203, Music Appreciation.....3
 PHIL 201, Ethics.....3 BIOL 412/CHEM 492, Sr Sem II0.5
 PHED 101-107, Phys.Ed.1 *HNTH 491, Honors Thesis III...2
 BIOL 411/CHEM 491, Sr Sem. I0.5 15.5/17
 18.5

*This course is required for Honors students.

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DEPARTMENT OF BIOLOGY COURSE DESCRIPTIONS

Biology (BIOL)

BIOL 111-112. Freshman Seminar.

Weekly sessions designed to introduce freshman biology students to the world of biological sciences, including career options, curricula options, departmental requirements, college requirements, study habits, test-taking strategies, library searches and critical thinking skills. Discussion and study groups will be formed among students and faculty. Final grades will be based on attendance and completion of assignments. One-half hour each semester. One hour.

BIOL 121. General Biology I.

Prerequisite: BIOL 102 or a major in Biology, Bioinformatics, Biotechnology, Biology Education, Chemistry, Environmental Science, Engineering, Mathematics or Computer Science. This is an introductory lecture-laboratory course studying the unity and diversity of life and emphasizing the chemistry of life, the cell theory, structure and function, energy transformation through living systems and the mechanisms of heredity and genetic variability. Three lectures and one laboratory per week. Four hours.

BIOL 122. General Biology II.

Prerequisite: A grade of “C” or better in BIOL 121. A lecture-laboratory course that is a continuation of BIOL121, emphasizing the evolutionary history of biological diversity, natural selection, behavior and environmental adaptation, animal form and function, plant form and function, reproduction and ecology. Three lectures and one laboratory per week. Four hours.

BIOL 200. Special Topics in Biology.

Prerequisite: BIOL 102 or a major in Biology, Bioinformatics, Biotechnology, Biology Education, Biochemistry, Chemistry, Environmental Science, Mathematics or Computer Science. Seminar and/or

laboratory course covering a current topic selected by the Department.
Two hours.

NOTE: Enrollment in any of the following BIOL courses requires acceptance into a major or minor Biology program – see Requirements for Majors above.

BIOL 202. Botany.

Prerequisites: A grade of “C” or better in BIOL 121, BIOL 122, CHEM 121 and CHEM 122 (CHEM 111 and CHEM 112 for Bioinformatics majors). An introductory plant biology course for biology majors. The biology of plants as autotrophic organisms is studied in the con-290 -

text of their primary role in the ecosystem. Lecture and laboratory activities in morphology, anatomy and physiology of plant organs are explored. Taxonomic classifications of plants are also explored as introduction to plant nomenclature. Special emphasis is placed on plant growth and development from germination, vegetative growth and flowering to seed formation and maturation. Greenhouse experiences to demonstrate practical application of lecture and laboratory concepts are emphasized. Three lectures and one laboratory per week.

Four hours.

BIOL 210. Genetics.

Prerequisites: A grade of “C” or better in BIOL 121, BIOL 122, CHEM 121 and CHEM 122 (CHEM 111 and CHEM 112 for Bioinformatics majors). A basic course in the principles of heredity, including Mendelian genetics and Mendelian variations. Designed to acquaint the student with the fundamental principles of genetics, with their cytological basis and with their application to human heredity. Three lectures and one laboratory per week. Four hours.

BIOL 211-212. Sophomore Seminar.

Prerequisites: A grade of “C” or better in BIOL 111, BIOL 112, BIOL 121, BIOL 122, CHEM 121 and CHEM 122 (CHEM 111 and CHEM 112 for Bioinformatics majors). Weekly sessions designed to introduce sophomore biology students to the scientific method, scientific writing and problem solving. Assignments and discussions will concentrate on basic science skills, including scientific experimentation and analyses, reading comprehension for scientific literature and writing and problem-solving skills. Reviews in preparation for departmental and standardized exams will be conducted. Final grades will be based on attendance and completion of assignments. Onehalf hour each semester. One hour.

BIOL 302. Human Anatomy.

Prerequisites: A grade of “C” or better in BIOL 121, BIOL 122, CHEM 121 and CHEM 122 (CHEM 111 and CHEM 112 for Bioinformatics majors). The anatomy of the human integumentary, skeletal, muscular, nervous, endocrine, circulatory, excretory, respiratory, immune, digestive (micro and gross) and reproductive systems. Three lectures and one laboratory per week. Four hours.

BIOL 309. Cell Biology.

Prerequisites: A grade of “C” or better in BIOL 121, BIOL 122, CHEM 121, CHEM 122, (CHEM 111 and CHEM 112 for Bioinformatics majors) CHEM 231 and CHEM 232. A study of ultra structural and

macro-molecular organization of cells and tissues, emphasizing the
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convergence of structure and function in life phenomena; principles of molecular aggregation and physiochemical organization of cells; energetics, transport, mobility, irritability and homeostatic mechanisms; cell growth and cell division; cell differentiation and transformation; evolutionary potential of cells; origin of multi cellularity; and techniques useful to the study of cell biology. Three lectures and one laboratory per week. Four hours.

BIOL 310. Molecular Biology.

Prerequisites. A grade of "C" or better in BIOL 121, BIOL 122, CHEM 121, CHEM 122, (CHEM 111 and CHEM 112 for Bioinformatics majors) CHEM 231 and CHEM 232. A study of the structure, organization, and regulation of genetic material. Emphasis is placed on the molecular and biochemical regulation of gene expression (including transcription and translation) and on the molecular techniques used in recombinant DNA manipulations. Three lectures and one laboratory per week. Four hours.

BIOL 311-312. Junior Seminar.

Prerequisites: A grade of "C" or better in BIOL 121, BIOL 122, BIOL 211 and 212, CHEM 121, CHEM 122, (CHEM 111 and CHEM 112 for Bioinformatics majors) CHEM 231 and CHEM 232. Weekly sessions will be designed to initiate the senior proposal preparation process for junior biology majors. Note: Any student wishing to select the senior research thesis option rather than the proposal may do so. Juniors will select a proposal (or thesis) topic and will collect and review scientific literature related to their topic. Students will also present in-class seminars from the literature review of their topics. Current signal papers in the scientific literature will be reviewed through in-class discussions. Final grades for the first semester will be based on attendance and on the successful completion of an acceptable literature review for the senior research proposal (or thesis). Final grades for the second semester will be based on attendance, on the mini-seminar and on successful acceptance of the prospectus by the Department. The deadline for the prospectus will be October 15 (for off-sequence students) or March 15. One-half hour each semester. One hour.

BIOL 321. Introduction to Immunology.

A grade of "C" or better in BIOL 121, BIOL 122, BIOL 211 and 212, CHEM 121, CHEM 122, (CHEM 111 and CHEM 112 for Bioinformatics majors). Introduction to human immune system. Topics to be covered would include: Roles of innate and acquired immunity, T-lymphocytes, B lymphocytes, macrophages and complement system, cellular aspects of cancer immunity, AIDS, transplan-

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tation and autoimmune diseases. Three lectures and one lab per week. Four hours.

BIOL 341. Applied Bioinformatics I.

Prerequisites: A grade of "C" or better in BIOL 121, BIOL 122, BIOL 310, CHEM 121, CHEM 122, (CHEM 111 and CHEM 112 for Bioinformatics majors) MATH 205, and CSCI 226. Introduction to

basic bioinformatics tools including, human genome project, DNA sequence databases, RNA sequence databases, protein sequence databases. Advance use of informational tools such as BLAST, Entrez, Swissprot, phylogenetic trees and others. Three lecture hours and three lab hours per week. Four hours.

BIOL 342. Introduction to Microbiology.

Prerequisites: A grade of "C" or better in BIOL 121, BIOL 122, BIOL 211 and 212, CHEM 121, CHEM 122, (CHEM 111 and CHEM 112 for Bioinformatics majors) and CHEM 231. The form, structure, reproduction, physiology, metabolism and identification of bacteria, fungi, protozoa, rickettsiae and viruses; significance of microbes in general sanitation, industry, agriculture, home economics and medicine. Three lectures and one laboratory per week. Four hours.

BIOL 350. Computational Molecular Biology.

Prerequisites: A grade of "C" or better in BIOL 121, BIOL 122, BIOL 310, CHEM 121, CHEM 122, (CHEM 111 and CHEM 112 for Bioinformatics majors), and Math 201. The course will summarize some traditional methods in computational biology such as sequence alignment and applications of dynamic programming. Students will explore underlying statistical models of sequence evolution as related to scoring matrices and significance scores attached to popular sequence search programs such as BLAST. The second half of the course will focus on more recent high-throughput screening of large datasets in biology and explore predictions of protein folding. Three lecture hours and three lab hours per week. Four hours.

BIOL 404. Human Physiology.

Prerequisites: A grade of "C" or better in BIOL 121, BIOL 122, BIOL 211, BIOL 212, BIOL 302, BIOL 309, CHEM 121, CHEM 122, (CHEM 111 and CHEM 112 for Bioinformatics majors) CHEM 231 and CHEM 232. A study of integrative physiological processes inherent at all organizational levels which enhance the normal operation of the human body as a single mechanical unit. Consideration will be given to disease and environmental factors that may disrupt the homeostatic operation of the human body. Three lectures and one laboratory per week. Four hours.

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BIOL 405. Ecology.

Prerequisites: A grade of "C" or better in BIOL 121, BIOL 122, BIOL 202, CHEM 121, and CHEM 122 (CHEM 111 and CHEM 112 for Bioinformatics majors). Concepts and principles of the relationships between the physical and biotic factors of the environment and living organisms. Practical field experience in techniques, the use of equipment and technology of ecological investigations are covered. Three lectures and one laboratory per week. Four hours.

BIOL 411-412. Senior Seminar.

Prerequisites: Graduating senior status and a grade of "C" or better in BIOL 121, BIOL 122, BIOL 211 and 212, BIOL 311 and BIOL 312, CHEM 121, CHEM 122, (CHEM 111 and CHEM 112 for Bioinformatics majors) CHEM 231 and CHEM 232. First-semester seniors will work toward the completion of a proposal/thesis draft for their proposal adviser. (Students opting for the thesis will also

conduct the necessary research during this time and may be concurrently enrolled in BIOL 420, 421, 422 or 423, Senior Research.) Second-semester seniors will present a proposal/thesis seminar to the department. Students opting for the research thesis will also be required to formally defend their thesis before their thesis committee.

Final grades will be based on attendance and on the successful and timely (October 15 or March 15, depending upon graduation status) completion and submission of the senior proposal/thesis. One-half hour each semester. One hour.

BIOL 420, 421, 422, and 423. Senior Research.

Prerequisite: Junior standing and a grade of “C” or better in BIOL 121, BIOL 122, BIOL 211 and 212, CHEM 121, CHEM 122, (CHEM 111 and CHEM 112 for Bioinformatics majors) CHEM 231 and CHEM 232 or permission of the Department. This course provides an opportunity for exposure to research under the guidance of a faculty member. Students will be shown how to use current literature and how to apply experimental techniques via the performance of an original research project. A written report will be made to the Department of Biology before a grade will be awarded. These courses may be used to receive credit for summer internship research if approved by the Department **before** the internship takes place. The course, if taken in-house, will meet for 4 to 10 hours each week, and a maximum of 2 credit hours will be awarded. If used to receive credit for an internship, the program must consist of a minimum of 6 weeks of research, and a maximum of 2 credit hours will be awarded. Two to eight hours.

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BIOL 441. Applied Bioinformatics II.

Prerequisites: Senior standing and a grade of “C” or better in BIOL 121, BIOL 122, BIOL310, CHEM 121, CHEM 122, (CHEM 111 and CHEM 112 for Bioinformatics majors) MATH 205, MATH 201, MATH 202, STAT 341, STAT 342, STAT 421, CSCI 240, CSCI 226 and CSCI 436. Research oriented course designed to develop tools by which to compare genomic and proteomics libraries for various organisms. These tools will help students develop ideas related to drug design, gene therapy and other therapeutic modalities. 1 hour recitation per week and independent laboratory study. Four hours.

BIOL 443. Advanced Microbiology.

Prerequisites grade of “C” or better in BIOL 121, BIOL 122, BIOL 211 and 212, BIOL 341, CHEM 121, CHEM 122, (CHEM 111 and CHEM 112 for Bioinformatics majors) and CHEM 231. Advanced treatment of topics to include microbial genetics, virology, and parasitology. Three lectures and one lab per week. Four hours.

BIOL 450. Biotechnical Methods Laboratory.

Prerequisites: A grade of “C” or better in BIOL 121, BIOL 122, BIOL 211 and 212, BIOL 310, BIOL 311 and BIOL 312, CHEM 121, CHEM 122, (CHEM 111 and CHEM 112 for Bioinformatics majors) CHEM 231 and CHEM 232 and CHEM 401. Advanced laboratory course designed to train students in modern biological laboratory techniques necessary for successful careers in science. Topics to be covered include, but are not limited to, advanced laboratory safety, record keeping,

data analysis (including computer-generated graphical analysis), technical writing, techniques for protein analysis, techniques for recombinant DNA analysis, techniques in immunochemistry, tissue culture techniques, chromatography techniques, polymerase chain reaction, micromanipulation, DNA sequencing, DNA fingerprinting and spectrophotometry. Two three-hour laboratories and one recitation per week. Four hours.

BIOL 451. Instrumental Methods in Bioresearch.

A grade of “C” or better in BIOL 121, BIOL 122, BIOL 211, BIOL 212, CHEM 121, CHEM 122, (CHEM 111 and CHEM 112 for Bioinformatics majors) CHEM 231 and CHEM 232. Theoretical and technical training in research instrumentation to include operation and troubleshooting for: spectrophotometry, high performance liquid chromatography, gas chromatography, mass spectroscopy, microscopy, x-ray crystallography, and nuclear magnetic resonance. Three lectures and one lab per week. Four hours.

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Honors Courses

BIOL 121H. Honors General Biology I.

Prerequisite: BIOL 102 or a major in Biology, Bioinformatics, Biotechnology, Biology Education, Chemistry, Environmental Science, Engineering, Mathematics or Computer Science. This is an accelerated Honors introductory lecture-laboratory course in which the unity and diversity of life are studied and the chemistry of life, the cell theory, structure and function, energy transformation through living systems and the mechanisms of heredity and genetic variability are emphasized. Three lectures and one laboratory per week. Four hours.

