

## SCHOOL OF NATURAL SCIENCES

**Professor J. Jeffers, Dean**

The School consists of the Departments of Biological Sciences, Chemistry, Mathematics and Computer Science, and Physics. The School of Natural Science seeks to provide the highest quality educational experience for all students. The School promotes student learning in an atmosphere that nurtures critical and creative thinking, an appreciation of the beauty and complexity of natural systems, the development of ethical codes in striving for moral excellence, the ability to communicate effectively in speaking and writing, and an understanding of the importance of service and leadership. Within the liberal arts tradition, the School emphasizes the methods of science as it prepares all students for informed citizenship and as it prepares natural science students for positions of leadership in the professions. The School places emphasis on the preparation of students for graduate and professional schools.

**2003. Earth Science.**

An introduction to the physical universe with emphasis on the processes, forces, and interrelations of the earth. The course includes selected topics, from geology, oceanography, meteorology, and astronomy. **Spring.**

**2801. Special Topics in Natural Science.**

A variable topics seminar course at the sophomore level in the environmental and natural sciences. **On Demand.**

**3001. Readings in Natural Science.**

A self-paced reading course for Natural Science students to acquaint them with general readings in the natural sciences. Meant as a companion to CORE 2001 and CORE 3001. Prerequisite: Sophomore standing. Must be completed before taking CORE 4001. Course is offered on a Satisfactory-Unsatisfactory basis. **Fall, Spring.**

**3003. Natural Science for Elementary Teachers.**

A course for elementary teachers including materials, methods and teaching units in natural science. Prerequisites: CORE 2313, 2323. **Spring.**

**3013. Methods in Natural Science for Middle and Secondary Schools.**

A methods course adapted to the teaching of science at the middle and secondary school level. It will involve practices, problems and trends in the sciences at this level. Emphasis will be placed upon correlating the lecture topics with computer applications and laboratory techniques. **On Demand.**

**3183. Issues in Science and Religion.**

A study of the processes and products of theological reflection and scientific inquiry and the issues that arise in the interaction of the two enterprises. Also listed as PHIL 3183. **Fall of even-numbered years.**

**3951-6. Workshop.**

Provides upper division students an opportunity to approach current topics and problems in a cooperative and concentrated manner. **On Demand.**

**3961. Laboratory Practicum.**

This course is designed specifically for students seeking teacher certification in one of the natural science fields. It is designed to enable them to plan, create and execute a laboratory in secondary school science courses. **On Demand.**

**4002. Medical Terminology.**

A programmed course designed to meet objectives related to career goals in biological and health-related fields such as medical secretary, social worker or records clerk. **Fall.**

**4801. Special Topics in Natural Science.**

A variable topics seminar course at the senior level in the environmental and natural sciences. **On Demand.**

**REQUIREMENTS FOR TEACHING FIELDS IN THE SCIENCES**

See page 110.

**Suggested Sequences for Pre-Professional Training in Medicine, Dentistry, Pharmacy, Optometry\*, and Veterinary Medicine**

Students intending to pursue any of the above courses of study should have at least four units of English, one unit of algebra, one unit of plane geometry, two units of science, and two units of history from high school. The first-year curriculum is the same for all of the above courses of study. The first year student should register as follows:

**FIRST YEAR**

<b>First Semester</b>		<b>Second Semester</b>	
Chemistry.....	1004	Chemistry.....	1014
Biology.....	1014	Biology.....	1024
CORE.....	1012	CORE.....	2113
Mathematics.....	1034	CORE.....	1022
CORE.....	1013	CORE.....	2123
	17 hours		16 hours

<sup>1</sup>Students with weak backgrounds in high school mathematics and chemistry should take Chemistry 1024 before taking Chemistry 1004.

<sup>2</sup>Pre-pharmacy students may substitute algebra and trigonometry for Mathematics 1034.

<sup>3</sup>This course will be required for admission to the University of Arkansas for Medical Sciences plus an additional English course. Options for the English may be obtained from the student's academic adviser.

<sup>4</sup>Optometry students should consult the appropriate optometry school's catalog for subsequent semesters.

## Pre-Medicine, Pre-Dentistry, and Pre-Veterinary Medicine

### SECOND YEAR

First Semester	Second Semester
Chemistry..... 2004	Physics ..... 1014
CORE ..... 2223	CORE ..... 1113
Physics..... 1004	CORE ..... 1023
Behavioral Science..... 3	CORE Soph. Menu ..... 3
CORE ..... 2213	CORE ..... 2001
17 hours	17 hours

### THIRD YEAR

First Semester	Second Semester
CORE ..... 1123	Chemistry..... 3015
Chemistry..... 3005	Biology ..... 2024
Biology ..... 2014	CORE Fine Arts..... 3
CORE Fine Arts..... 3	Language ..... 3
18 hours	15 hours

Only rarely do students gain entrance to medical or dental schools after three years of college. They should therefore plan their programs so that they can earn their baccalaureate degrees.

## Pre-Pharmacy

### SECOND YEAR

First Semester	Second Semester
Chemistry..... 3005	Chemistry..... 3015
Physics..... 1004	Physics ..... 1014
ENGL 3023 or higher..... 3	Humanities or Social Science elective..... 3
Accounting..... 2013	Economics..... 2013
History..... 2003	Speech Communication..... 1003
18 hours	18 hours

The School of Pharmacy requires a typing skill of at least thirty words per minute. A course in typing cannot be counted as an elective.

All students should consult their advisors in planning their programs as there are sometimes reasons for departing from the above program. Those students who plan to obtain a degree before entering one of the professional schools will need to modify the above program. Applicants to pharmacy school must take the Pharmacy College Admission Test, preferably in November or February of the academic year of application.

### Cooperative Degree Programs in Health Professions

A candidate for the Bachelor of Science degree at Ouachita who later attends a school of medicine, dentistry, or pharmacy may count up to thirty-two semester hours of courses with C or higher grades taken at such a school in the minor or as electives. These courses will be regarded as Junior-Senior level. The student must complete a major in one of the natural sciences and must

meet the conditions listed under CORE Requirements on page 67 of this catalog, except that the last hours may be taken at the professional school. At least sixty-six semester hours, including at least twenty at the Junior-Senior level, must be completed at Ouachita.

### Medical Technology

The student who plans to complete the professional course at the University of Arkansas for Medical Sciences and get a Medical Technology degree from Ouachita should spend five semesters and one summer term at Ouachita and complete the 94 hours specified below. The professional curriculum at UAMS is comprised of four semesters in a 17-month period with a January beginning date. Students planning to do the professional curriculum at the Baptist Medical Center, a program of 12 months duration with a July beginning date, should complete the entire curriculum listed below with any modifications indicated in the footnotes, although it can be done over a six-semester period if desired.

A student planning to do the professional courses other than in Little Rock may have to modify the program outlined below.

#### FIRST YEAR

First Semester		Second Semester	
Biology.....	1014	Biology.....	1024
Chemistry.....	1004	Chemistry.....	1014
CORE.....	1013	CORE.....	1023
Mathematics.....	1034	English.....	2013
CORE.....	1012	Speech.....	1003
	17 hours		17 hours

#### SECOND YEAR

First Semester		Second Semester	
Chemistry.....	3005	Physics.....	1014
Physics.....	1004	Chemistry.....	3015
History.....	1003	Biology.....	3014
History.....	2003	History.....	1013
	15 hours		16 hours

#### SUMMER

CORE.....	1113
CORE.....	2113
CORE.....	<u>2123</u>
	9 hours

#### THIRD YEAR

First Semester		Second Semester	
CORE.....	2001	CORE.....	2213
Chemistry.....	2004	CORE.....	2223
CORE.....	2443	CORE.....	2423
CORE.....	1123	CORE Fine Arts.....	6
CORE.....	1022	CORE.....	3001
Biology.....	2014		16 hours
	17 hours		

## Pre-Nursing

A student who wishes to obtain a B.S. degree in nursing at the University of Arkansas for Medical Sciences may complete the first two years of work at Ouachita as outlined below. A student who plans to enter any other nursing program should consult the catalog of the appropriate school before registering at Ouachita.