BIOL 122H. Honors General Biology II.

Prerequisite: A grade of “C” or better in BIOL 121. An accelerated honors lecture-laboratory course that is a continuation of BIOL 121, emphasizing the evolutionary history of biological diversity, natural selection, behavior and environmental adaptation, animal form and function, plant form and function, reproduction and ecology. Three lectures and one laboratory per week. Four hours.

HNTH 391-392. Honors Thesis Seminar I and II.

Prerequisite: Junior status in Honors College and A grade of “C” or better in BIOL 121, BIOL 122, BIOL 211 and 212, CHEM 121, CHEM 122, (CHEM 111 and CHEM 112 for Bioinformatics majors) CHEM 231 and CHEM 232. Non-Honors College students electing to prepare a thesis in place of a proposal may enroll in this course in the place of BIOL 411/412 if other course prerequisites are satisfied. A two-semester sequence designed to initiate the thesis process required for graduation from the Honors College. The first semester is an introduction to research, the scientific method, scientific writing and problem solving. Students will collect and review scientific literature related to areas of interest and select a thesis topic in addition to satisfying other course requirements described above. During the second semester, students will write a research prospectus outlining the goals and methodology for their thesis project. The student must take initiative in seeking a mentor to help in the design and supervision of the project. The deadline for submission of the prospectus to

the Department will fall on October 15 (for off-sequence students) or March 15. Final grades will be based on attendance and acceptance of the prospectus by the Department. One hour each semester.

Two hours.

HNTH 491. Honors Thesis Seminar III.

Prerequisite: Graduating senior status and a grade of “C” or better in BIOL 121, BIOL 122, BIOL 211 and 212, HNTH 391, HNTH 392

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(or BIOL 311 and BIOL 312 may be substituted for HNTH 391 and 392), CHEM 121, CHEM 122, (CHEM 111 and CHEM 112 for Bioinformatics majors) CHEM 231 and CHEM 232. A yearlong laboratory research/technical writing project done during the senior year under the supervision of a mentor from the appropriate department.

A final document (prepared according to the specific format approved by the Division of Natural Sciences and Mathematics) will be prepared along with a seminar presentation. Following the seminar the student will formally defend the thesis in front of his/her thesis committee.

The deadline for completion of the thesis is October 15 (for December graduation) and March 15 (for May graduation). Two hours.

Biology Education

EDUC 328. Methods and Materials of Teaching Biology in Secondary Schools.

Prerequisites: Acceptance into the Teacher Education Program, BIOL 121 and BIOL 122. History and objectives of science education in the U.S., materials, teaching strategies, curricular trends and issues, current research, reading in biology content area and assessment procedures applicable to the teaching of biology in secondary schools (grades 9 - 12). Students are required to participate in clinical experiences at a selected public school in the local school district. Three hours.

Environmental Science (ESCI)

ESCI 221. Principles of Environmental Science.

Prerequisites: A grade of “C” or better in BIOL 121, BIOL 122, CHEM 121 and CHEM 122 (CHEM 111 and CHEM 112 for Bioinformatics majors). Basic concepts of environmental science and the impact of human activities on the environment will be introduced. Energy generation, population growth, food production, vector-borne diseases, sources of radiation, pollution of air, land and water and their effects on living things and on the physical environment will be discussed. The basic testing in chemical and biological testing techniques are taught. Sampling methodology is reviewed. Three lectures and one laboratory per week. Four hours.

ESCI 222. Environmental Policies and Regulations.

Prerequisites: A grade of “C” or better in BIOL 121, BIOL 122, CHEM 121, CHEM 122, (CHEM 111 and CHEM 112 for Bioinformatics majors) and ESCI 221. Environmental issues and concerns in modern society are explored. The policies and regulations promulgated by various governmental agencies to address these issues are catalogued. The standards setting and enforcement procedures are de-

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tailed along with opportunities for and responsibilities of corporations,

private organizations, and individual citizens. Financial liability and bonding options are discussed. The conflicting interests of society and individuals are explored. Three lectures per week. Three hours.

ESCI 321. Technology and Environmental Interaction.

Prerequisites: ESCI 222, CHEM 232, BIOL 121 and BIOL 122. The role of commercialized technologies in meeting human needs is discussed. The impact of industrial and technological processes on the environment is discussed. The complex problems of acid rain, global warming, groundwater depletion, hazardous waste and air, water and soil pollution will be considered. The role of microbial organisms and technology in the abatement and remediation of these problems is also investigated. Energy production and conservation measures in industrial activities are included. Regulatory and compliance processes are introduced. Three lectures and one laboratory per week. Four hours.

ESCI 322. Environmental Management.

Prerequisite: ESCI 321. Planning, management and conservation of terrestrial, aquatic and forest resources for a sustainable use in both urban and non-urban habitats. Residential, commercial and industrial wastes are included as both a resource and a pollutant with methods of reduction, control and management discussed. Three lectures and one laboratory per week. Four hours.

ESCI 407. Waste Characterization and Management.

Prerequisite: ESCI 321. Available technology is applied to the classification of residential, commercial and industrial waste. Current quantities of generation are estimated. Polluting effects are identified. The most common current methods of reduction, control and management are discussed along with possible options for the future. Three lectures and one laboratory per week. Four hours.

ESCI 422. Environmental Toxicology and Health.

Prerequisites: ESCI 322 and BIOL 309. Provides an overview of the impact of hazardous substances on ecological systems and human health. Basic principles of toxicology, acute and chronic, ranging from the molecular level to the dynamics of an ecosystem, will be studied. Topics included are biodegradation, structure activity relationship, routes of entry, mode of action, acceptable limits of toxic substances and potential biomarkers. Three lectures and one laboratory per week. Four hours.

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DEPARTMENT OF CHEMISTRY

The Claflin Imperative: Preparing Students for Leadership and Service in a Multicultural, Global and Technological Society

The Department of Chemistry expects to produce graduates with a solid understanding of and practical experience in the chemical sciences so that they will be able to compete effectively and be successful in graduate school, professional school and the work place. Success in their careers will enable them to both serve society and become leaders in their fields. In addition to classroom learning, the Department of Chemistry uses laboratory experiments, research and summer internships to expose students to the multicultural, technological

and global world in which they will be expected to function.

Curricula

The Bachelor of Science degree with a major in Chemistry is designed for students planning to enter either a graduate school program leading to an M.S. or Ph.D. degree, or to enter the work force as a chemist.

The Bachelor of Science degree with a major in Biochemistry is designed for students entering into health care fields and/or planning to earn a Ph.D., M.D., Pharm D., DMD,DVM, OD, PT, OT, DO, etc.

The Bachelor of Science degree with a major in Environmental Science is designed for students who desire to enter graduate school or professions as environmental specialists with government, academia, industry, etc.

General Objectives for the Department of Chemistry

1. To prepare students to compete successfully in graduate and professional schools, and in the work place in government agencies, industry or health care.
2. To develop skills of accuracy and precision in thinking, communication and experimental manipulation and observation.
3. To teach the laws, theories and practices of chemistry.
4. To train students in laboratory skills and methods for demonstrating physical and chemical laws.
5. To teach students to perform chemical analysis, synthesize compounds, and use state-of-the-art laboratory instruments.

Requirements for All Majors

Students majoring in Biochemistry, Chemistry or Environmental Science must complete all General Education requirements and also - 299 -

satisfy the requirements for the major program in which they are enrolled. In addition, student must:

1. fill out (at the end of the year wherein CHEM 121 and CHEM122 have been completed with a grade of "C" or better) a Departmental Application for Major form and submit this form for approval and acceptance by the Chemistry Department and the Division of Natural Sciences and Mathematics.
2. have a GPA of 2.5 or better to be accepted into any of the major programs offered by the Department of Chemistry. (Note: acceptance into a major or minor program is prerequisite to enrollment into courses above CHEM 122.)
3. complete with a grade of "C" or better all Biology, Chemistry, Math, Physics and English courses required for their degree.
4. successfully complete the General Education Exit Exam which is to be taken at the end of the sophomore year (minimum of 45 semester hours completed).
5. achieve a passing score on the Senior Exit Examination.
6. write and present to the Division of Natural Sciences and Mathematics a senior research proposal (any student may opt to substitute a senior thesis for the proposal requirement).
7. have a 2.0 overall GPA before applying for graduation, at which time he/she should consult with his/her academic adviser and complete an Application for Graduation form by the deadline as

indicated in the current academic calendar.

Department Policy

Students planning to major in Chemistry, Biochemistry or Environmental Science should consult with a departmental adviser during the first semester of their freshman year.

Major in Chemistry

Specific Objectives for the Major in Chemistry

Upon completion of the program, students are expected:

1. to have acquired the basic knowledge and skills essential to an understanding of chemistry;
2. to have developed the ability to interpret the properties and reactions of matter at atomic and molecular levels;
3. to be able to employ scientific methods to analyze chemical problems rationally and quantitatively and to apply these methods to the solution of other problems; and

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4. to have developed an understanding of the historical application of chemistry in meeting mankind's needs for food, shelter, clothing and transportation and the ability to apply this understanding in terms of future needs.

Curriculum Summary for the Major in Chemistry

General Education 57

Note: The following courses substitute for requirements in the General Education Program:

1. MATH 201, Calculus (4 hrs.), replaces MATH 111, College Algebra (3 hrs.).
2. BIOL 121, General Biology I (4 hrs.), replaces BIOL 102, Biology, Health & Environment (3 hrs.), and BIOL 102 Lab (1 hr.).
3. CHEM 121, General Chemistry I (4 hrs.), replaces CHEM 101, Physical Science (3 hrs.), and CHEM 101 Lab (1 hr.).
4. CSCI 226, Intro. to Programming Using C Language (3hrs.), replaces CSCI 200, Computer Concepts (3 hrs.).

Major Courses

CHEM 191-492, Chemistry Seminars	4
CHEM 122, General Chemistry II	4
CHEM 201, Analytical Chemistry.....	4
CHEM 231, Organic Chemistry I.....	4
CHEM 232, Organic Chemistry II.....	4
CHEM 304, Inorganic Chemistry.....	4
CHEM 305, Physical Chemistry I.....	4
CHEM 306, Physical Chemistry II.....	4
CHEM 401, Biochemistry I.....	4
CHEM 404, Instrumental Methods.....	4
CHEM 420, Undergraduate Research.....	3
Total 43	

Support Courses

MATH 201, Calculus I.....	4
MATH 202, Calculus II.....	4
MATH 212, Linear Algebra.....	3
MATH 301, Calculus III.....	3
MATH 302, Differential Equations.....	3

PHYS 203, Principles of Physics I.....	4
PHYS 204, Principles of Physics II.....	4
STAT 341, Intro. to Probability and Statistics.....	3
Total	28

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Elective Courses

Elective.....	3
Elective.....	3
Total	6

Major in Biochemistry

Specific Objectives for the Major in Biochemistry

Upon completion of this program, students are expected:

1. to have acquired the basic knowledge and skills essential to an understanding of chemistry and biology;
 2. to have developed the ability to interpret the properties and reactions of matter at atomic, molecular and cellular levels;
 3. to be able to employ the scientific method to analyze chemical and biological problems rationally and quantitatively and to apply these methods to the solution of other problems;
 4. to have developed an understanding of the historical contributions arising from the studies of both biology and chemistry;
- and
5. to understand the intersection of principles of physics, chemistry and biology in life processes.

Curriculum Summary for the Major in Biochemistry

General Education	57
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Note: The following courses substitute for requirements in the General Education Program:

1. MATH 112, Pre-calculus (4 hrs.), replaces MATH 111, College Algebra (3 hrs.).
2. BIOL 121, General Biology I (4 hrs.), replaces BIOL 102, Biology, Health & Environment (3 hrs.), and BIOL 102 Lab (1 hr.).
3. CHEM 121, General Chemistry I (4 hrs.), replaces CHEM 101, Physical Science (3 hrs.), and CHEM 101 Lab (1 hr.).
4. CSCI 226, Introduction to Programming Using C Language (3 hrs.), replaces CSCI 200, Computer Concepts (3hrs.).

Major Courses

CHEM191-492, Seminars.....	4
CHEM 122, General Chemistry II.....	4
CHEM 201, Analytical Chemistry.....	4
CHEM 231, Organic Chemistry I.....	4

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CHEM 232, Organic Chemistry II.....	4
CHEM 305, Physical Chemistry I.....	4
CHEM 401, Biochemistry I.....	4
CHEM 402, Biochemistry II.....	4
CHEM 404, Instrumental Methods.....	4
CHEM 420, Research.....	3
BIOL 122, General Biology II.....	4
BIOL 210, Genetics.....	4
BIOL 308, Cell Biology.....	4

BIOL 310, Molecular Biology..... 4

Total 63

Support Courses

MATH 201, Calculus I..... 4

MATH 202, Calculus II..... 4

STAT 341, Intro. to Probability and Statistics..... 3

PHYS 203, Principles of Physics I..... 4

PHYS 204, Principles of Physics II..... 4

Total 19

Elective Courses

**Elective 4

Elective..... 3

Total 7

** Biology Electives: BIOL 342, 302, 304, 342, 404, 405, 450

Major in Environmental Science

Specific Objectives for the Major in Environmental Science

Upon completion of this program, students are expected:

1. to have acquired the basic knowledge and skills essential to an understanding of chemistry, biology and the environment;
2. to have developed the ability to interpret the properties and reactions of chemicals at molecular and cellular levels and the interaction of these chemicals with the environment;
3. to be able to employ scientific methods to analyze chemical, biological and environmental problems rationally and qualitatively; and
4. to have developed an understanding of the impact of biological and chemical processes on meeting mankind's needs and on protecting the environment now and in the future.

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Curriculum Summary for the Major in Environmental Science

General Education 57

Note: The following courses substitute for requirements in the General Education Program:

1. MATH 112, Pre-calculus (4 hrs.), replaces MATH 111, College Algebra (3 hrs.).

2. BIOL 121, General Biology I (4 hrs.), replaces BIOL 102, Biology, Health & Environment (3 hrs.), and BIOL 102 Lab (1 hr.).

3. CHEM 121, General Chemistry I (4 hrs.), replaces CHEM 101, Physical Science (3 hrs.), and CHEM 101 Lab (1 hr.).

Major Courses

ESCI 221, Principles of Environmental Science..... 4

ESCI 222, Environmental Policy and Regulations.... 3

ESCI 321, Technology and Environmental Interaction 4

ESCI 322, Environmental Management..... 4

ESCI 422, Environmental Toxicology and Health..... 4

BIOL 122, General Biology II..... 4

BIOL 309, Cell Biology..... 4

BIOL 342, Microbiology 4

BIOL 405, Ecology..... 4

CHEM191-492, Seminars..... 4

CHEM 122, General Chemistry II..... 4

CHEM 201, Analytical Chemistry.....	4
CHEM 231, Organic Chemistry I.....	4
CHEM 232, Organic Chemistry II.....	4
CHEM 305, Physical Chemistry I.....	4
CHEM 404, Instrumental Methods.....	4

Total 63

Support Courses

MATH 201, Calculus I.....	4
PHYS 201, Physics I.....	4
PHYS 202, Physics II.....	4
STAT 311, Elements of Statistics.....	3

Total 15

Elective Courses

Elective.....	3
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Total 3

Minor in Chemistry

For a minor in Chemistry, the student must take 18 hours of chemistry beyond CHEM 121.

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Curriculum Leading to the Bachelor of Science Degree with a Major in Chemistry - 134 Semester Hours.

FRESHMAN YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

EDUC 101, Orientation I.....	1	EDUC 102, Orientation II.....	1
ENGL 101, English Comp. I.....	3	ENGL 102, English Comp. II.....	3
CHEM 121, General Chem. I.....	4	CHEM 122, General Chem. II.....	4
BIOL 121, General Biology I.....	4	CSCI 226, Intro. Prog.....	3
MATH 201, Calculus I.....	4	MATH 202, Calculus II.....	4
CHEM 191, Fresh Seminar I.....	0.5	CHEM 192, Fresh Seminar II.....	0.5
ASMB 101.....	0.5	ASMB 102.....	0.5

17 16

SOPHOMORE YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

CHEM 231, Organic Chem. I.....	4	CHEM 232, Organic Chem. II.....	4
CHEM 201, Analytical Chem.....	4	ENGL 344, Technical Writing.....	3
PHYS 203, Princ. Of Phys I.....	4	PHYS 204, Prin. Of Phys II.....	4
MATH 301, Calculus III.....	3	MATH 212, Linear Algebra.....	3
PHED Elective (101-106).....	1	PHED Elective (101-106).....	1
CHEM 291, Soph. Seminar I.....	0.5	CHEM 292, Soph. Seminar II.....	0.5
ASMB 201.....	0.5	ASMB 202.....	0.5

17 16

JUNIOR YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

CHEM 401, Biochemistry I.....	4	CHEM 304, Inorganic Chem.....	4
SOCI 201/ECON 203.....	3	Elective.....	3
STAT 341, Intro Prob. & Stat I.....	3	MATH 302, Differential Equat.....	3
HIST 101, African Heritage.....	3	HIST 301, Survey of World.....	3
ARTS 201/MUSC 203.....	3	ENGL 202, Public Speaking.....	3

CHEM 391, Junior Seminar I.... 0.5 CHEM 392, Junior Seminar II... 0.5
 *HNTH 391, Honors Thesis I.... 1 *HNTH 391, Honors Thesis II... 1
 16.5/17 16.5/17

SENIOR YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

CHEM 305, Physical Chem. I..... 4 CHEM 306, Physical Chem. II..... 4
 CHEM 420, Research..... 3 CHEM 404, Instr. Methods..... 4
 RLG 201, Biblical Literature..... 3 PHIL 201, Ethics..... 3
 FREN/SPAN 203 F. Lang I..... 3 FREN/SPAN 204 F. Lang II..... 3
 Elective..... 3 ENGL 201, Intro to Literature..... 4
 CHEM 491, Senior Seminar I..... 0.5 CHEM 492, Senior Seminar II..... 0.5
 16.5 *HNTH 491, Honors Thesis..... 2

18.5/20

*This course is required for Honors students.

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**Curriculum Leading to the Bachelor of Science Degree with a Major in Biochemistry
 - 138 Semester Hours.**

FRESHMAN YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

EDUC 101, Orientation I..... 1 EDUC 102, Orientation II..... 1
 ENGL 101, English Comp. I..... 3 ENGL 102, English Comp. II..... 3
 CHEM 121, General Chem. I..... 4 CHEM 122, General Chem. II..... 4
 BIOL 121, General Biology I..... 4 BIOL 122, General Biology II..... 4
 MATH 112, Pre-Calculus..... 4 MATH 201, Calculus I..... 4
 CHEM 191, Fresh Seminar I..... 0.5 CHEM 192, Fresh Seminar II..... 0.5
 ASMB 101..... 0.5 ASMB 102..... 0.5

17 17

SOPHOMORE YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

CHEM 231, Organic Chem. I..... 4 CHEM 232, Organic Chem. II..... 4
 CHEM 201, Analytical Chem..... 4 BIOL 210, Genetics..... 4
 PHYS 203, Princ. Of Phys I..... 4 PHYS 204, Prin. Of Phys II..... 4
 MATH 202, Calculus II..... 4 CSCI 226, Intro. Prog..... 3
 PHED Elective (101-107)..... 1 PHED Elective (101-107)..... 1
 CHEM 291, Soph. Seminar I..... 0.5 CHEM 292, Soph. Seminar II..... 0.5
 ASMB 201..... 0.5 ASMB 202..... 0.5

18 17

JUNIOR YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

CHEM 401, Biochemistry I..... 4 CHEM 402, Biochemistry II..... 4
 BIOL 309, Cell Biology..... 4 BIOL 310, Molecular Biology..... 4
 STAT 341, Intro Prob. & Stat I. 3 Elective..... 3
 HIST 101, African Heritage..... 3 HIST 301, Survey of World..... 3
 ARTS 201/MUSC 203..... 3 ENGL 202, Public Speaking..... 3
 CHEM 391, Junior Seminar I.... 0.5 CHEM 392, Junior Seminar II. 0.5
 *HNTH 391 Honors Thesis I.... 1 *HNTH 391 Honors Thesis II... 1

17.5/18 17.5/18

SENIOR YEAR

First Semester Second Semester

Courses Sem. Hrs.

Courses Sem. Hrs.

CHEM 305, Physical Chem. I.....	4	CHEM404, Instr. Methods.....	4
CHEM 420, Research.....	3	**Elective.....	4
RLGN 201, Biblical Literature.....	3	PHIL 201, Ethics.....	3
FREN/SPAN 203 F. Lang I.....	3	FREN/SPAN 204 F. Lang II.....	3
SOCI 201/ECON 203.....	3	ENGL 201, Intro to Literature.....	3
CHEM 491, Senior Seminar I.....	0.5	CHEM 492, Senior Seminar II.....	0.5
16.5 *HNTH491, Honors Thesis III.....	2		

17.5/19

*This course is required for Honors students.

** Biology Electives: BIOL 342, 302, 304, 404, 405, 450

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Curriculum Leading to the Bachelor of Science Degree with a Major in Environmental Science - 138 Semester Hours.

FRESHMAN YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

EDUC 101, Orientation I.....	1	EDUC 102, Orientation II.....	1
BIOL 121, General Biology I.....	4	BIOL 122, General Biology II.....	4
CHEM 121, General Chem. I.....	4	CHEM 122, General Chem. II.....	4
MATH 112, Pre-Calculus.....	4	MATH 201 Calculus I.....	4
ENGL 101, Comp I.....	3	ENGL 102, Comp II.....	3
CHEM 191 Fresh. Seminar I.....	0.5	CHEM 192, Fresh. Seminar II.....	0.5
ASMB 101, Assembly.....	0.5	ASMB 102, Assembly.....	0.5

17 17

SOPHOMORE YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

CHEM 231 Organic Chem. I.....	4	CHEM 232, Organic Chem. II.....	4
CHEM 201 Analytical Chem.....	4	ESCI 222 Prin. Env. Science.....	3
ESCI 221 Env. Policy/Reg.....	4	ENGL 201 Intro to Literature.....	3
CSCI 200, Computer Concepts.....	3	RLGN 201, Bibl. Lit.....	3
**Elective.....	3	HIST 101, African Heritage.....	3
CHEM 291, Soph. Seminar I.....	0.5	CHEM 292, Soph. Seminar II.....	0.5
ASMB 201, Assembly.....	0.5	ASMB 202, Assembly.....	0.5

19 17

JUNIOR YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

PHYS 201, College Physics I.....	4	PHYS 202, College Physics II.....	4
ESCI 321 Tech. Env. Interact.....	4	ESCI 322, Env. Mgt.....	4
BIOL 309, Cell Biology.....	4	STAT 311, Elements of Stats.....	3
FREN/SPAN 203.....	3	FREN/SPAN 204.....	3
ENGL 202, Public Speaking.....	3	PHED Elective (101-107).....	1
CHEM 391, Junior Seminar I.....	0.5	CHEM 392, Junior Seminar II.....	0.5
*HNTH391, Honors Thesis I.....	1	*HNTH391, Honors Thesis II.....	1

18.5/19 15.5/16

SENIOR YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

BIOL 405, Ecology.....	4	BIOL 405, Ecology.....	4
CHEM 305, Physical Chem. I.....	4	CHEM 305, Physical Chem. I.....	4
HIST 302, Survey of World.....	3	HIST 302, Survey of World.....	3
SOCI 201 or ECON 200.....	3	SOCI 201 or ECON 200.....	3
PHIL 201, Ethics.....	3	PHIL 201, Ethics.....	3
PHED Elective (101-107).....	1	PHED Elective (101-107).....	1
CHEM 491, Senior Seminar I.....	0.5	CHEM 491, Senior Seminar I.....	0.5

18.5 15.5/17

*This course is required for Honors students.

** Research Strongly Suggested.

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DEPARTMENT OF CHEMISTRY COURSE DESCRIPTIONS

Chemistry (CHEM)

CHEM 101. Physical Science.

Co-requisites: MATH 111, CHEM 101L. May not be taken for credits toward majors in the Departments of Biology or Chemistry. This course is an introduction to modern concepts of Astronomy, Physics, Chemistry, Meteorology and Geology. Studies include the structure of the universe and the laws of mechanics that govern it. The nature of the elements and the substances that they form are also investigated. Studies also include the nature of heat, light, and sound.

Overviews of weather and the structure of the earth are included.

Three hours lecture per week. Three hours.

CHEM 101L. Physical Science Laboratory.

Co-requisite: CHEM 101. May not be taken for credits toward majors in the Departments of Biology or Chemistry. This lab is designed to develop laboratory skills, and focus on safety procedures and experimental design and observation. The lab also reinforces the principles and concepts taught in Chem. 101 by means of hands-on application.

The student will learn the metric system, preparation of gases and chemicals, and the basics of heat, energy, electricity and mechanics. Students will acquire enhanced writing skills through the recording of data and preparation of reports. One two-hour lab per week. One hour.

CHEM 103. Earth Science.

Prerequisite: CHEM 101. May not be taken for credits toward majors in the Departments of Biology (Except Biology Education) or Chemistry. This course is an introduction to the principles of geology, meteorology and hydrology. Discusses the origins, current status, and interactions of the various ecosystems affecting life on earth. For students majoring in education. Cannot be used as an elective for science or math majors. Three hours lecture, two hours laboratory per week. Four hours.

CHEM 121. General Chemistry I.

Prerequisites: MATH 111. Corequisites: MATH 112 and ENGL 101. This course is an introduction to the modern concepts of matter and the changes which it undergoes. The study includes topics such as the description of matter and the nature of atoms, molecules, and molecular bonding. Formulae and equations representing these

changes are also studied. The study follows with a discussion of the kinetic theory of gases and reviews of liquids and solutions (including acids, bases, and salts). Three hours of lecture and three hours of laboratory per week. Four hours.

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CHEM 122. General Chemistry II.

Prerequisites: A "C" or better in CHEM 121. A continuation of CHEM 121 covering chemical kinetics, thermodynamics, equilibrium, oxidation and reduction reactions, and applications of these phenomena. The inorganic chemistry of the elements IA-VIIIA and an introduction to organic and biochemistry are also presented. Three hours of lecture and three hours of laboratory per week. Four hours.

CHEM 191-192. Freshman Seminar I & II.

Prerequisites: Academic advisement in the Department of Chemistry or academic advisement in Student Support Services with an intended major amongst those offered by the Department of Chemistry. This course provides background information, skills, and selfevaluations to help students make a successful transition from the structured, closely monitored high school environment to the more unstructured, independent life at college. Included in the topics covered are time management, study skills, personalized curriculum planning, problem solving, grades enhancement, special demands of science courses, and successful laboratory performance. This course provides exposure to and information on some of the career options available to students in the Department of Chemistry. Outside speakers present seminars to the students. Students are encouraged and assisted in applying for summer internships and undergraduate research experiences. One-half hour each semester. One hour.

CHEM 200. Special Topics.

Perquisites: CHEM 121 or a major within the Division of Natural Science and Mathematics. Seminar and/or laboratory course covering current topics selected by the Department. Two hours.

CHEM 201. Analytical Chemistry.

Perquisites: CHEM 122 and MATH 112. An introduction to the principles and procedures of modern quantitative analysis. Quantitative aspects of stereochemistry, solution chemistry, and chemical equilibria are studied. Electroanalytical chemistry, complexometry and separation techniques are also covered. Standard volumetric and gravimetric techniques are covered. Emphasis is on quantitative measurements by non-instrumental methods. Three hours of lecture, three hours of lab and one hour of recitation per week. Four hours.

CHEM 231. Organic Chemistry I.

Prerequisites: CHEM 122. The fundamental aspects of chemical bonding, structural theory, stereochemistry and reaction mechanisms of organic compounds are introduced. Nomenclatures, occurrence,

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properties, preparations and reactions of aliphatic and aromatic compounds are included. Three hours of lecture and one three-hour laboratory per week. Four hours.