### FIRST YEAR

First Semester	Second Semester
CORE..... 1013	English.....2013
Chemistry..... 1004 or 1024	Chemistry.....1034
Biology..... 1014	Psychology.....2033
Psychology..... 1013	History ..... 1003 or 1013
Mathematics ..... <u>1003</u>	Philosophy.....1003, 1023, 2113 or
17 hours	CORE 2413
	CORE ..... <u>1022</u>
	18 hours

### SECOND YEAR

First Semester	Second Semester
Biology.....2014	Biology .....2024
U.S. Hist. or U.S. Govt..... 3	Biology .....3014
Sociology..... 1003	Dietetics .....3053
Psychology.....2053	English..... 3003 or 3013
Speech Communication.....1003	Elective..... 3
16 hours	17 hours

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\*English 3003 may be replaced by an elective if exemption is obtained. See a pre-nursing advisor for details.

## Pre-Dental Hygiene Curriculum

The courses listed are for the program in dental hygiene of the College of Health-Related Professions, University of Arkansas. The minimum courses required for admission are those listed for the first year; the remaining courses are required for a B.S. degree from the University of Arkansas.

### FIRST YEAR

First Semester	Second Semester
Chemistry..... 1024	Computer Science.....1003
Biology..... 1014	Sociology.....1003
CORE..... 1013	English.....2013
Mathematics ..... 1003	Speech.....1003
History.....1003	History .....1013
17 hours	15 hours

### SECOND YEAR

BIOL 3014, HIST 2003 (or HIST 2013); PSYC 1013; three hours of philosophy, political science, literature or humanities; three hours of art, music, or theatre art; additional hours to total 55 including at least 11 hours at the Junior-Senior level.

For personal reasons a student may want to vary the above program slightly and should therefore consult with the counselor to see that the minimum requirements for admission to the Dental Hygienist Program are attained. A student who wishes to return to Ouachita to obtain a Bachelor's

degree may be able to transfer some of the credits in the Dental Hygienist Program toward this degree and should therefore have the transcript from the University of Arkansas examined by the Registrar at Ouachita.

## Professional Chemistry

The professional program in chemistry includes enough courses in chemistry, physics, and mathematics to prepare the student for graduate study and to provide the minimum requirements for a career as a professional chemist.

### FIRST YEAR

#### Fall Semester

CHEM 1004, Gen Chem.....	4
MATH 1034, PreCalculus.....	4
CORE 1012, Intro Lib Arts.....	2
CORE 1013, Composition.....	3
CORE 1113, Survey Bible.....	3
	<u>16</u>

#### Spring Semester

CHEM 1014, Gen Chem & Qual.	4
MATH 2014, Calculus 1.....	4
CORE 1022, Concepts Wellness..	2
CORE 2113, Am Heritage.....	3
CORE 2123, Am Letters.....	3
	<u>16</u>

### SECOND YEAR

#### Fall Semester

CHEM 2004, Quant Analysis.....	4
CHEM 3005, Organic Chem 1.....	5
PHYS 2004, Univ Physics 1.....	4
CORE 2001, Soph Readings.....	1
language elective.....	3
	<u>17</u>

#### Spring Semester

CHEM 3005, Organic Chem 2....	5
PHYS 2014, Univ Physics 2.....	4
MATH 3202, Adv Chem Cal.....	2
CORE 1023, Cont World.....	3
language elective.....	3
	<u>17</u>

### THIRD YEAR

#### Fall Semester

CHEM 3053, Phys Chem 1.....	3
BIOL Elective.....	4
NSCI 3001, Read Nat Sci.....	1
CORE Soph Menu Elective.....	3
CORE 2213, West Heritage.....	3
CORE 2223, West Letters.....	3
	<u>17</u>

#### Spring Semester

CHEM 3063, Phys Chem 2.....	3
CHEM 3111, Chem Lit.....	1
CHEM 3142, Instr Analysis.....	2
CHEM 3272, Expt Tech 1.....	2
CORE 1123, Interp Bible.....	3
CORE 3001, Jr Readings.....	1
CORE Fine Arts Menu.....	3
	<u>15</u>

### FOURTH YEAR

#### Fall Semester

CHEM 4272, Expt Tech 2.....	2
CHEM Research*.....	1
CORE Fine Arts Menu.....	3
Electives**.....	9
	<u>15</u>

#### Spring Semester

CHEM 4023, Biochem.....	3
CHEM 4111, Research Sem.....	1
CHEM 4033, Adv Inorganic.....	3
CORE 4001, Sr Seminar.....	1
Electives**.....	7
	<u>15</u>

\*Research requirement can be met by taking CHEM 4201-4492 for a minimum of one credit hour (three hours laboratory per week for one semester) or by participating in a summer undergraduate research participation program at another university or research institute.

\*\*Additional courses in Mathematics, Physics, Computer Science or Biology must be taken to complete a minor.

## Environmental Analysis Sequence

Recommended sequence for Environmental Analysis with a major in Biology and a minor in Chemistry.

### First Semester

BIOL 1014, Zoology .....	4
CHEM 1004, Gen. Chem. ....	4
MATH 1034, Pre-calculus.....	4
CORE 1013, Fresh. Comp. ....	3
CORE 1012.....	2
	17

### Third Semester

BIOL 2033, Genetics.....	3
CHEM 2004, Quant. Anal.....	4
CORE 1023, Contemp. World.....	3
CORE 1123, Interp. Bible.....	3
CORE 2001, Soph. Readings.....	1
NSCI 2801, Envir. Anal.....	1
PHYS 1004, Intro. Phys. I.....	4
	19

### Fifth Semester

BIOL 3054, Parasitology.....	4
CORE 2213, West. Heritage.....	3
CORE 2223, West. Letters.....	3
CORE 3001, Jr. Readings.....	1
Behavioral Science.....	3
CHEM 3005, Organic Chem. I.....	5
	19

### Seventh Semester

BIOL 4802, Biol. Monitor .....	2
CORE 3113, Art .....	3
Foreign Language.....	3
Electives.....	6
NSCI 3001, Rdgs/Nat. Sci.....	1
	15

Recommended sequence for Environmental Analysis with a major in Chemistry and a minor in Biology.

### First Semester

CHEM 1004, Gen. Chem. ....	4
BIOL 1014, Zoology .....	4
MATH 1034, Pre-calculus.....	4
CORE 1013, Composition .....	3
CORE 1012, Intro. Lib. Arts.....	2
	17

### Second Semester

BIOL 1024, Botany.....	4
CHEM 1014, Gen. Chem. & Qual.....	4
MATH 2014, Calculus I.....	4
CORE 1022, Wellness.....	3
CORE 1113, Survey/Bible.....	3
	18

### Fourth Semester

BIOL 3034, Ecology.....	4
PHYS 1014, Intro. Phys. II.....	4
CORE 2113, Amer. Heritage.....	3
CORE 2123, Amer. Letters.....	3
	14

### Sixth Semester

BIOL 3014, Microbiology.....	4
BIOL 4014, Histology.....	4
CORE 2423, Invest. Methods.....	3
BIOL 4801, Lab Practicum.....	1
CHEM 3015, Organic Chem. II ..	5
	17

### Eighth Semester

BIOL 4861, Senior Research.....	1
NSCI 4801, Envir. Analysis.....	1
CORE 3123, Music.....	3
Foreign Language.....	3
Electives.....	6
CORE 4001, Sr. Seminar.....	1
	15

### Second Semester

CHEM 1014, Gen. Chem. & Qual.....	4
BIOL 1024, Botany.....	4
MATH 2014, Calculus I.....	4
CORE 1023, Contemp. World.....	3
CORE 1022, Wellness.....	2
	17

### Third Semester

CHEM 3005, Organic Chem 1.....	5
PHYS 1004, Intro. Phys. 1.....	4
NSCI 2801, Envir. Analysis.....	1
CORE 1113, Survey/Bible.....	3
CORE 2423, Invest. Methods.....	3
CORE 2001, Soph. Readings.....	1
	<hr/> 17

### Summer

CHEM 2004, Quan. Analysis.....	4
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### Fifth Semester

CHEM 3053, Phys. Chem. 1.....	3
CHEM 4201, AA/ICP.....	1
CORE 2213, West. Heritage...3	
CORE 2223, West. Letters.....	3
CORE 3031, Jr. Readings.....	1
Foreign Language.....	3
Elective.....	3
	<hr/> 17

### Seventh Semester

CHEM 4861, Senior Research....	1
CHEM 4211, GC/Mass Spec. ....	1
BIOL 4202, Biol. Monitoring.....	2
CORE 1123, Interp./Bible.....	3
Electives.....	9
	<hr/> 16

### Fourth Semester

CHEM 3015, Organic Chem 2....	5
PHYS 1014, Intro Phys. 2.....	4
MATH 3202, Adv. Chem. Cal.....	2
CORE 2113, Amer. Heritage.....	3
CORE 2123, Amer. Letters.....	3
	<hr/> 17

### Sixth Semester

CHEM 3272, Expt. Tech. 1.....	2
CHEM 4201, Lab Practicum.....	1
BIOL 3014, Microbiology.....	4
NSCI 3001, Rdgs./Nat. Sci. ....	1
CORE 3113, Art.....	3
Foreign Language.....	3
Electives.....	3
	<hr/> 17

### Eighth Semester

CHEM 4023, Biochem.....	3
CHEM 4111, Research Sem.....	1
BIOL 3034, Ecology.....	4
NSCI 4801, Envir. Analysis.....	1
CORE 3123, Music.....	3
CORE 4001, Sr. Seminar.....	1
Electives.....	3
	<hr/> 16

## The Arts-Engineering Programs

Cooperating with the University of Arkansas, Vanderbilt University, Louisiana Tech University, and the University of Southern California, Ouachita Baptist University offers several combination programs.