CHEM 232. Organic Chemistry II.

Prerequisite: CHEM 231. Nomenclatures, properties, preparations and reactions of organic compounds via functional group organization are studied. Types of reaction mechanisms and spectroscopic methods of analyzing organic compounds are introduced. Three hours of lecture and one three-hour laboratory per week. Four hours.

CHEM 291-292. Sophomore Seminar I & II.

Prerequisites: Academic advisement in the Department of Chemistry or academic advisement in Student Support Services with an intended major amongst those offered by the Department of Chemistry.

Weekly session designed to introduce sophomore chemistry students to the scientific method, scientific writing and problem solving.

Assignments and discussions will concentrate on basic science skills, including scientific experimentation and analyses, reading comprehension for scientific literature, writing and problem solving skills. Reviews in preparation for departmental and standardized exams will be covered. Final grades will be based upon attendance and completion of assignments. One-half hour each semester. One hour.

CHEM 304. Inorganic Chemistry.

Prerequisites: CHEM 201, CHEM 231, and MATH 201. An advanced survey of theoretical and descriptive inorganic chemistry emphasizing such topics as atomic and molecular structure, periodic trends, theory of bonding, descriptive chemistry of transition metals and physical methods of examining inorganic compounds. Three hours of lecture and three hours of laboratory per week. Four hours.

CHEM 305. Physical Chemistry I.

Prerequisites: MATH 201, PHY 204, and CHEM 122

The applications of mathematics and physics to the solution of problems in chemistry. Topics covered are gases, the kinetic-molecular theory, the laws of thermodynamics, phases, solutions, equilibria, electrochemistry and chemical kinetics. Three hours of lecture and three hours of lab per week. Four hours.

CHEM 306. Physical Chemistry II.

Prerequisite: CHEM 305. A continuation of Physical Chemistry I.

Topics covered are quantum theory, chemical bonds, spectroscopy, molecular structure, statistical mechanics and crystal structure. Three hours of lecture and three hours of lab per week. Four hours.

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CHEM 391-392. Junior Seminar I & II.

Prerequisite: Academic advisement in the Department of Chemistry and Junior status. Weekly sessions designed to initiate the senior proposal preparation process for junior chemistry majors. Students will select a proposal topic and will collect and review scientific literature related to their thesis. Students will also present an in-class seminar from the literature review of their proposal topic. Current signal papers in the scientific literature will be reviewed by in-class discussions. Final grades will be based upon attendance and upon the successful completion of an acceptable literature review for the senior research proposal. One half-hour each semester. One hour.

CHEM 401. Biochemistry I.

Prerequisites: CHEM 232 and BIOL 121 or BIOL 122. An introduction

to the chemistry of biological compounds including a systematic study of carbohydrates, lipids, amino acids, proteins, nucleic acids, and enzymes kinetics. Metabolism of biological compounds is studied, as are the interrelations among the carbon, nitrogen, and energy cycles. A laboratory program designed to introduce the student to enzyme kinetics and the use of quantification. A brief introduction to instrumentation will be included. Three hours lecture and three hours laboratory per week. Four hours.

CHEM 402. Biochemistry II.

Prerequisite: CHEM 401. A continuation of Biochemistry I with an emphasis on the chemistry of physiological systems. Topics include but are not limited to biosynthesis of amino acids and nucleotides, molecular biology, coenzymes and vitamins, and immunogenetics. A laboratory program designed to introduce the student to the study of biological molecules includes experiments with procedures for the quantification, isolation, and characterization of various cellular components. Three hours lecture and three hour laboratory per week. Four hours.

CHEM 404. Instrumental Methods.

Prerequisites: CHEM 201 and MATH 201. An advanced level study of the theories and techniques of instrumental analysis. The nature of electromagnetic radiation and its applications to UV-visible, infrared, atomic absorption and mass spec are studied. Gas chromatography (GC), high-pressure liquid chromatography (HPLC), Nuclear Magnetic Resonance (NMR), polarographic and electroanalytical techniques are covered. The scientific application of electronics and optics are emphasized. Three hours lecture, three hours lab and one hour recitation per week. Four hours.

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CHEM 420. Undergraduate Research.

Prerequisite: Junior standing and completion of CHEM 231 & 232 or permission of the department. This course provides an opportunity for exposure to research under the guidance of a faculty member. Students will be shown how to use current literature and how to apply experimental techniques in the investigation of an original research project. A written report will be submitted before completion of course (ACS style guide). This course may be used to receive credit for summer internship research if approved by the department before the internship takes place. The course, if taken in-house, will meet for 3 hours (minimum) each week and three credit hours will be awarded. If used to receive credit for an internship, the program must consist of a minimum of 6 weeks of research and a written report must be submitted to department of Chemistry. Three credit hours

CHEM 491-492. Senior Seminar I & II.

Prerequisites. Advisement in the Chemistry Department and Senior standing or permission of the department. First Semester seniors will work toward the completion of a proposal draft to their proposal advisor. Second semester seniors will present a proposal defense seminar to the department. Final grades will be based upon attendance and upon the successful and timely completion and submission of

the senior proposal. One-half hour each semester. One hour.

Environmental Science (ESCI)

ESCI 221. Principles of Environmental Science.

Prerequisites: A grade of "C" or better in BIOL 121, BIOL 122, CHEM 121 and CHEM 122 (CHEM 111 and CHEM 112 for Bioinformatics majors). Basic concepts of environmental science and the impact of human activities on the environment will be introduced. Energy generation, population growth, food production, vector borne diseases, sources of radiation, pollution of air, land and water and their effects on living things and on the physical environment will be discussed. The basic testing and chemical and biological testing techniques are taught. Sampling methodology is reviewed. Three hours of lecture and three hours of laboratory per week. Four hours.

ESCI 222. Environmental Policies and Regulations..

Prerequisites: A grade of "C" or better in BIOL 121, BIOL 122, CHEM 121 and CHEM 122 (CHEM 111 and CHEM 112 for Bioinformatics majors). Environmental issues and concerns in modern society are explored. The policies and regulations promulgated

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by various governmental agencies to address these issues are catalogued. The standards setting and enforcement procedures are detailed along with opportunities and responsibilities of corporations, private organizations, and individual citizens. Financial liability and bonding options are discussed. The conflicting interests of society and individuals are explored. Three hours of lecture per week. Three hours.

ESCI 321. Technology and Environmental Interaction.

Prerequisite: ESCI 222, CHEM 232, BIOL 121, BIOL 122. The role of commercialized technologies in meeting human needs is discussed. The impact of industrial and technological processes on the environment is discussed. The complex problems of acid rain, global warming, groundwater depletion, hazardous waste, and air, water and soil pollution will be considered. The role of microbial organisms and technology on the abatement and remediation of these problems is also investigated. Energy production and conservation measures are included in industrial activities. The regulatory and compliance processes are introduced. Three hours of lecture and three hours of laboratory per week. Four hours.

ESCI 322. Environmental Management.

Prerequisite: ESCI 321. Discusses the planning, management, and conservation of terrestrial, aquatic and forest resources for a sustainable use in both urban and non-urban habitats. Residential, commercial and industrial wastes are included as both a resource and a pollutant with methods of reduction, control, and management discussed. Three credit hours of lecture and three hours of laboratory per week. Four hours.

ESCI 407. Waste Characterization and Management.

Prerequisites: ESCI 321. Available technology is applied to classify residential, commercial, and industrial waste. Current quantities of generation are estimated. Polluting effects are identified. The most

common current methods of reduction, control, and management are discussed along with possible options for the future. Three hours of lecture and three hours of laboratory per week. Four hours.

ESCI 422. Environmental Toxicology and Health.

Prerequisites ESCI 322, BIOL 309. Overviews the impact of hazardous substances on ecological systems and human health. Basic principles of toxicology, acute and chronic, ranging from molecular level to the dynamics of an ecosystem will be studied. Topics included are biodegradation, structure-activity relationship, routes of entry, mode of action, acceptable limits of toxic substances and po-

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tential biomarkers. Three hours of lecture and three hours of laboratory per week. Four hours.

Honors College (HNTH)

HNTH 391-392. Honors Thesis Seminar I & II.

Prerequisites: Junior status and Honors College membership. A two-semester sequence designed to initiate the thesis process required for graduation from the Honors College. The first semester is an introduction to research, the scientific method, scientific writing, and problem solving. Students will collect and review scientific literature related to areas of interest and select a thesis topic in addition to other course requirements described above. During the second semester, students will write a research prospectus outlining the goals and methodology for their thesis project. The student must take initiative in seeking a mentor to help in the design and supervision of the project. The deadline for submission of the prospectus to the department will fall on October 15th (for December graduation) or March 15th (for May graduation). Final grades will be based upon attendance and successful acceptance of the prospectus by the department. One hour each semester. Two hours.

HNTH 491. Honors Thesis Seminar III.

Prerequisite: HNTH 392. A year-long writing project done during the senior year under the supervision of a mentor from the appropriate department. The student must take initiative in seeking a mentor to help in the design and supervision of the project. A final document prepared following a specific format will be presented. The deadline for completion of the thesis is October (for December graduation) and March (for May graduation). Two (2) hours.

CHEM 121H. Honors General Chemistry I.

Prerequisites: MATH 111. Corequisites: MATH 112 and ENGL 101. This is an accelerated honors introductory lecture-laboratory course to the modern concepts of matter and the changes which it undergoes. The study includes topics such as the description of matter and the nature of atoms, molecules, and molecular bonding. Formulae and equations representing these changes are also studied. The study follows with a discussion of the kinetic theory of gases and reviews of liquids and solutions (including acids, bases, and salts). Three hours of lecture and three hours of laboratory per week. Four hours.

CHEM 122H. Honors General Chemistry II.

Prerequisites: A "C" or better in CHEM 121. An accelerated honors lecture-laboratory course that is a continuation of CHEM 121 covering chemical kinetics, thermodynamics, equilibrium, oxidation and

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reduction reactions, and applications of these phenomena. The inorganic chemistry of the elements IA-VIIIA and an introduction to organic and biochemistry are also presented. Three hours of lecture and three hours of laboratory per week. Four hours.



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DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

The Claflin Imperative: Preparing Students for Leadership and Service in a Multicultural, Global and Technological Society

The Department of Mathematics and Computer Science endeavors to provide programs for students in general education, mathematics education and pre-engineering and for students wishing to pursue professional careers or graduate study in the fields of mathematics, computer science and management information science.

Curricula

A student may major in Mathematics, Computer Science or Management Information Science by completing the requirements for the professional program in the chosen major. A major in Mathematics or Computer Science includes an open minor or additional electives. A student majoring in Management Information Science is required to satisfy the requirements for this program, which includes a concentration in Business. There is no option for a minor in Management Information Science.

A student majoring in Mathematics Education is required to satisfy the requirements of the Teacher Education Program, which is designed to qualify students for teacher certification in South Carolina.

A student may pursue a dual degree in Applied Mathematics, Engineering or Engineering Technology by completing the curriculum as prescribed in the dual-degree section of the catalog and then finishing two years of study at Clemson University or South Carolina State University. Dual-degree candidates from Claflin University are eligible to seek B.S. degrees in the following majors at Clemson University: Bio-systems Engineering, Chemical Engineering, Ceramic Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, Industrial Engineering, and Mechanical Engineering. The areas of Engineering Technology available at South Carolina State University are Mechanical Engineering, Electrical Engineering, Civil Engineering and Industrial Engineering.

General Objectives for the Department of Mathematics and Computer Science

All students, as a result of enrolling in the General Education courses offered by the Department, will be able to:

1. display basic skills in computational mathematics;
2. state and apply mathematical principles;
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3. understand the role computer technology plays in our civilization;
4. use application software to prepare documents and process data;
5. use high-level critical thinking skills of analysis, synthesis and evaluation to solve problems in their disciplines; and
6. read and understand expositions involving quantitative analysis of local, national and international problems.

The Department of Mathematics and Computer Science provides instruction, educational experiences and advisement for students majoring in programs offered by the Department so that all graduates will have a knowledge and understanding of mathematics, technology and their applications that prepare them to provide leadership and service in a multicultural, global and technological society.

The specific objectives of programs offered by this department are to produce graduates who can:

1. perform at the fiftieth percentile or higher on standardized tests such as the GRE, Praxis II, and GMAT;
2. attain entry into graduate programs in the appropriate discipline;
3. attain employment and become leaders in their disciplines in a competitive job market;
4. use technology, speak and write coherently, think critically, logically and quantitatively and conduct independent inquiry within their disciplines;
5. read scholarly journals in their disciplines; and
6. demonstrate a knowledge and an awareness of the role that mathematics and technology have played and continues to play in our multicultural global and technological society.

Program Requirements

Students entering mathematics and computer science programs must

meet standards prescribed by the institution for selecting a major. In addition, students must have a minimum overall grade point average of 2.5 at the time of acceptance. Students should have taken and passed all major course requirements through the end of the sophomore year. Students may apply for admittance to the Department in their sophomore year. Acceptance will be based upon overall grade point average and performance in all major courses and designated foundation courses taken prior to the time of application.

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Each student majoring in an area offered by the Department must meet the following requirements:

1. obtain a grade of "C" or better in all major, support and restricted elective courses;
 2. pass the General Education Exam and the Senior Exit Examination covering the objectives of the required courses in his/her program;
 3. submit a departmentally approved Honors Senior Thesis, a senior project or a proposal that attempts the solution of a problem;
- and
4. attend and pass departmental seminar courses.

Minor in Computer Science

Mathematics majors with a minor in Computer Science must complete at least 18 semester hours of basic mathematics and computer science courses as outlined below. A grade of "C" or better must be earned in each course in this minor.

The required courses are: MATH 207, CSCI 215, CSCI 220 and CSCI 227. The remaining courses are to be chosen from the following group: CSCI 325, CSCI 346, CSCI 415, and CSCI 436.

Minor in Mathematics

Students who elect Mathematics as their minor must complete at least 20 semester hours of mathematics courses as outlined below. A grade of "C" or better must be earned in each course in this minor.

The following courses are required: MATH 201, MATH 202, MATH 212 and MATH 401. The remaining two courses are to be chosen from one of the following groups in the sequence shown:

- (1) STAT 341, STAT 342 or STAT 401
- (2) MATH 301, MATH 306
- (3) MATH 302, MATH 409
- (4) MATH 403, MATH 405
- (5) MATH 336, CSCI 335

Minor in Physics

Students who elect Physics as their minor must complete at least 18 semester hours of basic mathematics and physics as outlined below. A grade of "C" or better must be earned in each course in this minor.

The following courses are required: PHYS 203, PHYS 204, PHYS 311 and PHYS 352. The remaining courses are to be chosen from the following group: MATH 202 AND PHYS 310 or PHYS 322.

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Major in Mathematics

A. Objectives

In addition to meeting the objectives for all departmental majors,

students majoring in mathematics should, upon graduation, be able to:

1. formulate mathematical models and use them to solve problems in various disciplines;
2. enter graduate programs in mathematics, applied mathematics or statistics; and
3. explain mathematical concepts to undergraduate students.

B. Acceptance into the Major

A grade of “C” or better in the following courses: MATH 201, MATH 202, and MATH 205

C. Curriculum Summary for the Major in Mathematics

General Education 57

Note: The following courses substitute for requirements in the General Education Program:

1. MATH 201 [Calculus I (4 hrs.)] replaces MATH 111 [College Algebra (3 hrs.)].
2. PHYS 203 [Principles of Physics I (4 hrs.)] replaces CHEM 101 [Physical Science (3 hrs.) and CHEM 101 Lab (1 hr.)].

Major Courses

MATH 202, Calculus II	4
MATH 205, Discrete Mathematics	3
MATH 212, Linear Algebra	3
MATH 301, Calculus III	3
MATH 302, Differential Equations	3
MATH 306, Vector Analysis	3
MATH 336, Linear Programming	3
MATH 191-492, Freshman/Junior/Senior Seminar.....	5
MATH 401, Modern Algebra	3
MATH 403, Real Analysis	3
MATH 405, Complex Variables	3
MATH 409, Applied Mathematics.....	3
STAT 341, Introduction to Statistics I	3
STAT 342, Introduction to Statistics II.....	3
STAT 401, Data Analysis	3
CSCI 226, Introduction to Programming.....	3

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PHYS 204, Principles of Physics II	4
Total	55

Elective Courses in the Major (9 hrs. from those listed below)

MATH 207, Applied Discrete Mathematics.....	3
CSCI 230, Business Application Software.....	3
STAT 394, Probability I.....	3
STAT 421, Applied Stat. and Experimental Design.....	3
STAT 423, Applied Regression and Analysis of Var....	3
STAT 427, Introduction to Categorical Data Analysis...	3
Total	18

Free Electives	9
Total	9

Major in Computer Science

A. Objectives

In addition to achieving departmental goals, graduates of the computer

science program should be able to:

1. Use UNIX, Windows and other operating systems efficiently;
2. Apply knowledge of operating system principles;
3. Relate knowledge of programming language design to various high-level languages;
4. Use appropriate data structures for information processing;
5. Demonstrate an awareness of computer architecture in design of assembly programs; and
6. Enter graduate programs in computer science, computer engineering or information systems.

B. Acceptance into the Major

A grade of “C” or better in the following courses: CSCI 215, CSCI 220, CSCI 225, CSCI 227, and MATH 207.

C. Curriculum Summary for the Major in Computer Science

General Education 57

Note: The following courses substitute for requirements in the General Education Program:

1. MATH 201 [Calculus I (4 hrs.)] replaces MATH 111 [College Algebra (3 hrs.)].
2. PHYS 203 [Principles of Physics I (4 hrs.)] replaces CHEM 101 [Physical Science (3 hrs.) and CHEM 101 Lab (1 hr.)].
3. CSCI 225 [Introduction to Digital Logic Design (3 hrs.)] replaces CSCI 200 [Computer Concepts (3 hrs.)].

Major Courses

CSCI 215, Basic Algorithmic Design.....	4
CSCI 220, Intro to Object-Oriented Design & Ana.....	3
CSCI 225, Introduction to Digital Logic Design.....	3
CSCI 227, Object-Oriented Programming using C++..	3
CSCI 242, Data Structure & Algorithm Design.....	3
CSCI 325, Comp. Org. & Assembly Language.....	3
CSCI 340, Operating Systems	3
CSCI 346, Computer System Architecture.....	3
CSCI 391- 492, Junior/Senior Seminar	4
CSCI 401, Senior Design Project.....	3
CSCI 425, Intro. to Theoretical Con. in Comp. Sci.....	3
MATH 202, Calculus II	4
MATH 207, App. Discrete Math for Comp. Sci.....	3
MATH 212, Linear Algebra	3
STAT 341, Intro. to Prob. & Statistics: Inference I	3
PHYS 204, Principles of Physics II	4
Total	52

Elective Courses in the Major (15 hrs. from the following)

CSCI 335, Numerical Methods	3
CSCI 402, Introduction to Internet Technologies.....	3
CSCI 403, Introduction to Java Language.....	3
CSCI 404, Introduction to Artificial Intelligence.....	3
CSCI 405, Introduction to Computer Security.....	3
CSCI 406, Intro. to Grap. App. Dev. in a Vis. Env.....	3
CSCI 415, Database System Design and Analysis	3
CSCI 436, Computer Networks	3

CSCI 437, Fundamentals of Software Engineering.....	3
CSCI 438, Multimedia Systems Design	3
CSCI 455, Special Topics	3
Total	33

Major in Management Information Science

A. Objectives

Graduates of this program will be prepared for careers in large industries or small companies as analysts, developers and managers of data entry, storage and retrieval systems. They will also be prepared to enter graduate programs in Management Information Science. Students completing the program will be able to:

1. assess information needs of business management, marketing and accounting operations;
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2. design database management systems to solve information management problems;
3. implement and develop documentation for efficient application programs in C and C++ Languages;
4. use various operating systems (e.g., Windows and Unix) efficiently; and
5. select and use appropriate software applications to solve information management problems.

B. Acceptance into the Major

A grade of “C” or better in the following courses: CSCI 215, CSCI 220, CSCI 227, and MATH 205.

C. Curriculum Summary for the Major in Management Information Science

General Education 57

Note: The following modifications of the General Education program apply to the Major in Management Information Science:

1. CSCI 230 [Business Application Software (3 hrs.)] replaces CSCI 200 [Computer Concepts (3 hrs.)].
2. There is no option for SOCI 201; students with this major must take ECON 200.

Major Courses

Computer Science Courses

CSCI 215, Basic Algorithmic Design.....	4
CSCI 220, Intro to Object-Oriented Design & Ana.....	3
CSCI 227, Introduction to C++ Programming	3
CSCI 191- 492, Freshman/Junior/Senior Seminar.....	5
CSCI 402, Introduction to Internet Technologies.....	3
CSCI 415, Database System Design and Analysis.....	3
CSCI 436, Computer Networks	3
CSCI 438, Multimedia Systems Design.....	3

Business Courses

ACCT 211, Financial Accounting	3
ACCT 212, Managerial Accounting	3
BADM 201, Business Communications	3
BADM 311, Business Finance	3
BADM 314, Business Research	3
ECON 312, Quantitative Methods	3

MGMT 201, Principles of Management	3
MGMT 403, Productions and Operations Management...	3
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MGMT 407, Management Information Systems	3
MRKT 201, Principles of Marketing	3
Total	57
Support Courses	
MATH 201, Calculus I	4
MATH 205, Discrete Mathematics.....	3
MATH 212, Linear Algebra	3
MATH 336, Linear Programming	3
STAT 341, Intro to Prob. & Statistics: Inference I	3
STAT 401, Data Analysis.....	3
Total	19

Major in Mathematics Education

A. Objectives

Students completing this program will be able to:

1. demonstrate a knowledge of basic skills in reading, composition and mathematics;
2. demonstrate a broad general knowledge required by the General Education curriculum;
3. demonstrate an appropriate knowledge base in all areas of mathematics;
4. demonstrate knowledge and skills in the selection of appropriate assessment methods;
5. demonstrate an awareness of cultural diversity and the ability to work with children and youth of diverse social, economic, religious and ethnic backgrounds and disabilities (physical and emotional);
6. demonstrate the application of pedagogical theory and practice;
7. model the characteristics of an educational leader;
8. relate mathematics to other disciplines;
9. demonstrate skills in planning and preparation of instruction;
10. demonstrate knowledge, skills and the application of effective classroom management;
11. select and use appropriate technology;
12. demonstrate knowledge and application of the history of mathematics;
13. demonstrate skills using the workplace-centered approach to teaching algebra and geometry; and

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14. select and use appropriate service learning models to enhance teaching and learning.

B. Acceptance into the Major

A grade of "C" or better in the following courses: MATH 201, MATH 202, and MATH 205.

C. Specific Requirements

1. Complete applications for admission to the Teacher Education Program and Student Teaching.
2. Complete required courses with a grade of "C" or better in each.
3. Pass a test of basic academic skills (Praxis I).
4. Pass the General Education Exam.
5. Pass a subject assessment (Praxis II).
6. Pass a senior exit exam.

7. Demonstrate competent performance as measured by ADEPT.
8. Submit a departmentally approved Honors Senior Thesis, a senior project or a proposal that attempts the solution of a problem.

D. Curriculum Summary for the Major in Mathematics Education

General Education 51

Note: The following modifications to the General Education Program apply to the Major in Mathematics Education:

1. MATH 201 [Calculus I (4 hrs.)] replaces MATH 111 [College Algebra (3 hrs.)].
2. BIOL 102 [Biology of Health & Environment (3 hrs.) and BIOL 102 Lab (1 hr.)].
3. CSCI 226 [Intro. to Programming (3 hrs.)] replaces CSCI 200 [Computer Concepts (3 hrs.)]

Math Courses

MATH 201, Calculus I	4
MATH 202, Calculus II	4
MATH 203, College Geometry.....	3
MATH 205, Discrete Mathematics.....	3
MATH 212, Linear Algebra.....	3
MATH 301, Calculus III.....	3
MATH 302, Differential Equations.....	3
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MATH 310, Applied Algebra and Geometry.....	3
MATH 391- 491, Junior/Senior Seminar.....	3/4
MATH 401, Modern Algebra.....	3
MATH 407, History of Mathematics.....	1
PHYS 203, Principles of Physics.....	4
CSCI 226, Introduction to Programming.....	3
STAT 341, Introduction to Probability and Statistics.....	3
STAT 401, Data Analysis.....	3
Total	46

Education Courses

EDUC 104, Introduction to Education	3
EDUC 200, Strategies in Test-Taking (PRAXIS I).....	1
EDUC 204, History, Principle and Philosophy of Edu.....	3
EDUC 317, Introduction to Exceptional Students.....	3
EDUC 325, Methds. of Teach. math in the sec. Schools...	3
EDUC 326, Human Growth and Development	3
EDUC 327, Classroom Management	2
EDUC 338, Diagnostic-Prescriptive Teaching	3
EDUC 401, Technology for Teachers	2
EDUC 450S, Educational Psychology	3
EDUC 409, Reading in the Content Area	3
EDUC 454, Professional Clinical Practice.....	12
PSYC 201, Introduction to Psychology	3
Total	47

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Curriculum Leading to the Bachelor of Science Degree with a Major in Mathematics and an Open Minor/Electives -129 Semester Hours.

FRESHMAN YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

EDUC 101, Orientation.....	1	EDUC 102, Orientation.....	1
ENGL 101, Composition.....	3	ENGL 102, Composition.....	3
CHEM 121, General Chemistry....	4	MATH 201, Calculus I.....	4
MATH 205, Discrete Math.....	3	CSCI 226, Intro. to Prog. using C	3
HIST 101, Afr Am. Heritage.....	3	BIOL 102, Biol. Hlth. & Env.....	3
PHED 101-107, Physical Ed.....	1	PHED 101-107, Physical Ed.....	1
ASMB 101, Assembly.....	0.5	BIOL 102L, Lab.....	1
MATH 191, Freshman Seminar I.....	0.5	ASMB 102, Assembly.....	0.5
16 MATH 192, Freshman Sem II.....	0.5		

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SOPHOMORE YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

FREN/SPAN 203.....	3	FREN/SPAN 204.....	3
MATH 202, Calculus II.....	4	MATH 212, Linear Algebra.....	3
ARTS 201, Art Appreciation		PHYS 204, Prin. of Physics II.....	4
or ENGL 202, Public Speaking.....	3		
MUSC 203, Music Appreciation.....	3	ASMB 202, Assembly.....	0.5
PHYS 203, Prin of Physics I.....	4	Free Elective.....	3
ENGL 201, Intro to Literature.....	3	16.5	
ASMB 201, Assembly.....	0.5		

17.5

JUNIOR YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

STAT 341, Introd. to Prob. Stat. I.	3	MATH 336, Linear Prog.....	3
MATH 301, Calculus III.....	3	MATH 306, Vector Analysis.....	3
MATH Elective/Minor.....	3	MATH 302, Differential Eq.....	3
SOCI 201, Introd. to Sociology		HIST 301, Surv. of World Hist.....	3
or STAT 342, Intro. to Pro. Stat. II.....	3		
ECON 200, Intro to Economy.....	3	MATH 392, Junior Seminar II	
MATH 391, Junior Seminar I or			
or *HNTH 392, Hon. Thesis Sem. I.....	1		
*HNTH 391, Hon. Thesis Sem. I.....	1	16	

13

SENIOR YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

STAT 401, Data Analysis.....	3	MATH 405, Complex. Variables	3
MATH 401, Modern Algebra.....	3	MATH 409, Applied Maths.....	3
MATH Elective/Minor.....	3	MATH Elective/Minor.....	3
MATH 403, Real Analysis.....	3	Free Elective.....	3
Free Elective.....	3	MATH 492, Sen. Sem II.....	1
MATH 491, Senior Seminar I.....	1	or	
16 *HNTH 491, Hon. Thesis Sem.....	2		

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Curriculum Leading to the Bachelor of Science Degree with a Major in Mathematics Education - 131/132 Semester Hours.