The joint program with the University of Arkansas involves a three-year program of study at Ouachita University. Following one year at the University of Arkansas College of Engineering, the Bachelor of Arts degree or the Bachelor of Science degree, if all requirements are met, will be conferred by Ouachita University. At the end of the fifth year, the student will receive from the University of Arkansas the Bachelor of Science in Engineering.

In order to receive a degree under this program, a student must complete each of the courses listed below. At least sixty-six semester hours, including at least twenty at the Junior-Senior level, must be completed at Ouachita. In those cases in which the B.A. degree is conferred before the engineering degree, the student must have completed a total of 128 semester hours with a grade point average of 2.000 in all courses in which grade points are given.

Arrangements for students who will go to other engineering schools are possible. Such students should confer with a pre-engineering advisor.

## FIRST YEAR

First Semester		Second Semester	
CORE .....	1012	CORE.....	1022
CORE .....	1013	Chemistry.....	1014
Chemistry.....	1004	Mathematics.....	2014
Mathematics .....	1034	CORE .....	2113
CORE .....	1023	CORE.....	2123
	16 hours		16 hours

<sup>1</sup>Mathematics courses below calculus and analytic geometry cannot be counted toward a degree in engineering. A student with adequate preparation as shown by his high school credits and admission test score will be permitted to take calculus without the prerequisites of MATH 1034.

## SECOND YEAR

First Semester		Second Semester	
Mathematics .....	2024	Mathematics.....	3034
Physics.....	2004	Physics .....	2014
CORE .....	1113	CORE.....	2213
Economics.....	2013	CORE.....	2223
Computer Science .....	1043	Computer Science.....	2033
	17 hours		17 hours

Third year: MATH 3043; CORE 1123, 2323, 2423 and two courses from 3113, 3123 and 3133; two hours of Physical Education activities; PHYS 1112, 2123, 2133, 3004, 3123; SPCM 1003. Students who are interested in engineering should consult the curriculum of the Department of Physics on page 187 for the Engineering Physics Option.

## Pre-Engineering Programs

Students wishing to undertake a program of pre-engineering other than the Arts-Engineering programs should complete as many of the following courses as possible before transferring:

MATH 1034, 2014, 2024, 3034, 3043

PHYS 1112, 2004, 2014, 2123, 2133, 3004, 3123

CHEM 1004, 1014

CORE 1013, 2123

CSCI 1043, 2033

The Mathematics courses are especially important, since MATH 3034 is prerequisite to many Junior-Level courses in engineering. All the courses listed above are part of the Engineering Physics Option on page 187. Interested students should consider this option.

## Pre-Architecture and Pre-Landscape Architecture

The University of Arkansas School of Architecture permits the first year of their Architecture and Landscape Architecture programs to be taken at Ouachita with the following suggested curricula:

### PRE-ARCHITECTURE

First Semester		Second Semester	
English Composition.....	3 *	American Letters.....	3
College Algebra.....	3 *	College Trigonometry.....	3 *
Western Civilization I.....	3	Western Civilization II.....	3
World Literature I.....	3	World Literature II.....	3
Freehand Drawing.....	3	Fine Arts, Art.....	3
	15 hours		15 hours

### PRE-LANDSCAPE ARCHITECTURE

First Semester		Second Semester	
English Composition.....	3 *	American Letters.....	3
College Algebra.....	3 *	Freehand Drawing.....	3
Botany.....	4 (*)	Geology.....	4 (*)
U.S. History or Government.....	3	Intro. to Sociology.....	3
Free Elective.....	3	Free Elective.....	3
	16 hours		16 hours

\* Courses which are prerequisite to entry into the Professional Program (sophomore level)  
 (\*)Though both Botany and Geology are preferred, either one of the two will qualify a candidate to apply for the professional program.

Please note that pre-Architecture students must complete three courses on the campus prior to application to admission to the Professional School; for the benefit of transfer students, these courses will be offered during the summer session prior to a fall application.

## Department of Biological Sciences

**Associate Professor T. Knight, Chair**  
**Professors J. Jeffers, R. Wight**  
**Associate Professor D. Brech**  
**Assistant Professors D. Brooks, B. DeBusk, T. DeWitt,**  
**S. Freeman, N. Hardman, F. Kucera, C. Morgan, J. Taylor**

### Biology (BIOL)

**Associate Professor T. Knight, Director**

The Department of Biology provides undergraduate instruction in the biological sciences to students seeking admission to graduate and professional schools; to students majoring in other disciplines who desire insight into biological principles; to students seeking certification as public school teachers; and to general, liberal arts students. The department seeks to serve students within the liberal arts tradition described in the University's mission statement.

#### **Requirements for a major in Biology:**

B.S. degree: BIOL 1014, 1024, 4001, at least twenty-one additional hours in the Department. A minor of at least twenty hours must be completed in another department in chemistry, computer science, mathematics or physics.

B.A. degree: BIOL 1014, 1024, at least sixteen additional hours in the Department including a minimum of twelve Junior-Senior hours.

**Requirements for a teaching field in Biology:** See page 110.

**Requirements for a minor in Biology:** BIOL 1014, 1024, at least ten additional hours in the Department including a minimum of six Junior-Senior hours. A split minor may not be taken in Biology.

#### **1014. General Biology (Zoology).**

A study of the animal kingdom from the standpoint of systematics with emphasis upon the progressive advances of tissue organization, physiology and reproductive adaptation, including a consideration of ecological principles and economic importance of the major animal groups. Three hours lecture and three hours laboratory. [WAC] **Fall, Spring.**

#### **1024. General Biology (Botany).**

A study of the plant kingdom from the stand point of systematics with emphasis upon the progressive advances of tissue organization, physiology and reproductive adaptation, including a consideration of ecological principles and economic importance of the major plant groups. Three hours lecture and three hours laboratory. **Fall, Spring.**

#### **2014. Human Anatomy and Physiology I.**

A study of the organization of the human body, its tissues and the structure and functional relationships in the integumentary, skeletal, muscular, and nervous systems. Prerequisite: Four hours of Biology. **Fall.**

<sup>1</sup> J.D. Patterson Professor of Biology

**2024. Human Anatomy and Physiology II.**

A continuation of BIOL 2014 concentrating on the cardiovascular, endocrine, respiratory, digestive, excretory and reproductive systems. Prerequisite: Four hours of Biology. **Spring.**

**2034. Genetics.**

This course is a study of the basic principles, theories and mechanisms of heredity. It will address the tenets of transmission genetics, population genetics, and quantitative genetics. The laboratory provides an opportunity for hands-on demonstrations of the principles of genetics mechanism, as well as molecular techniques for studying DNA. Three hours lecture and three hours laboratory. Prerequisites: MATH 1003 and four hours of Biology. **Fall of odd-numbered years.**

**3014. Microbiology.**

A study of bacteria and other life forms from the standpoint of classification, morphology, physiology and environmental factors, and of the relation of bacteria to water, foods, industrial processes and diseases. Three hours lecture and three hours laboratory. Prerequisites: Four hours of Biology or CORE 2323; Eight hours of Chemistry; Junior standing. **Spring.**

**3034. Ecology.**

A study of principles governing the relationships between plants, animals and their environment. Consideration is given to local aquatic and terrestrial communities. Lectures, laboratories and field trips. Prerequisites: BIOL 1014, 1024 and four hours of Chemistry. **Spring of odd-numbered years.**

**3044. Cell Biology.**

This course is designed to address some general and specific principles of cellular and molecular biology. It begins by looking at the evolution of the cell and then progresses to the chemistry, anatomy, and physiology of the organelles. Commonly used molecular techniques will be introduced in both lab and lecture, and recent research in the area of cell biology will be discussed. Prerequisites: twelve hours of biology and 8 hours of chemistry. **Fall.**