FRESHMAN YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

HIST 101, Af Am Heritage.....	3	PHIL 201, Ethics.....	3
MATH 205, Discrete Math.....	3	EDUC 102, Orientation.....	1
EDUC 101, Orientation.....	1	ENGL 102, Composition.....	3
BIOL 102, Biol. Hlth. & Env.....	3	MUSC 203/ARTS 201.....	3
BIOL 102L, Biol. Hlth. & Env.....	1	MATH 201, Calculus I.....	4
PHED 101-107, Physical Education.....	1	PHED 101-107, Physical Ed.....	1
ENGL 101, English Comp I.....	3	MATH 192, Freshman Semi. II... ..	0.5
MATH 191, Freshman Seminar I.	0.5	ASMB 102, Assembly.....	0.5
ASMB 101, Assembly.....	0.5		16

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SOPHOMORE YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

ENGL 201, Intro to Literature.....	3	MATH 212, Linear Algebra.....	3
CSCI 226, Intro to Prog using C... ..	3	SOCI 201, Intro to Sociology.....	3
PSYC 201, Intro to Psychology.....	3	ENGL 202, Public Speaking.....	3
EDUC 104, Intro to Education.....	3	STAT 341, Intro. to Prob. & Stat	3
MATH 202, Calculus II.....	4	EDUC 326, Human Grw. Devel.	3
EDUC 200, Testing Strategy.....	1	RLGN 201, Biblical Literature....	3
ASMB 201, Assembly.....	0.5	ASMB 202, Assembly.....	0.5

17.5 18.5

JUNIOR YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

PHYS 203, Principles of Phys. I..	4	MATH 302, Differential Equ.....	3
MATH 301, Calculus III.....	3	EDUC 317, Intro. to Ex. Stu.....	3
STAT 401, Data Analysis.....	3	EDUC 409, Tech. Cont. Reading	3
MATH 407, History of Math.....	1	EDUC 204, Hist. Prin. & Philos.	3
MATH 203, College Geometry.....	3	EDUC 401, Tech for Teach.....	2
EDUC 345, Edu. Psychology.....	3	HIST 301, Surv of World Hist.....	3
MATH 391, Junior Seminar I.....	1	MATH 392, Junior Seminar II.....	1
*HNTH 391, Hon. Thesis Sem. I	1	*HNTH 392, Hon. Thesis Sem II	1

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SENIOR YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

MATH 401, Modern Algebra.....	3	EDUC 450S, Prof. Clini. Pract.....	12
MATH 310, App. Algebra/Geom.	3		12
EDUC 327, Classroom Mgmt.....	3		
EDUC 338, Diag.-Pres. Teaching.	2		
EDUC 325, Met. Teac. Sec. Math	3		
MATH 491, Senior Seminar I.....	1		
*HNTH 491, Hon Thesis Sem.....	2		

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*This course is required for Honors students.

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Curriculum Leading to the Bachelor of Science Degree with a Major in Computer Science – 129/130 Semester Hours.

FRESHMAN YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

EDUC 101, Orientation.....	1	EDUC 102, Orientation.....	1
ENGL 101, Composition I.....	3	ENGL 102, Composition II.....	3
CHEM 121, Chemistry.....	4	BIOL 102, Biol. Hlth. & Env.....	3
MATH 201, Calculus I.....	4	BIOL 102L, Biol. Hlth. & Env.....	1
PHED 101-107, Physical Ed.....	1	CSCI 220, OO Design & Anal.....	3
ASMB 101, Assembly.....	0.5	MATH 202, Calculus II.....	4
CSCI 215, Basic Alg Design.....	4	PHED 101-107, Physical Ed.....	1
CSCI 191, Freshman Seminar I.....	0.5	CSCI 192, Freshman Seminar II.....	0.5
17 ASMB 102, Assembly.....	0.5		

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SOPHOMORE YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

ENGL 201, Intro. to Lit.....	3	CSCI 242, Data Struct. & Alg.....	3
CSCI 225, Intro to Digital Logic.....	3	ARTS 221, Drawing & Comp. I	
PHYS 203, Prin. of Phys. I.....	4	or	
CSCI 227, Intro. to Prog. Usg. C++.....	3	MUSC 203, Music Appreciation.....	3
MATH 207, App. Discrete Math.....	3	PHYS 204, Prin. of Phys. II.....	4
ASMB 201, Assembly.....	0.5	MATH 212, Linear Algebra.....	3
16.5 ENGL 202, Public Speaking.....	3		
ASMB 202, Assembly.....	0.5		

16.5

JUNIOR YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

ENGL 344, Tech. Writing.....	3	CSCI 340, Operating System.....	3
PHIL 201, Ethics.....	3	RLGN 201, Biblical Literature.....	3
CSCI 325, Comp Org & Asmb.....	3	SOCI 201, Intro. to Soc.	
STAT 341, Intro. to Prob. & Stat. I.....	3	or	
FREN/SPAN 203.....	3	ECON 200, Intro. to Econ.....	3
CSCI 391, Junior Seminar I.....	1	CSCI 346 Comp Arch.....	3
*HNTH 391, Hon. Thesis Sem. I.....	1	FREN/SPAN 204.....	3
16 CSCI 392, Junior Seminar II.....	1		
* HNTH 392, Hon. Th. Sem I.....	1		

16

SENIOR YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

CSCI 401, Project Design.....	3	CSCI Elective.....	3
CSCI 425, Theoretical Con. in CS.....	3	CSCI Elective.....	3
CSCI Elective.....	3	Free Elective.....	3
CSCI Elective.....	3	HIST 301, Sur of World Hist.....	3
HIST 101, Af Am Heritage.....	3	CSCI 492, Senior Seminar II.....	1
CSCI 491, Senior Seminar I.....	1	*HNTH 492, Hon Th. Sem.....	2

16 13/14

*This course is required for Honors students.

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Curriculum Leading to the Bachelor of Science Degree with a Major in Management Information Science – 133 Semester Hours.

FRESHMAN YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

ENGL 101, Composition I.....	3	ENGL 102, Composition II.....	3
CHEM 101, Physical Science.....	3	BIOL 102, Bio of Hlth. & Env.....	3
CHEM 101L, Phys. Science Lab... ..	1	BIOL 102L, Lab.....	1
PHED 101-107, Phys. Ed.....	1	MATH 205, Discrete Math.....	3
MATH 112, Pre-calculus.....	4	PHED 101-107, Phys. Ed.....	1
CSCI 230, Bus. App. Software.....	3	CSCI 215, Basic Alg Design.....	4
EDUC 101, Orientation I.....	1	EDUC 102, Orientation II.....	1
ASMB 101, Assembly.....	0.5	ASMB 102, Assembly.....	0.5
CSCI 191, Freshman Seminar I....	0.5	CSCI 192, Freshman Seminar II..	0.5

17 17

SOPHOMORE YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem Hrs.

FREN/SPAN 203.....	3	FREN/SPAN 204.....	3
MATH 201, Calculus I.....	4	ECON 200, Sur of Econ.....	3
BADM 201, Bus Communication	3	ENGL 201, Intro to Literature....	3
HIST 101, Afr, Ameri. Heritage... ..	3	MATH 212, Linear Algebra.....	3
CSCI 220, OO Design & Anal.....	3	ENGL 202, Public Speaking.....	3
ASMB 201, Assembly.....	0.5	CSCI 227, Intro to Pro. usg C++	3
16.5 ASMB 202, Assembly.....	0.5		

18.5

JUNIOR YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

STAT 341, Intro. to Pro. & Stats I	3	ARTS 201, Art Appreciation	
ACCT 211, Financial Acct.....	3	or	
CSCI 415, Database Sys. & Ana.....	3	MUSC 203, Music Appreciation.....	3
MGMT 201, Prin. of Mgmt.....	3	ACCT 212, Manag. Accounting..	3
HIST 301, Surv. of World Hist.....	3	MRKT 201, Principles of Mark....	3
CSCI 391, Junior Seminar I		ECON 312, Quantitative Meth.....	3
*HNTH 391, Hon. Thesis Sem. I.....	1	BADM 314 , Bus. Research.....	3
16 CSCI 392, Junior Seminar II			
* HNTH 392, Hon Th Seminar II.....	1		

16

SENIOR YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

BADM 311, Bus. Finance.....	3	CSCI 402, Intro. to Internet Tech	3
MGMT 403, Prod. & Op. Mgmt... ..	3	CSCI 436, Comp Networks.....	3
MGMT 407, Mgmt. Info. Sys.....	3	MATH 336, Linear Prog.....	3
CSCI 438, Multi-Media Sys Des.....	3	PHIL 201, Ethics.....	3
STAT 401, Data Analysis.....	3	RLGN 201, Biblical Lit.....	3
CSCI 491, Senior Seminar I.....	1	CSCI 492, Senior Seminar II.....	2
* HNTH 491, Hon. Thesis Sem.....	1		

15/16

*This course is required for Honors students.

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Dual Degree (3+2) Transfer Program in Engineering - Clemson Curriculum

Leading to the Bachelor of Science Degree in Applied Mathematics and Bachelor of Science Degree in Engineering - 104-112 Semester Hours Before Transfer.

FRESHMAN YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

ENGL 101, Composition I.....	3	ENGL 102, Composition II.....	3
ENGR 101, Engineering Graph.....	3	ENGR 102, Intro. to Engineering.	3
MATH 201, Calculus I.....	4	MATH 202, Calculus II.....	4
HIST 101, Afr Am Heritage.....	3	CSCI 225, Digital Logic.....	3
CHEM 121, General Chem. I.....	4	CHEM 122, General Chem. II.....	4
EDUC 101, Orientation.....	1	EDUC 102, Orientation.....	1
ASMB 101, Assembly.....	0.5	ASMB 102, Assembly.....	0.5

18 18

SOPHOMORE YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

PHYS 203, Prin. of Phys. I.....	4	PHYS 204, Prin. of Phys. II.....	4
FREN/SPAN 203.....	3	FREN/SPAN 204.....	3
ENGR 215, Statics.....	3	BIOL 102, Bio of Hlth & Env.....	3
HIST 301, Sur of World Hist.....	3	ECON 200, Surv of Economics... ..	3
MATH 301, Calculus III.....	3	MATH 212, Linear Algebra.....	3
PHED 101-107, Phys. Ed.....	1	PHED 101-107, Phys. Ed.....	1
ASMB 201, Assembly.....	0.5	ASMB 202, Assembly.....	0.5

17 BIOL 102L, Biology Lab..... 1

18

JUNIOR YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

STAT 341, Intro. to Prob. Stat. I..	3	ENGL 202, Public Speaking.....	3
*CHEM 231, Organic Chem. I.....	4	*CHEM 232, Organic Chem. II... ..	4
ENGL 201, Intro. to Literature.....	3	RLGN 201, Biblical Lit.....	3
PHIL 201, Ethics.....	3	MATH 302, Differential Eq.....	3
CSCI 226, Intro. to C Lang.....	3	MATH 306, Vector Analysis.....	3
+ENGR 216, Dynamics.....	3	ARTS 201, Art Appreciation	

19 or

MUS 203, Music Appreciation.....3

19

-SENIOR YEAR

Clemson University

*Chemical Engineering majors must take CHEM 231 and CHEM 232 before matriculating at Clemson University.

+Civil and Mechanical Engineering majors must take ENGR 216 before matriculating at Clemson University.

*This course is required for Honors students.

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Dual Degree (3+2) Transfer Program in Engineering Technology - South Carolina State University Curriculum Leading to the Bachelor of Science Degree in Applied Mathematics and Bachelor of Science Degree in Engineering Technology – 106-112 Semester Hours Before Transfer.

FRESHMAN YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

ENGL 101, Composition I.....	3	ENGL 102, Composition II.....	3
ENGT 170, Intro. to Eng. Tech.....	3	ENGR 150, Engineering Graph.....	3
MATH 112, Pre-Calculus.....	4	MATH 201, Calculus I.....	4
CHEM 121, Gen. Chem. I.....	4	CSCI 225, Digital Logic.....	3
CSCI 200, Computer Concepts.....	3	HIST 101, African Amer.-Her.....	3
EDUC 101, Orientation.....	1	EDUC 102, Orientation.....	1
ASMB 101, Assembly.....	0.5	ASMB 102, Assembly.....	0.5

18 17

SOPHOMORE YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

PHYS 203, Prin. of Phys. I.....	4	PHYS 204, Prin. of Phys. II.....	4
FREN/SPAN 203.....	3	FREN/SPAN 204.....	3
HIST 301, Surv of World Hist.....	3	BIOL 102, Bio of Hlth. & Env.....	3
MATH 202, Calculus II.....	4	ECON 200, Surv of Econ.....	3
PHED 101-107, Phys. Ed.....	1	MATH 212, Linear Algebra.....	3
ENGR 215, Statics.....	3	PHED 101-107, Phys. Ed.....	1
ASMB 201, Assembly.....	0.5	ASMB 202, Assembly.....	0.5

18 BIOL 102L, Lab.....1

18

JUNIOR YEAR

First Semester Second Semester

Courses Sem. Hrs. Courses Sem. Hrs.

STAT 341, Intro. Prob. Stat. I.....	3	ENGL 202, Public Speaking.....	3
ENGT 213, Strength of Mat.....	3	RLGN 201, Biblical Literature.....	3
ENGL 201, Intro. to Literature.....	3	MATH 302, Differential Eq.....	3
MATH 301, Calculus III.....	3	ART 201, Art Appreciation	
PHIL 201, Ethics.....	3	or	
CSCI 226, Intro. to Programming.....	3	MUSC 203, Music Appreciation.....	3

18 ENGT 230, Circuit Analysis.....3

15

SENIOR YEAR

South Carolina State University

*This course is required for Honors students.

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DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE COURSE DESCRIPTIONS

Computer Science (CSCI)

CSCI 191, 192. Freshman Seminar I and II.

Weekly sessions designed to introduce freshman Computer Science students to the world of computer technology, including career options, curricula options, departmental requirements, college requirements, study habits, test-taking strategies, library searches and critical thinking skills. Discussion and study groups will be formed among students and faculty. Final grades will be based on attendance and completion of assignments. One hour per week. One-half hour per course.