**3064. Neuroscience.**

An introduction to the biological substrate of behavior and experience, especially as expressed in neuroanatomy, neurophysiology and behavioral neuroscience. Prerequisite: CORE 2323 or BIOL 1014. Also listed as PSYC 3064. **Spring.**

**3801-3894. Individual Study, Group Study, Research.**

This course is offered to provide competent students an opportunity to do independent study and research. Prior to registration, a student is required to obtain approval from a professor in the department who consents to serve as faculty supervisor. Prerequisite: Permission of supervising faculty member and department chairman. **On Demand.**

**4001. Experimental Research.**

A course in lab or field research in biological science. Course may be taken only once for credit. Prerequisite: 12 hours of Chemistry; BIOL 1014, 1024 and 8 additional hours in Biology. **Fall, Spring.**

**4014. Histology and Microtechniques.**

Lecture and laboratory dealing with primary tissues of vertebrate animals. A practical course for laboratory technicians, pre-medical students, and other Biology students. Prerequisite: BIOL 2014. **Spring.**

**4024. Developmental Biology.**

A comparative study of the development of the vertebrate embryo. Cell division, gametogenesis, fertilization, cleavage, gastrulation and organ formation in the frog, chick and pig are studied. Lecture and laboratory. Prerequisites: BIOL 1014, 2014. **Fall of even-numbered years.**

**4801-4894. Individual Study, Group Study, Research.**

See BIOL 3801-3894 for course details and requirements. **On Demand.**

## **Communication Sciences and Disorders (CMDS)**

**Assistant Professor N. Hardman, Director**

**Requirements for a major in Communication Sciences and Disorders:** CMDS 1013, 2023, 3003, 3013 or 3113, 3023, 3063, 4003, 4013, 4033, 4040.5, 4053, 4063, minimum of 2.5 hours of 4140.5-3; ENGL 3073 or BIOL 3064; SPCM 1003; eighteen hours in one related field, 6 of which must be Junior/Senior level. The requirement for a minor is waived.

**Requirements for a minor in Communication Sciences and Disorders:** CMDS 1013, 2023, 3003, 3023, 3063, 4053.

**1013. Phonetics.**

A study of the International Phonetic Alphabet and standard regional dialects. An analysis of speech sounds with an emphasis on phonetic transcription, pronunciation, and effective communication. **Spring.**

**2023. Introduction to Communication Disorders.**

The study of the development of speech in the child, etiology and principles of therapy of speech disorders, including the areas of articulation, language, voice and fluency. **Fall.**

**3003. Clinical Management.**

Clinical procedures for working in various practicum settings, using diagnostic and therapeutic techniques, writing behavioral objectives, observations and procedures for report writing. Prerequisite: CMDS 2023 or consent of instructor. **Fall.**

**3013. Voice Disorders.**

Study of normal voice function and voice pathologies including evaluation techniques and specific remediation procedures for patients with voice disorders. Prerequisite: CMDS 2023. [WAC]. **Fall of odd-numbered years.**

**3023. Vocal Anatomy.**

A study of the structure and function of the speaking mechanism. **Fall of even-numbered years.**

**3063. Language Development.**

An introduction to linguistics as well as a study of developmental psycholinguistics as related to the acquisition of language and speech as well as normal phonological development. Prerequisite: CMDS 2023. **Fall of odd-numbered years.**

**3073. Linguistics.**

See ENGL 3073. **Spring of odd-numbered years.**

**3113. Fluency Disorders.**

Study of the nature and theories of stuttering, diagnosis, and treatment procedures. Prerequisite: CMDS 2023. [WAC]. **Spring of even-numbered years.**

**3801-3893. Special Studies in Speech Pathology.**

This course is offered to provide competent students an opportunity to do directed study or research. Prerequisite: Junior or Senior standing and consent of instructor. **On Demand.**

**4003. Introduction to Audiology.**

An introduction to the problems of the deaf and hearing impaired, the classification of hearing disorders and development of audiometry through pure tone techniques are considered. **Spring of odd-numbered years.**

**4013. Diagnostic Methods.**

Procedural guide for evaluation of speech and language disorders in children and adults, and effective usage of available testing materials. **Spring of odd-numbered years.**

**4033. Fundamentals of Speech and Hearing Science.**

Basic principles of acoustics related to speech and hearing are studied. Areas covered include basic sound, mathematical computation of sound intensity and pressure, and physiological aspects of acoustics. **Fall of even-numbered years.**

**4040.5. Clinical Observation.**

Supervised observation of evaluation and therapeutic management of a variety of communication disorders. Prerequisite: concurrent enrollment in, or completion of CMDS 2023, 3003, or consent of instructor. **Fall, Spring.**

**4053. Language Disorders.**

A study of the etiology, pathology and remediation of language disorders and articulation disorders in children and adults. Prerequisite: CMDS 2023. **Spring of even-numbered years.**

**4063. Articulation and Phonological Disorders.**

Identification, classification, analysis, and remediation of phonological and articulation disorders in children. Prerequisite: CMDS 2023. **Spring of even-numbered years.**

**4140.5-3. Clinical Practicum.**

Supervised participation in evaluation and therapeutic management of a variety of communication disorders. (May be repeated for credit.) Prerequisite: CMDS 4040.5 and an overall grade point average of 2.500 or consent of instructor. **Fall, Spring.**

## **Dietetics and Nutrition (DIET)**

**Assistant Professor S. Freeman, Director**

The mission of the Didactic Program in Dietetics is to provide academic preparation for students in the field of nutrition and dietetics; to prepare students to function as dietetic professionals; to encourage students to think critically and creatively in problem solving; and to inspire a commitment to life-long learning and to Christian leadership and service in all areas of life.

The Dietetics and Nutrition curriculum is approved as a Didactic Dietetic Program (DPD) by the Commission on Accreditation/Approval for Dietetic Education of the American Dietetic Association. Mastery of course content in the Didactic Dietetic Program and successful completion of an accredited Dietetic Internship or an approved preprofessional practice program are required to take the registration examination for dietitians.

**Requirements for the B.S. degree with a major in Dietetics and Nutrition meeting the prerequisites to enter a Dietetic Internship accredited by the American Dietetic Association:** DIET 2003, 3043, 3053, 3083, 3093, 3203, 3213, 4014, 4023, 4033, 4043, 4051, 4053; BIOL 1014, 2024, 3014; CHEM 1024, 1034, 3203; MATH 1003; ECON 2023; INSY 1033; ENGL 3013; PSYC 1013 or SOCI 1003. A minor is not required.

**2003. Foods.**

Use of food science principles in food selection and preparation procedures. Introduction to food science research. **Fall, Spring.**

**3043. Sports Nutrition.**

Nutrient needs and food related issues in exercise for wellness and training for competitive athletes. **Fall.**

**3053. Nutrition.**

Functions of various nutrients and their interrelationships with emphasis on personal food habits and selection. Recommended prerequisite: CHEM 1024. **Fall, Spring.**

**3083. Community and Life Cycle Nutrition.**

Prevention and treatment of nutrition problems common to individuals, families, and communities. Includes survey of federal, state, and local nutrition programs for various age groups. Prerequisite: DIET 3053 recommended. **Fall.**

**3093. Nutrition Assessment.**

Methods used to assess the nutritional status of individuals and populations. Interpretation of anthropometric, biochemical, clinical and dietary data as a basis for recommending nutritional care. Prerequisite: DIET 3053. **Spring.**

**3203. Nutrition Counseling and Education.**

A study of nutrition counseling theory and methods, interviewing techniques, and nutrition education theory and techniques. The course will also focus on the development of nutrition education materials. Prerequisite: DIET 3093 or consent of instructor. **Spring.**

- 3213. Advanced Nutrition.**  
Food nutrients, their digestion, absorption and metabolism. Methods of determining requirements and interrelationships of nutrients. [WAC]  
Prerequisite: DIET 3053. **Spring.**
- 4014. Food Systems Management I.**  
Menu planning; recipe development; food procurement; receiving and storage; food production; quality assurance; management of financial resources; equipment selection and layout; computer-assisted management and distribution. Prerequisite: DIET 2003. **Fall.**
- 4023. Food Systems Management II.**  
Study of the principles of organization and management applied to institutional food service. Prerequisite: DIET 4014. **Spring.**
- 4033. Medical Nutrition Therapy I.**  
An in-depth study of nutrition from the perspective of disease prevention and treatment, including patient interviewing, charting techniques, and medical terminology. Prerequisites: DIET 3093. **Fall.**
- 4043. Medical Nutrition Therapy II.**  
A continuation of the study of nutrition in the prevention and treatment of disease. Prerequisite: DIET 4033. **Spring.**
- 4051. Senior Seminar in Dietetics.**  
Procedures and application process for obtaining professional status through dietetic registration and licensure. Professional ethics and legal responsibilities. Strategies for integration of current issues into dietetic practice. Prerequisite: senior standing in dietetics and nutrition. **Fall.**
- 4053. Experimental Food Science.**  
An advanced course consisting of a study of the composition and chemical properties of food. The course also includes a study of food problems and an analysis of current research in food materials and processes. Prerequisite: DIET 2003. **Spring.**
- 4093. Research in Dietetics.**  
Individualized and directed research in the area of dietetics and nutrition. Prerequisite: Senior standing in dietetics and nutrition. **On Demand.**

## **Athletic Training Education Program (ATEP)**

**Assistant Professor, T. DeWitt, Director**

**Approved Clinical Instructors K. Downing, C. DeRouen,  
J. Bolin, C. Finney, K. Burris, J. Cates**

**Requirements for a B.A. degree in Athletic Training with a double minor in Physical Education and Biology:** ATEP 2001, 2011, 2062, 2083, 3001, 3011, 3021, 3031, 3043, 3053, 3061, 3071, 3082, 4003, 4053; PED 1002, 1112, 3023, 4043; HPER 3073; HED 1012, 2063; BIOL 1014, 2014, 2024 and 8 additional hours in Biology, at least six of which must be Junior-Senior hours; NSCI 4002; DIET 3053.

**Requirements for B.A. degree in Athletic Training (second major in Biology):** ATEP 2001, 2011, 2062, 2083, 3001, 3011, 3021, 3031, 3043, 3053, 3061, 3071, 3082, 4003, 4053; BIOL 1014, 2014, 2024, and 12 additional hours in Biology; NSCI 4002; DIET 3053; PED 3023, 4043; HED 1012.

### **Admission:**

To be admitted into the Athletic Training Education Program (ATEP) at Ouachita, a student must meet ALL of the following criteria:

1. have a cumulative grade point average of 2.5 on a 4.0 scale from an institution of higher education (including transfer students) and;
2. have completed Human Anatomy I or II with the grade of a "C" or better and;
3. have completed ATEP 2001 Practicum in Athletic Training I or completed ATEP 2011 Practicum in Athletic Training II with a "B" or better and;
4. have on file in the program director's office three (3) letters of recommendation from the following:
  - a. a current university faculty member or a former university faculty member (from another institution) (university athletic training staff cannot be used);
  - b. a high school faculty member (where you attended high school);
  - c. an allied health care provider

A student who has not been accepted into the Athletic Training Education Program will not be allowed to take more than 9 hours in the ATEP curriculum.

### **Application deadlines:**

January 15<sup>th</sup> for the spring semester of admission

September 15<sup>th</sup> for the fall semester of admission

### **Interview Process:**

Interview for program admission will be given only after completion of the above criteria. This is a *competitive admission program*. Only those students meeting the criteria for admission will be selected for this program of study.

### **Attrition:**

To remain in the ATEP, a student must maintain a cumulative GPA of 2.5 on a 4.0 scale and maintain a 2.75 in the ATEP core or major courses.

Failure to meet these standards will result in forfeiture of the position in the program. Readmission will be based upon the aforementioned criteria. Any student who forfeits their admission status is subject to readmission. Any student who forfeits their admission status more than two times is subject to permanent dismissal from the ATEP. Those students accepted into the ATEP must keep at least a "C" or better in the ATEP courses to be retained. Failure to meet this retention requirement may result in program dismissal.

**2001. Practicum in Athletic Training I.**

This course is an introductory course for a student interested in learning about athletic training. Opportunities are available to observe and gain practical experience working with a staff member in prevention, evaluation, treatment, management, and rehabilitation of athletic related injuries. A practicum will contain some of the specific competencies required in athletic training. **Fall.**

**2011. Practicum in Athletic Training II.**

The course follows the first practicum class. Additional learning opportunities are made available in athletic training. Specified modules are required for course content. Prerequisite: ATEP 2001. **Spring.**

**2062. Techniques of Athletic Training.**

This course is an introductory course designed to show students the art and science of athletic training. Emphasis is placed upon the various responsibilities of a certified athletic trainer. **Fall.**

**2083. Introduction to Therapeutic Techniques.**

This course is designed as an introduction to the use of specified techniques used in athletic training. Special emphasis is placed on understanding the use of each modality as well as special therapeutic exercise techniques. **Spring.**

**3001. Practicum in Athletic Training III.**

This practicum places the student intern in a more prominent role learning from an approved clinical instructor covering intercollegiate or interscholastic athletic events. Prerequisite: ATEP 2001, 2011, and formal acceptance into the ATEP. **Fall.**

**3011. Practicum in Athletic Training IV.**

This course is offered in the spring following successful completion of ATEP 3001. This is the second part of a two-semester clinical involvement in intercollegiate or interscholastic event coverage. The student intern is placed under the direct supervision of an approved clinical instructor. Prerequisite: ATEP 3001. **Spring.**

**3021. Practicum in Athletic Training V.**

This course involves extended involvement with an approved clinical instructor in comprehensive dealings in prevention, evaluation, treatment, management, and rehabilitation in athletic training. Prerequisite: ATEP 3011. **Fall.**

**3031. Practicum in Athletic Training VI.**

This course involves continuation of extended involvement with an approved clinical instructor in comprehensive dealings in prevention, evaluation, treatment, management, and rehabilitation in athletic training. Prerequisite: ATEP 3021. **Spring.**

**3043. Lower Extremity Evaluation.**

This course involves the evaluation techniques used to assess injuries to the lower extremity to include the spine. Writing SOAP notes and using special tests will be emphasized. Prerequisite: ATEP 2062. **Spring.**

**3053. Upper Extremity Evaluation.**

This course involves the evaluation techniques used to assess injuries to the upper extremity to include the head and face. Writing SOAP notes and using special tests will be emphasized. Prerequisite: BIO 2014 or BIO 2024. **Fall.**

**3061. Allied Health Internship I.**

This course allows the student the opportunity to work with another allied health organization as an intern. This internship will be a four- to five-week rotation in a clinical setting under the direct supervision of another allied health care professional. Prerequisite: ATEP 2001, 2011. **Fall.**

**3071. Allied Health Internship II.**

This course allows the student intern the opportunity to work with a second allied health organization as an intern. This internship will be a four- to five-week rotation in a clinical setting under the direct supervision of another allied health care professional. Prerequisite is ATEP 3061. **Spring.**

**3082. Organization and Administration in Athletic Training.**

This course takes the student through various competencies of athletic training including but not limited to the budget process, ordering of supplies, inventory and facility design. **Spring.**

**4003. Advanced Therapeutic Techniques.**

This course deals with the therapeutic application of modalities and pharmacological considerations in treating conditions associated with physical activity and sports. Prerequisite: ATEP 2083. **Fall.**

**4053. Seminar in Athletic Training.**

This course involves general medical problems in athletic training. Prerequisites: Senior standing and approval of course instructor. [WAC] **Spring.**

## Department of Chemistry (CHEM)

**Professor J. Jeffers, Chair**  
**Professors, A. Nisbet, J. Nix**  
**Associate Professor J. Bradshaw, M. Perry**  
**Assistant Professors T. Hayes**

The Department of Chemistry provides the opportunity for students to gain professional level competence in the concepts and techniques of chemistry within the framework of a strong liberal arts tradition. The Department offers personalized attention in teaching and research to allow students to adapt this mastery of undergraduate chemistry to a variety of career objectives. The study of Chemistry has value for general education; for preparation for careers as laboratory chemists, high school teachers, science writers, science-oriented businesspersons, etc.; and for preparation for graduate school, law school, medical school or other health professions schools.

### **Requirements for a major in Professional Chemistry:**

B.S. degree: CHEM 1004, 1014, 2004, 3005, 3015, 3053, 3063, 3111, 3142, 3272, 4023, 4033, 4111, 4272, and research\*; PHYS 1004, 1014 or 2004, 2014; MATH 2014 and 3202. A minor must be completed in one of the following: mathematics, physics, computer science, or biology.