CSCI 215. Basic Algorithmic Design.

Co-requisite: MATH 201. Problem-solving, algorithmic design and computer programs. Windows and UNIX operating systems will be

used. Two lecture hours and two lab hours per week. Four hours.

CSCI 220. Introduction to Object-Oriented Design and Analysis.

Prerequisite: A grade of “C” or better in CSCI 215 or its equivalent.

Co-requisite: CSCI 240. Introduction to object-oriented concepts and techniques; multiple inheritance; memory management; operator overloading; polymorphism; performance issues. Three hours.

CSCI 225. Introduction to Digital Logic Design.

Co-requisites: MATH 207. Emphasis on digital computer hardware and software, fundamentals of boolean algebra, switching and switching functions, applications to logic design, minimization of boolean function, logic design with arrays, finite state model for sequential state minimization. Three hours.

CSCI 226. Introduction to Programming Using C Language.

Prerequisite: A grade of “C” or better in MATH 111 or its equivalent.

An introduction to the syntax, semantics and application of C programming language. Covers topics in declaration, variables, input, output, loops, functions, recursion, arrays, strings, pointers, programming style and documentation. Three hours.

CSCI 227. Introduction to Programming Using C++ Language.

Prerequisite: A grade of “C” or better in CSCI 220 or its equivalent.

Program design and implementation in the C++ programming language.

Programming using object-oriented concepts including objects, class structure and behavior, inheritance and reuse, polymor-

phism, dynamic binding and object identity. The UNIX operating system is used. Three hours.

CSCI 230. Business Application Software.

Prerequisite: A grade of “C” or better in CSCI 200 or its equivalent.

Hands-on application of database management software and spreadsheet software for solution of business problems. Emphasis in the course will be on the development of skill in the use of advanced program features of microcomputer software packages using spreadsheet macros and a database programming language. A project will be required. Three hours.

CSCI 242. Introduction to Data Structures and Algorithm.

Prerequisite: A grade of “C” or better in CSCI 227 or its equivalent.

Design and analysis of algorithms with an emphasis on data structures. Classical algorithm design techniques, including one/two-dimensional arrays, stack, queues, linked-lists, trees, graphs, etc., different sorting and searching techniques. Concepts on algorithm complexity. Three hours.

CSCI 245. Introduction to COBOL Programming Language.

Prerequisite: A grade of “C” or better in CSCI 215 or its equivalent.

An introduction to data processing using COBOL programming language and business-related applications. Structured programming and proper programming style are emphasized. Three hours.

CSCI 325. Computer Organization and Assembly Language Programming.

Prerequisite: A grade of “C” or better in CSCI 227 or its equivalent.

Memory organization, input-output organization. Digital logic circuits, digital components, data representation, register transfer and micro operations. Basic computer organization, design, and development of the basic computer. Central processing unit, hard-wired control, and micro-program control, memory organization, input/output organization. Three hours.

CSCI 335. Numerical Methods.

Prerequisites: A grade of “C” or better in CSCI 227, MATH 202 and MATH 212. Errors and their propagation in numerical computation; concepts of convergence and stability of an algorithm. Solution of non-linear equations – iterative methods, acceleration of convergence, Newton’s method of polynomials, quotient difference of linear questions, computation of inverse and eigen values of a matrix. Solution of ordinary differential equations. Three hours.

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CSCI 340. Operating Systems.

Prerequisite: A grade of “C” or better in CSCI 346 or its equivalent. Basic concepts and terminology of operating systems: interrupt programming, machine structure, memory management and virtual memory resource management. Three hours.

CSCI 341. Data Communications and Networking.

Prerequisite: A grade of “C” or better in CSCI 225 and CSCI 227 or their equivalents. OSI Communication model, data communications, protocol and protocol architecture, data transmission, transmission media, data, data communication interface, data link control, multiplexing. Three hours.

CSCI 346. Introduction to Computer Architecture.

Prerequisite: A grade of “C” or better in CSCI 325 or its equivalent. Architectural classification (Von Newman architecture, parallel architecture, etc.), various terminologies, parallelism in uniprocessor system, memory interleaving. Pipelining and vector processing, multiprocessor architectures. Three hours.

CSCI 391, 392, 491, 492. Junior/Senior Seminars.

Prerequisite: Acceptance as departmental major as prescribed by the program requirements in the beginning of the section. This seminar is designed to help prepare students for the successful completion of their senior thesis project and for transition into graduate/professional school or workplace within their major discipline. Lectures and exercises in areas such as technical writing will be conducted. Students will present a minimum of two briefings; each student will make a brief presentation of his/her thesis proposal during CSCI 391 and a final thesis presentation during CSCI 491. The seminar will also serve as a student-faculty informal forum for communication and exchange of ideas and discussion of topics in the areas of mathematics and computer science. Occasional presentations by invited guests. One hour per week. One hour per course.

CSCI 401. Senior Design Project.

Prerequisite: Completion of all required CSCI courses. Students work in teams to conceive, specify, design, implement, test and document a major project of current relevance. Students make oral and written reports throughout the semester in addition to a final report and demonstration

of the finished project. The course should be taken during the semester in which graduation is projected. Three hours.

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CSCI 402. Introduction to Internet Technologies.

Prerequisite: A grade of "C" or better in CSCI 227 or its equivalent. An introductory course in developing applications for the Internet and the WWW. Website development, client-server paradigm, scripting languages, e-commerce, and Internet security. Syntax and semantics of a string manipulation languages. Discussion of string processing languages such as PERL, VBScript, JavaScript, and ASP.

CSCI 403. Introduction to Java Language.

Prerequisite: A grade of "C" or better in CSCI 227 or its equivalent. Program design and implementation in the Java programming language. Programming using object-oriented concepts including objects, class structure and behavior, inheritance and reuse, polymorphism, dynamic binding and object identity. The Windows operating system and the Microsoft Visual Studio will be used. A major project is required. Three hours.

CSCI 404. Introduction to Artificial Intelligence.

Prerequisite: A grade of "C" or better in CSCI 227 and MATH 207 or their equivalent. Overview and definitions of Artificial Intelligence (AI). Search, including depth-first and breadth-first techniques with backtracking. Knowledge representation with emphasis on logical methods, Horn databases, resolution, quantification, unification, skolemization and control issues; non-monotonic reasoning; frames; semantic nets. AI systems, including planning, learning, natural language and expert systems. An AI programming language may be taught at the instructor's discretion. Three hours.

CSCI 405. Introduction to Computer Security.

Prerequisite: A grade of "C" or better in CSCI 227 or its equivalent. Basic concepts in information security and management such as risks and vulnerabilities, encryption practices, program security, operating system security, trusted operating system design, database security, distributed system security, security administration, and legal issues. Coverage of high-level concepts such as confidentiality, integrity, and availability applied to hardware, software, and data. Case studies of actual program threats and secure operating systems followed up with secure programming practices. Textbook augmented by readings and class discussions of current events. Three hours.

CSCI 406. Introduction to Graphical Application Development in a Visual Environment.

Prerequisite: A grade of "C" or better in CSCI 227 or its equivalent. Programming in Windows 95/NT using the Visual Studio (C++/J++/Basic) and tools. The focus is on using the Microsoft Foundation

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Classes (MFC) to develop graphical user interfaces, understanding the Win32 API, and modern operating systems concepts. Three hours.

CSCI 415. Introduction to Database System Design & Analysis.

Prerequisite: A grade of "C" or better in CSCI 227 or its equivalent. Database systems. File structures for database search, including indexing and hashing. The relational data model and the SQL language.

Conceptual database design and normalization. Overview of other data models. Three hours.

CSCI 425. Introduction to Theoretical Concepts in Computer Science.

Prerequisite: A grade of “C” or better in MATH 207 or its equivalent. Selected theoretical concepts including automata and formal languages, computability, reducibility, and complexity using Turing Machines and Automaton. Three hours.

CSCI 436. Computer Network Design and Analysis.

Prerequisite: A grade of “C” or better in CSCI 227 and CSCI 225 or their equivalent. Design and analysis of computer networks. Emphasis on the OSI architecture but discusses other schemes (e.g., ARPAnet). Data link control, local networks, protocols/architectures, network access protocols, internetworking and ISDN. Three hours.

CSCI 437. Fundamentals of Software Engineering.

Prerequisites: CSCI 242 and CSCI 325. Software engineering principles, process and techniques; software development approaches focusing on functional analysis and functional design methods. Configuration management, implementation strategies and testing. Three hours.

CSCI 438. Multimedia Systems Design.

Prerequisite: Senior standing. A hands-on approach to the study of principles underlying multimedia systems. Topics include multimedia systems design, multimedia hardware and software, issues in effective representation, processing and communication of multimedia data such as text, graphics, audio, images and video. Three hours.

CSCI 445. Computer Systems.

(Prerequisite: A grade of “C” or better in CSCI 225 and CSCI 325) Design of microcomputer based systems, microcomputer programming, component and system architectures, memory interfacing, parallel and serial I/O interfacing, A/D and D/A conversion, and typical applications. Three hours.

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CSCI 455. Special Topics.

Prerequisite: Consent of instructor. Departmental approval required in advance to use for degree credit. New developments in the field of computer science and engineering. Topic may vary from semester to semester. May be repeated for credit when topic changes. Three hours.

Pre-Engineering (ENGR)

ENGR 101. Engineering Graphics.

Prerequisite: A grade of “C” or better in MATH 112 or its equivalent. An introductory course in engineering graphics, which includes beginning drawing techniques, lettering and dimensioning, multi-view drawings, sectional and auxiliary views and principles and practices of graphing representations using modern computer-aided design tools. One hour of lecture and two hours of laboratory per week. Three hours.

ENGR 102. Introduction to Engineering.

Prerequisite: A grade of “C” or better in MATH 112. Students are introduced to the engineering profession and engineering disciplines.

Professional ethics, computers in engineering practice, word processing, spreadsheet, mathcad and technical communication. Problems from different disciplines of engineering, analytical and problemsolving techniques, such as estimation and approximation, solution by graphing and computation methods. Three hours.

ENGR 215. Statics.

Prerequisites: A grade of “C” or better in MATH 201 and PHYS 203. For all engineering majors. Introduction to principles of mechanics, equilibrium of particles and rigid bodies in two and three dimensions, components, resultants and moments. Distributed forces, centroids, friction and virtual work. Analysis with vector methods. Three hours.

ENGR 218. Dynamics.

Prerequisite: A grade of “C” or better in ENGR 215. For Civil and Mechanical Engineering majors. Kinematics of particles and rigid bodies, with emphasis on Newton’s laws: work, energy, momentum and impulse methods for the solution of problems. Three hours.

ENGR 310. Engineering Computing.

See CSCI 226 or CSCI 227.

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ENGR 321, Systems and Signals.

(Prerequisite: A grade of “C” or better in ENGR 230 and MATH 302) Introduction to signal processing and linear systems. Concepts of signal and system analysis in time and frequency domains as applied to electric circuits. Laplace transform, Fourier series, and Fourier techniques are stressed. Three hours.

ENGR 322, Digital Signal Processing.

(Prerequisite: A grade of “C” or better in ENGR 321). An introduction to digital signal processing. Signal processing of discrete-time systems. Sampling, z-transform, discrete and fast Fourier transforms, flow graphs, design techniques for digital filters, effects of finite word length, and applications. Three hours.

Engineering Technology (ENGT)

ENGT 150. Engineering Graphics.

Prerequisite: A grade of “C” or better in MATH 112 or its equivalent. An introductory course in engineering graphics, which includes beginning drawing techniques, lettering and dimensioning, multi-view drawings, sectional and auxiliary views, principles and practices of graphing representations using modern computer- aided design tools. One hour of lecture and two hours of laboratory per week. Three hours.

ENGT 170. Introduction to Engineering Technology.

Prerequisite: A grade of “C” or better in MATH 112. Students are introduced to the role that engineering and technology play in society. Professional ethics, computers in engineering practice and various tools used for solving technical problems. Problems drawn from different disciplines of engineering technology, analytical and problem-solving techniques, such as estimation and approximation, solution by graphing and computation methods. Three hours.

ENGT 212. Statics.

Prerequisites: A grade of “C” or better in MATH 201 and PHYS 203.

For all engineering majors. Introduction to principles of mechanics, equilibrium of particles and rigid bodies in two and three dimensions, components, resultants and moments. Distributed forces, centroids, friction and virtual work. Analysis with vector methods. Three hours.

ENGT 213. Strength of Materials.

Prerequisite: A grade of “C” or better in ENGR 212. Concepts of stress and strain. Axial loading, torsions, bending and shear. Stress - 338 -

transformations. Bending moments, beam deflection, Mohr’s cycle and columns. Three hours.

ENGT 230. Circuit Analysis.

Prerequisite: A grade of “C” or better in MATH 201. Basic DC electricity: voltage, current, resistance and Ohm’s Law; series, parallel and composite circuits. Analysis using Kirchoff’s Laws and basic current theorems; analysis of DC circuits. Introduction to AC. Three hours.

ENGT 310. Engineering Computing.

See CSCI 226 or CSCI 227.

Honors Thesis (HNTH)

HNTH 391. Honors Junior Seminar I.

Prerequisites: Junior status, Honors College membership, and acceptance as departmental major as prescribed by the program requirements in the beginning of this section. A two-semester sequence designed to initiate the thesis process required for graduation from the Honors College. The first semester concerns an introduction to research, technical writing, and problem solving. Students will collect and review scientific literature related to an area of interest and select a thesis topic in addition to meeting other course requirements described above. One hour.

HNTH 392. Honors Junior Seminar II.

Prerequisites: A grade of “C” or better in HNTH 391. During the second semester. Students will write a research prospectus outlining the goals and methodology for their thesis projects. The student must take the initiative in seeking a mentor to help in the design and supervision of the project. The deadline for submission of the prospectus to the Department will fall on October 15 (for December graduation) or March 15 (for May graduation). Final grades will be based upon attendance and acceptance of the prospectus by the Department. One hour.

HNTH 491. Honors Thesis Seminar III.