### **Requirements for a major in Chemistry:**

B.S. degree: CHEM 1004, 1014, 2004, 3005, 3015, 3053, 3272, 4111, plus one of 3063, 3142, 4023, and research\*; PHYS 1004, 1014 or 2004, 2014; MATH 2014. MATH 3202 recommended. A minor must be completed in one of the following: Mathematics, Physics, Computer Science, or Biology.

B.A. degree: CHEM 1004, 1014, 2004, 3005, 3015, 3053, 3272, 4111, plus one of 3063, 3142, 4023, and research\*; PHYS 1004, 1014 or 2004, 2014; MATH 2014. MATH 3202 recommended.

**Requirements for a teaching field in Chemistry:** See page 110.

CHEM 1004, 1014, 2004, 3005, 3015, 3053, 3272, 4023, 4111, and research\*; NSCI 2003, 3013, 3961; PHYS 1004, 1014 or 2004, 2014; BIOL 1014, 1024; MATH 2014. MATH 3202, CORE 2423 recommended.

### **Requirements for a minor in Chemistry:**

CHEM 1004, 1014, additional courses in the Department to total at least eighteen hours. No more than two hours credit from CHEM 4201-4491, 4202-4492, 4701-4794, 4801-4893 may be counted.

### **1004. General Chemistry I.**

An introduction to the field of chemistry including nomenclature, stoichiometry, atomic structure, bonding, behavior of gases, and nuclear processes. Lecture three hours, laboratory three hours per week. **Fall.**

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\*Research requirement can be met by taking CHEM 4801-4893 for a minimum of one credit hour (three hours laboratory per week for one semester) or by participating in a summer undergraduate research participation program at another university or research institute.

<sup>1</sup>W.D. and Alice Burch Professor of Chemistry and Pre -Medical Studies.

<sup>2</sup>Distinguished University Professor.

**1014. General Chemistry II.**

A continuation of CHEM 1004 including solids and liquids, chemical equilibria, electrochemistry, thermodynamics, and kinetics. Lecture three hours, laboratory six hours per week. Prerequisite: CHEM 1004. **Spring.**

**1024. Introductory Chemistry.**

Introductory course primarily for students in dietetics and nutrition, nursing, and dental hygiene. The course may not be counted toward a major or minor in Chemistry. No science background is assumed. Lecture three hours, laboratory two hours per week. **Fall.**

**1034. Introductory Organic and Biological Chemistry.**

Designed to follow CHEM 1024. The course may not be counted toward a major or minor in Chemistry. Lecture three hours, laboratory two hours per week. Prerequisite: CHEM 1024 or 1004. **Spring.**

**2004. Quantitative Analysis.**

Gravimetric and titrimetric analyses, separation methods, chemical equilibrium, redox theory, statistical treatment of data, and an introduction to spectrophotometry. Lecture two hours, laboratory six hours per week. Prerequisite: CHEM 1014. **Fall.**

**2701-4. Special Topics in Chemistry.**

A course varied to meet the needs of the department. **On Demand.**

**3005. Organic Chemistry I.**

A systematic study of the typical compounds of carbon emphasizing the relationship between structure and reactivity. Lecture three hours, laboratory six hours per week. [WAC] Prerequisite: CHEM 1014. **Fall.**

**3015. Organic Chemistry II**

A continuation of CHEM 3005 emphasizing reaction mechanisms and synthesis. Lecture three hours, laboratory six hours per week. [WAC] Prerequisite: CHEM 3005. **Spring.**

**3053. Physical Chemistry I.**

Introductory theoretical analysis of molecular structure, chemical bonding, and macroscopic chemical systems using quantum theory, classical and statistical thermodynamics, and kinetics. Lecture three hours per week. Prerequisites: MATH 2014, (MATH 3202 is highly recommended); PHYS 1004, 1014 or 2004, 2014. Prerequisite or corequisite: CHEM 3015. **Fall.**

**3063. Physical Chemistry II**

A continuation of CHEM 3053 emphasizing classical thermodynamics and electrochemistry. Lecture three hours. Prerequisite: CHEM 3053. **Spring.**

**3111. Chemistry Literature Seminar.**

Participants will prepare written reviews, make an oral presentation, and address questions on a topic of current interest in the literature. One hour per week. Prerequisite: Junior standing. **Spring.**

**3142. Instrumental Analysis.**

Theory of modern analytical techniques including spectrometric, chromatographic, and electrometric methods. Lecture two hours per week. Prerequisite: CHEM 3053. **Spring.**

**3203. Nutritional Biochemistry.**

A study of the structure, chemistry and metabolism of amino acids, proteins, carbohydrates, lipids, nucleic acids and vitamins. This course may not be counted toward a major or minor in Chemistry. Lecture three hours per week. Prerequisite: CHEM 1034. **Fall of even-numbered years.**

**3272. Experimental Techniques of Chemistry I.**

Integrated laboratory experiments from each of the sub-disciplines of chemistry: analytical, biochemistry, inorganic, organic, nuclear, and physical. Use of synthetic techniques, modern instrumentation, chemical literature, and both oral and written presentation of experimental data will be emphasized. Six hours of laboratory per week. Prerequisites: CHEM 2004, 3053. **Spring.**

**4023. Biochemistry.**

An introduction to biochemistry including discussions of natural products, enzymes, metabolism and other physiological processes. Pertinent physiochemical problems are included. Lecture three hours per week. Prerequisites: CHEM 3005, 3015. **Spring.**

**4033. Advanced Inorganic Chemistry.**

Atomic structure and its relationship to the properties of elements and their compounds, types of bonding, and periodic arrangements. Lecture three hours per week. Prerequisite or corequisite: MATH 3202. Prerequisite or corequisite: CHEM 3063. **Spring of odd-numbered years.**

**4111. Chemistry Research Seminar.**

Participants will prepare written reviews, make oral presentations, and defend results on their chemical research projects. One hour per week. Prerequisite: Senior standing. **Spring.**

**4201-4491, 4202-4492. Special Laboratory Topics.**

Laboratory courses suited to the needs of the student. **On Demand.**

**4272. Experimental Techniques of Chemistry II.**

Continuation of integrated laboratory experiments oriented toward modern applications of fundamental chemical principles from each sub-discipline. Six hours of laboratory per week. Prerequisite: CHEM 3272. **Fall.**

**4701-4794. Special Topics in Chemistry.**

A course varied to suit the interests of students. The course may be repeated one time for credit. **On Demand.**

**4801-4893. Special Studies in Chemistry.**

Treats special problems or techniques in chemistry and varied to suit the needs of chemistry students. **On Demand.**

## **Department of Mathematics (MATH) and Computer Science**

**Associate Professor A. Selph, Chair**  
**Professor S. Hennagin**  
**Associate Professors C. Cagle**  
**Assistant Professors T. Sergeant, J. Sykes**  
**Instructors D. Buscher, A. Tollett**

The Department of Mathematics and Computer Science has missions to several different populations, including non-science students in the Hickingbotham School of Business, School of Education, the Jones School of Fine Arts, the School of Humanities, and the School of Social Sciences. Further, the Department has missions to serve the science students in the School of Natural Sciences. The Department strives to serve these populations and their needs in the unique atmosphere of Ouachita Baptist University in a caring and responsible manner.

The mathematics curriculum is designed to meet the needs of students in all disciplines. The non-science student has choices of liberal arts mathematics courses, business mathematics, or college algebra, depending upon the major. Science students may take a variety of mathematics courses and, if desired, may obtain a major or minor in mathematics. One choosing a major in mathematics will receive adequate preparation for a career in the mathematics field, including preparation for graduate school, industrial employment, and teaching in secondary schools.

The Computer Science Program is designed to meet the objectives of service to the community, qualification for professional and industrial careers, and preparation for graduate study. Introductory courses are offered in several programming languages for general computer users. Two different majors and minors are available, namely a curriculum designed to emphasize the study of computer science as a discipline and another to emphasize the applications of computers in specific disciplines. All courses are taught with programming being an integral component.

Credit may not be earned in a departmental course that is a prerequisite for any course already completed. The Interdisciplinary Studies Mathematics requirement must be completed prior to Junior standing or during the first semester for transfer students.

All mathematics courses with the MATH prefix will require the student to have access to a graphing calculator.

### **Requirements for a major in Mathematics:**

B.S. degree: MATH 2014, 2024, 2043, 3034, 3093, 4062; three courses chosen from MATH 3053, 4023, 4043, 4073; one additional course from MATH 3043, 3063, 3073, 4043, 4073; CSCI 1043; PHIL 2043. A minor must be completed in biology, chemistry, computer science, or physics.

B.A. degree: MATH 2014, 2024, 2043, 3034, 3053, 3093, 4023, 4062, six additional Junior-Senior hours in Mathematics; CSCI 1043; PHIL 2043.

**Requirements for a teaching field in Mathematics:** See page 110.

**Requirements for a minor in Mathematics:** MATH 2014, 2024, at least ten additional hours in Mathematics including a minimum of six Junior-Senior hours.

- 1003. College Algebra.**  
Review of fundamentals, study of quadratic equations, solution of systems of linear equations, and other topics. **Fall, Spring.**
- 1013. Trigonometry.**  
Solution of triangles, identities, and equations. Study of graphs. Prerequisite: Plane Geometry. **Spring.**
- 1034. Pre-calculus Mathematics.**  
A course covering selected topics from College Algebra and Trigonometry intended for students who will take Calculus. Topics include functions, polynomials, rational functions, exponential and logarithmic functions, circular functions, systems of linear equations and coordinate geometry. Credit for graduation will not be given for this course and MATH 1003 or 1013. **Fall.**
- 1063. Business Calculus.**  
Intuitive coverage of calculus emphasizing applications in business. Derivatives, curve sketching, optimization, integrals, techniques and application of integrals. Credit for graduation may not be earned in both MATH 1063 and MATH 2014. Prerequisite: MATH 1003 or consent of instructor. **Fall, Spring.**
- 2014. Calculus I.**  
Introductory study of calculus and analytic geometry, including differentiation, application of derivatives, integration, and application of integrals. Prerequisite: MATH 1034 or 1003 and 1013 or consent of instructor. **Fall, Spring.**
- 2024. Calculus II.**  
Continuation of MATH 2014. Further study of transcendental functions, techniques of integration, sequences and series. Prerequisite: MATH 2014. **Fall, Spring.**
- 2033. Mathematics for Early Childhood Teachers I.**  
An introduction to the mathematical concepts underlying the traditional computational techniques for elementary school mathematics. The course may not be counted on a major or minor in Mathematics or for certification in secondary mathematics. Open only to Education majors. **Fall, Spring.**
- 2043. Discrete Mathematics.**  
A study of the basic principles underlying various areas of Mathematics: set theory, number theory, complex numbers, matrix operations, probability and graph theory. Prerequisite: MATH 2014. **Spring.**
- 2053. Mathematics for Middle School Teachers.**  
An introduction to the mathematical concepts underlying the traditional computational techniques for middle school Mathematics. The course may not be counted towards a major or minor in Mathematics. **Fall, Spring.**
- 2063. Elementary Statistics.**  
A study of statistics appropriate to the teaching of middle school Mathematics. The course may not be counted towards a major or minor in Mathematics. Prerequisite: MATH 1003. **Fall if there is sufficient demand.**

**3003. Foundations of Geometry.**

A study of the axiomatic bases of geometries, their relation to "real" space; basic concepts of point, line, plane and space; projective and non-Euclidean geometries. Prerequisite: MATH 2014. **Spring.**

**3013. Mathematics for Early Childhood Teachers II.**

A continuation of the study of the number system: rational and real. Basic ideas of geometry including plane regions and space figures, measurement, relations, functions and graphs, linear equations, probability and logic will be studied. Prerequisite: MATH 2033 or consent of instructor. The course may not be counted on a major or minor in Mathematics or for certification in secondary mathematics. It is open only to Elementary Education students. **Fall, Spring.**

**3034. Calculus III.**

Continuation of MATH 2024. A study of polar coordinates, vectors, vector-valued functions, function of multiple variables, including partial differentiation and multiple integrals. Prerequisite: MATH 2024. **Fall.**

**3043. Differential Equations.**

Ordinary differential equations such as occur in geometry, physics, and chemistry. Course covers classical solution techniques including power series solutions and also treats the Laplace Transform Method. Prerequisite: MATH 2024. **Spring of odd-numbered years.**

**3053. Abstract Algebra I.**

A study of groups: symmetric groups, groups of integers, subgroups, group homomorphisms and isomorphisms, and other group theory topics. Prerequisites: MATH 2024, 2043; PHIL 2043. **Fall of odd-numbered years.**

**3063. Probability and Statistics.**

Counting techniques, probability, odds, mathematical expectation, distributions, moments, sampling, mathematical models and testing hypotheses. Prerequisites: Math 2014, 2043. **Spring of even-numbered years.**

**3073. Numerical Methods.**

Provides a computation-oriented introduction to algorithms vital to scientific computing. Includes elementary error analysis and computational methods for roots of equations, linear systems of equations, interpolation, numerical integration, and initial value ordinary differential equations. Prerequisites: CSCI 1043; MATH 2014. Also listed as CSCI 3073. **On Demand.**

**3083. History of Mathematics.**

A survey of the development of mathematical theories and techniques from the early Egyptians through the eighteenth century. Emphasis is placed upon appreciation, but assignments include representative exercises. **Spring of even-numbered years.**

**3093. Linear Algebra.**

A study of vectors, vector spaces, matrices and determinants. Prerequisites: MATH 2043, 3034; PHIL 2043; CSCI 1043. **Fall of even-numbered years.**

**3103. Geometry for Middle School Teachers.**

A study of geometry appropriate for the teaching of middle school mathematics. Topics covered include basic concepts of point, line, plane, and space; constructing proofs; and use of computer software in the classroom. Open only to education majors. Prerequisite: MATH 1063 or MATH 2014. **On Demand.**

**3202. Advanced Chemical Calculations.**

A study of calculations required to master advanced chemical topics. This course may not be counted towards a major in mathematics. Prerequisite: MATH 2014. Prerequisite or corequisite: CHEM 3015.

**Spring.**

**4013. Methods in Secondary Mathematics.**

A modular course for secondary mathematics education students including theories, purposes, activities, curricula and new developments in teaching. Prerequisite: junior or senior standing. **Fall of odd-numbered years.**

**4023. Advanced Calculus I.**

A more theoretical treatment than is provided by the basic calculus courses. Topics include: limits, continuity, derivatives and the Riemann integral; primarily in one dimension. Prerequisites: MATH 2043, 3034, 3093; PHIL 2043. **Spring of odd-numbered years.**

**4033. Advanced Calculus II.**

Continuation of MATH 4023. Topics include: series, functions of several variables and integrals other than Riemann-type. Prerequisite: MATH 4023. **On Demand.**

**4043. Complex Variables.**

Complex number arithmetic, calculus of a complex variable, analyticity, power series representation, Cauchy's integral theorem, and consequences. Prerequisite: MATH 3034 and either MATH 3053 or MATH 4023. **Spring of even-numbered years.**

**4053. Abstract Algebra II.**

Continuation of MATH 3053. Study of rings, fields, polynomial rings, extension fields, Galois Theory, and other topics. Prerequisites: MATH 2024, 3053; PHIL 2043. **On Demand.**

**4062. Senior Seminar.**

A course designed to give experience in reading technical literature and to give extensive writing experience. Prerequisite: Senior status or consent of instructor. [WAC] **Fall.**

**4073. Introduction to Topology.**

A basic course in point-set topology. Topics include abstract topological spaces, topology of lines and planes, connectedness, compact spaces and continuous mappings. Prerequisites: MATH 3053 or 4023; PHIL 2043. **Fall of even-numbered years.**

**4801-4893. Special Studies in Mathematics.**

For students who wish to do independent work on advanced problems.

## Computer Science (CSCI)

CSCI Core: 1043, 1063, 2063, 3033.

### Requirements for a major in Computer Science:

B.S. degree: CSCI Core, CSCI 2093, 3043, 4043, 4023 or 4033, 4053, 4083, 4093; PHIL 2043; MATH 2014, 2024; one course from MATH 3034, 3053, 3063, 3093. A minor must be completed in biology, chemistry, physics or mathematics.

B.A. degree: CSCI Core, CSCI 2093, 3043 or 4043, 4033, 4083, 4093, six additional hours in Computer Science including at least three Junior-Senior hours; PHIL 2043; MATH 2014.

For a B.A. with Business applications it is recommended that the student take CSCI 1023, 2023 and select a minor within the School of Business.

### Requirements for a minor in Computer Science:

Option I: CSCI Core plus six additional hours in Computer Science including at least three Junior-Senior hours.

Option II: CSCI 1043 and 1063 or CSCI 1023 and 2023. CSCI 3053, 4033, 4083, plus 3 additional hours in computer science.