Prerequisites: Senior status and a grade of “C” or better in HNTH 392. This seminar centers on a year-long writing project to be completed during the senior year under the supervision of a mentor from the appropriate department. Lectures and exercises in areas of mathematics and computer science will be conducted to improve the technical writing. The seminar will also serve as a student-faculty informal forum for communication and exchange of ideas in the areas of mathematics and computer science. Two hours.

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Mathematics (MATH)

MATH 112. Pre-Calculus.

Prerequisite: A grade of “C” or better in MATH 111 or its equivalent. Angles and measurements, trigonometric functions and their graphs, period, amplitude and phase shift, inverse trig functions, right triangle trigonometry, trigonometric identities and equations, the laws of sine and cosine. Vectors, partial fractions, systems of equations in two or three variables, solving linear systems using matrices, Cramer’s Rule. Five contact hours. Four hours.

MATH 191, 192. Freshman Seminars.

Weekly sessions designed to introduce freshman Math students to the current trends in the area of mathematics and mathematical research, including career options, curricula options, departmental requirements, college requirements, study habits, test-taking strategies, library searches and critical thinking skills. Discussion and study groups will be formed among students and faculty. Final grades will be based on attendance and completion of assignments. One hour per week. One-half hour per course.

MATH 200. Integrated Mathematics.

Prerequisite: A grade of “C” or better in MATH 111 or its equivalent. This course features concepts from number and operations, algebra, geometry, measurement, and data analysis. Test-taking strategies will be infused into the assessment of the application of the concepts. Students will apply the usefulness of the concepts to physical science, aerospace technology, biological science and other disciplines. Reasoning and proof, communication, representation, connections, and problem solving skills will be enhanced as the students explore, discuss and write about different concepts using graphing calculators, MS Excel, Maple and manipulatives. This course is recommended for prospective education majors before taking Praxis I. Three hours.

MATH 201. Calculus I.

Prerequisite: A grade of “C” or better in MATH 112 or its equivalent. Piece-wise functions, limits and continuity, intermediate value theorem, derivatives using limit definition. Power Rule, sum and difference rule, scalar multiple rule, derivatives of polynomials, exponential functions, product and quotient rule, Chain rule, derivatives of logarithmic functions and trigonometric functions, higher-order derivatives, implicit differentiation, related rates, Newton’s method, curve sketching, maximum and minimum problems. Four hours.

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MATH 202. Calculus II.

Prerequisite: A grade of “C” or better in MATH 201 or its equivalent. Indefinite integrals, the definite integral as area and as the limit of a sum, numerical integration, trapezoidal and Simpson’s rule, Fundamental theorem of calculus, indefinite integrals of trigonometric functions, methods of integration, substitution, trigonometric substitution, integration by parts, convergence and divergence of improper integrals. Four hours.

MATH 203. College Geometry.

Prerequisite: A grade of “C” or better in MATH 201 or its equivalent. Basic concepts of Euclidean and non-Euclidean geometries are studied.

Perspectives on synthetics, coordinates, transformation and vectors. This course examines visual thinking, inductive reasoning along with geometric constructions, analysis of geometric figures, informal deduction, formal deduction, simple algebraic and paragraph proofs, properties and applications of right-triangle trigonometry, tessellations, and fractals. Three hours.

MATH 205. Introduction to Discrete Mathematics.

Prerequisite: A grade of “C” or better in MATH 111 or its equivalent. Truth tables, logical equivalence, necessary and sufficient conditions, valid and invalid arguments, binary and decimal representation of numbers, universal and existential quantifiers, direct proof and counter example, elementary number theory, mathematical induction, basic set theory, probability, permutations and combinations, one-to-one and inverse functions. Three hours.

MATH 207. Applied Discrete Mathematics for Computer Scientists.

Prerequisite: A grade of “C” or better in MATH 111 or its equivalent. Propositional logic and the predicate calculus. Logic gates and circuits. Methods of proof. Elementary set theory. Mathematical induction. Recursive definitions and algorithms. Solving recurrences. The analysis of algorithms and asymptotic growth of functions. Elementary combinatorics. Introduction to graph theory. Ordered sets, including posets and equivalence relations. Introduction to formal languages and automata. Three hours.

MATH 212. Linear Algebra.

Prerequisite: Prerequisite: A grade of “C” or better in MATH 201 or its equivalent. Systems of linear equations. Gaussuian elimination, inverses of matrices and elementary matrices. Properties of determinants, cofactor expansion, Cramer’s Rule, applications, vectors in two and three spaces, general vector spaces, subspaces, span, null space dimension, rank of matrix, matrices as linear transformations,

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orthogonal bases and Gram-Schmidt Process, Eigen values and Eigen vectors. Three hours.

MATH 301. Calculus III.

Prerequisite: A grade of “C” or better in MATH 202 or its equivalent. Sequences and series. Vectors in three dimensions, dot product and cross product, limits and derivatives of functions of several variables, tangent, normal and binomial vectors, curvature and radius of curvature of curves in three dimensions. Three hours.

MATH 302. Differential Equations.

Prerequisite: A grade of “C” or better in MATH 202 or its equivalent. Initial value problems, separable variables, exact equations, linear first-order equations, modeling with first-order equations, systems of linear and nonlinear equations, boundary values problems, homogenous linear equations with constant coefficients, method of undetermined coefficients, superposition principle, variation of parameters, modeling with higher-order equations. Three hours.

MATH 306. Vector Analysis.

Prerequisite: A grade of “C” or better in MATH 301 or its equivalent. Functions of several variables and their limits and continuity. Partial

and directional derivatives and their applications to tangent planes and normal lines. Extrema of functions of several variables. LaGrange multipliers. Multiple integrals with cylindrical and spherical coordinates. Vector fields, Green's divergence and Stokes theorems are introduced. Three hours.

MATH 310. Applied Algebra and Geometry.

Prerequisite: A grade of "C" or better in MATH 301 or its equivalent. This course employs an interactive, workplace-centered approach to the teaching of algebra and geometry. It emphasizes the use of mathematics in the workplace, covering five occupational areas: agribusiness and agriculture, business and marketing, family and consumer science, health occupations and industrial technology. Interactive discovery occurs through hands-on "math labs." Students will be able to integrate geometry with ideas from algebra, probability, statistics, discrete mathematics and trigonometry. Technology will serve as a tool in the development of concepts. This course is required for prospective high school mathematics teachers. Three hours.

MATH 336. Linear Programming.

Prerequisite: A grade of "C" or better in MATH 212 or its equivalent. Review of vectors and matrices, linear independence and span of vectors, systems of equations, inverse of a matrix, simplex method, - 342 - slack variables, feasible solutions and extreme points, the dual of linear problem, transportation problems, critical path and shortest path, convexity and location of extreme in two variables and the nvariable case. Three hours.

MATH 391, 392, 491, 492. Junior/Senior Seminar I, II, III, IV.

Prerequisite: Acceptance as departmental major as prescribed by the program requirements in the beginning of this section. This seminar is designed to help prepare students for the successful completion of their senior thesis project and for transition into graduate/professional school or work place within their major discipline. Lectures and exercises in areas such as technical writing will be conducted. Students will present a minimum of two briefings; each student will present his/her thesis proposal during MATH 391 and make a final thesis presentation during MATH 491. The seminar will also serve as a student-faculty informal forum for communication and exchange of ideas and discussion of topics in the area of mathematics and computer science. Occasional presentations by invited guests. (A "Z" grade will be awarded for successful completion of MATH 391, MATH 392 and MATH 491, with an overall grade awarded for all four courses at the completion of the senior thesis and MATH 492.) One hour per week. One hour per course.

MATH 401. Modern Algebra.

Prerequisite: A grade of "C" or better in MATH 212 or its equivalent. Sets, composition of mappings, binary operations, matrices, mathematical induction, divisibility, prime factors and greatest common divisor, congruence of integers and congruence classes, groups, subgroups, cyclic groups, isomorphism and homomorphism, permutation groups, normal groups, quotient groups, definition of ring, integral domains and fields. Three hours.

MATH 403. Real Analysis.

Prerequisite: A grade of “C” or better in MATH 301 or its equivalent. Properties of real numbers, supremum and infimum of sets of real numbers, limits of sequences, series, convergence and divergence of series. Tests for convergence of series, comparison test, quotient test, integral test, and alternating series test. Three hours.

MATH 405. Complex Variables.

Prerequisite: A grade of “C” or better in MATH 403 or its equivalent. The algebra of complex numbers, analytic functions, Cauchy-Reimann conditions, geometry of elementary functions, power series and contour integration. Three hours.

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MATH 407. History of Mathematics.

Prerequisite: A grade of “C” or better in MATH 301 or its equivalent. This course emphasizes the intellectual, historical and philosophical nature of mathematics, the development of technology, Mandelbrot’s fractals and methods of applying mathematical principles to fine arts, science, philosophy and other disciplines. Students will recognize the multiculturalism of mathematics from a global perspective. This course is required for prospective high school mathematics teachers. One hour.

MATH 409. Applied Mathematics.

Prerequisite: A grade of “C” or better in MATH 302 and MATH 306. Fourier series and integrals, Fourier transforms and applications, power series solutions of differential equations, Laplace transforms and applications, partial differential equations, Bessel’s Equation and Legendre’s Equations. Three hours.

Physics (PHYS)**PHYS 201. College Physics I.**

Prerequisite: A grade of “C” or better in MATH 112 or its equivalent. This is a non-calculus based introductory physics course. It is offered to students in the life sciences and pre-professional health fields whose mathematical preparation has not gone beyond a pre-calculus course. The class work is complemented by laboratory experiments in mechanics, properties of matter and sound. Three one-hour lectures and one two-hour laboratory per week. Four hours.

PHYS 202. College Physics II.

Prerequisite: A grade of “C” or better in PHYS 201 or its equivalent. This is a continuation of PHYS 201. Subject matter includes heat and thermodynamics and electricity and magnetism, optics and modern physics. Three one-hour lectures and one two-hour laboratory per week. Four hours.

PHYS 203. Principles of Physics I.

Prerequisites: Satisfactory completion of or concurrent enrollment in MATH 201. A calculus-based introduction to the principles of physics. This course is required for mathematics, physical sciences/engineering technology majors who enroll in a calculus course. Mathematical formulation of physics problems. Subject matter includes mechanics, sound waves and thermal physics. Three one-hour lectures and one two-hour laboratory per week. Four hours.

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PHYS 204. Principles of Physics II.

Prerequisite: A grade of “C” or better in PHYS 203 or its equivalent. This is a continuation of PHYS 203. Subject matter includes electricity and magnetism and optics and modern physics. Three one-hour lectures and one two-hour laboratory per week. Four hours.

PHYS 310. Mechanics.

Prerequisites: A grade of “C” or better in PHYS 204 and MATH 202 or its equivalent. Kinematics and dynamics of motion in one, two and three dimensions, vector analysis, harmonic motion, motion of systems of particles, rigid body motion. Three hours.

PHYS 311. Classical Laboratory.

Prerequisites: A grade of “C” or better in PHYS 202, PHYS 204 and MATH 202 or their equivalent. Experiments in gravitation, optics, electromagnetism, mechanics and heat. Error analysis. One one-hour lecture and four hours of laboratory per week. Three hours.

PHYS 322. Electricity and Magnetism.

Prerequisites: A grade of “C” or better in PHYS 204 and MATH 202 or their equivalent. Electrostatics, current, magnetostatics, properties of electric and magnetic fields, Maxwell’s equations and vector calculus. Three hours.

PHYS 352. Modern Physics.

Prerequisites: A grade of “C” or better in PHYS 202, PHYS 204 and MATH 202 or their equivalent. Special relativity, introductory quantum mechanics, atomic and nuclear physics and the solid state. Three hours of lecture and four hours of laboratory per week. Four hours.

Statistics (STAT)**STAT 311. Elements of Statistical Methods.**

Prerequisite: A grade of “C” or better in MATH 111. Discrete and continuous data, data displays, Ogives and histograms, measures of central tendency, dispersion, linear regression, elementary concepts of probability, permutations, combinations, binomial and normal distributions, basic concepts of hypothesis testing, estimation and confidence intervals, t-tests and chi-square tests. Three hours.

STAT 341. Introduction to Probability and Statistics:**Inference I.**

Prerequisites: A grade of “C” or better in MATH 202 or its equivalent. Basic probability, conditional probability and independent events,
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random variables, discrete and continuous probability distributions, mathematical expectation and analysis of variance. Three hours.

STAT 342. Introduction to Probability and Statistics:**Inference II.**

Prerequisite: A grade of “C” or better in STAT 341 or its equivalent. Moment generation functions, sufficient statistics, points and intervals estimation and testing of hypothesis. Three hours.

STAT 394. Probability I.

Prerequisite: A grade of “C” or better in MATH 301 or its equivalent. Sample spaces, basic axioms of probability, combination probability, conditional probability and independence, binomial, Poisson and normal distributions. Three hours.

STAT 401. Data Analysis.

Prerequisite: A grade of “C” or better in STAT341 or its equivalent displaying and describing distributions, normal distributions, scatter plots, correlation, multiple comparison, least square regression, sampling design, analysis of variance, use of computer statistical package.

Three hours.

STAT 421. Applied Statistics and Experimental Design.

Prerequisites: A grade of “C” or better in STAT 342 or its equivalent.

Computer-aided data analysis using comparisons between batches, analysis of variance and regression. Evaluation of assumptions, data transformation and reliability of statistical measures (Jackknife, bootstrap). Fisher-Gosset controversy. Three hours.

STAT 423. Applied Regression and Analysis of Variance.

Prerequisite: A grade of “C” or better in STAT 342 or STAT 421.

Regression analysis, problems in interpreting regression coefficients, estimation, including two-stage least squares, guided regression, building linear models, selecting carriers, regression residuals, analysis of variance, non-parametric regression, factorial designs and response surface methods. Three hours.

STAT 427. Introduction to Categorical Data Analysis.

Prerequisite: A grade of “C” or better in STAT 421. Introduction to topics in the analysis of categorical data, indices of association, loglinear models, ordered response categories, discriminant analysis and factor analysis of polychotomous observation. Computational techniques will be emphasized, illustrated primarily by social, behavioral and biological science examples. Three hours.