### 1003. Information Technology.

A course for non-majors designed to introduce the student to computer history, terminology, and mainstream technology. The course provides hands-on experience in using word processors, spreadsheets, presentation software, e-mail systems, and web browsers. This course may not be counted toward a major or minor in computer science; nor may it be taken after completion of INSY 1033 or any CSCI course. **Fall, Spring.**

### 1023. COBOL.

An introduction to solving business problems using COBOL, emphasizing structured program design, data organization, control break logic, and elementary file storage and manipulation. Prerequisite: MATH 1003 or equivalent. **Fall of even-numbered years.**

### 1043. Computer Programming I.

Introduction to computer science and to computer programming with emphasis on top-down design, stepwise refinement, and structured programming techniques. Topics include control structures, subprograms, character-based I/O, sequential file processing, arrays, and elementary sorting and searching techniques. Prerequisite: MATH 1003 or equivalent or consent of instructor. **Fall.**

### 1063. Computer Programming II.

Continuation of CSCI 1043 in developing a disciplined approach to the design, coding, and testing of computer programs. Includes coverage of linked lists, stacks, queues, recursion, sorting and searching techniques, and binary files. Prerequisite: CSCI 1043 or consent of instructor. **Spring.**

### 2013. RPG.

An introduction to solving business problems using RPG, emphasizing disk file processing related to generating reports. Prerequisite: MATH 1003 or equivalent. **On Demand.**

- 2023. Advanced COBOL.**  
Advanced programming in COBOL including built-in sort, table processing, and indexed and relative file processing. Prerequisite: CSCI 1023. **Spring of odd-numbered years.**
- 2033. FORTRAN.**  
Elements of the FORTRAN language will be utilized in solving primarily scientific-oriented problems. Simulation and sorting applications will be included. Prerequisite: At least concurrent enrollment in MATH 2014. **Spring of even-numbered years.**
- 2043. Java.**  
An overview of the Java programming language. Emphasis is on features of the language that set it apart from traditional programming languages. Prerequisite: CSCI 1063. **Spring of odd-numbered years.**
- 2063. Discrete Structures.**  
Finite and discrete algebraic structures, including finite sets, relations, counting techniques, recurrence relations, algorithmic complexity analysis, Boolean algebra, and elementary graph theory. Emphasis is upon application of these areas to computer science. Prerequisites: CSCI 1063; PHIL 2043. **Fall.**
- 2093. Assembly Language Programming.**  
An introduction to assembly language programming that includes binary and hexadecimal number systems, computer structure, internal representation of data, addressing, subroutines, and interfacing with high-level languages. Prerequisite: CSCI 1063. **Fall.**
- 3033. Data Structures.**  
Study of the implementation and analysis of classical data structures including arrays, lists, trees, and hash tables. Includes advanced searching and sorting methods as well as an introduction of the application of the object-oriented programming paradigm to the implementation of data structures. Prerequisite: CSCI 2063. **Spring.**
- 3043. Computer Organization and Architecture.**  
Examination of architectural concepts such as elementary digital circuits, performance measures, design issues, instruction sets, memory organization, and interrupt handling. Prerequisite: CSCI 2063 and 2093. **Spring of odd-numbered years.**
- 3053. Computer Networks.**  
Examination of modern networking terminology, concepts, and methods. Includes examination of modern protocols and network operating systems. Prerequisite: CSCI 1063 or CSCI 2023. **Spring of even-numbered years.**
- 3073. Numerical Methods.**  
Provides a computation-oriented introduction to algorithms vital to scientific computing. Includes elementary error analysis and computational methods for roots of equations, linear systems of equations, interpolation, numerical integration, and initial value ordinary differential equations. Prerequisites: CSCI 1043; MATH 2014. **On Demand.**
- 4023. Programming Languages.**  
A survey of procedure-oriented languages, emphasizing the syntactic and semantic structures present in the language. Also includes an

introduction to formal languages. Prerequisite: CSCI 3033. **Spring of odd-numbered years.**

**4033. Database Management Systems.**

Examines the design and implementation of database management systems. Specific assignments will be made utilizing database software packages. Prerequisite: CSCI 1063 or 2023. **Spring of even-numbered years.**

**4043. Algorithms.**

The design, analysis, and implementation of classical sequential algorithms, including greedy, divide-and-conquer, dynamic programming, and backtracking algorithms. Also includes an introduction to parallel algorithms and algorithmic theory. Prerequisite: CSCI 3033. **Spring of even-numbered years.**

**4053. Operating Systems.**

Detailed investigation of modern operating systems including process concepts, issues in multiuser and concurrent systems, virtual memory systems, security issues, and an introduction to distributed operating systems. Prerequisite: CSCI 2093. **Fall of odd-numbered years.**

**4063. Computer Graphics.**

Introduction to elementary topics in interactive computer graphics. Input devices, display devices and techniques for 2-D and 3-D transformations will be explored. Projects will be used to emphasize data structures and applications to various disciplines. Prerequisites: CSCI 1063; MATH 2014. **On Demand.**

**4073. Artificial Intelligence.**

Fundamental concepts and techniques of intelligent systems including search strategies, representation methods, and interpretation of knowledge. Prerequisite: CSCI 3033. **On Demand.**

**4083. Current Topics.**

Examination of topics, languages, and tools that have become significant forces in the field and that are not covered by other courses in the curriculum. The course is project-based and, when possible, customized to the individual student's educational or vocational objectives. Prerequisites: Senior status or consent of instructor. **Spring.**

**4093. Senior Seminar.**

A course designed to help majors draw connections among the various courses they have encountered during their college years. This is accomplished through projects and through selected reading and writing assignments. Prerequisite: Senior status or consent of instructor. [WAC] **Fall.**

**4801-4893. Special Studies in Computer Science.**

Continuation of courses offered on a regular basis or areas of computer science not covered in the regular curriculum. Prerequisite: consent of instructor. **On Demand.**

## Department of Physics (PHYS)

**Professor G. Good<sup>1</sup>, Chair**

**Assistant Professors K. Cornelius, C. Sheehan**

Because physics is basic to other disciplines in the sciences and in engineering, our curriculum is designed to prepare students for a number of options after graduation. Many of our students pursue graduate work in physics directed toward employment in research in government, including laboratories, or teaching. Other students attend professional schools such as engineering, law or medicine; others work in related fields, such as Biophysics, or Geophysics. Finally, a number of our students go directly to work after receiving the bachelor's degree. These students benefit greatly from the option in Engineering Physics outlined below. This option is of value to the student who may be undecided about further work in engineering or physics or who pursues graduate work. This option is also of value to the student who is interested in the Arts-Engineering program described on page [check pg #]. Students undecided about these options will find our faculty informed and readily available to assist in making these important decisions.

### **Requirements for a major in Physics:**

B.S. degree (Physics Option): PHYS 2004, 2014, 3004, 3034, 4003, seventeen additional approved hours in physics (4043, 4183, and 4263 are strongly recommended); CHEM 1004, 1014; MATH 2014, 2024, 3034, 3043, three additional Junior-Senior hours in Mathematics; six hours of Computer Science, completion of a minor in chemistry, biology, computer science or mathematics.

B.S. degree (Engineering Physics Option): PHYS 1112, 2004, 2014, 2123, 2133, 3004, 3034, 3123, 4003, nine additional hours in Physics chosen from PHYS 3013, 3044, 3203, 4023, 4041, 4043, 4183, 4263; CHEM 1004, 1014; MATH 2014, 2024, 3034, 3043, three additional Junior-Senior hours in Mathematics; six hours of Computer Science, completion of a minor in biology, chemistry, computer science, or mathematics.

B.A. degree: PHYS 2004, 2014 (or 1004, 1014), 3004, 3034, 4003, two additional courses in physics, one of which must be at the Junior-Senior level, for a minimum of twenty-four hours; MATH 2014, 2024.

**Requirements for a teaching field in Physics:** See page 110.

**Requirements for a minor in Physics:** PHYS 2004, 2014 (or 1004, 1014), 3004. Of the remaining six hours, only PHYS 1203 may be below the Junior level; PHYS 1212 may be taken with consent of Department chairman.

### **1004, 1014. Introductory Physics I, II.**

Introductory non-calculus courses in the fundamental principles of physics. Lecture three hours, laboratory two hours per week. Corequisite or prerequisite: MATH 1003, 1013, or equivalent. **Fall, Spring.**

### **1112. Engineering Graphics.**

Instruction in the proper use of drafting instruments, lettering, design, layout and projection. **Fall.**

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<sup>1</sup>Charles S. and Elma Grey Goodwin Holt Professor of Physics and Pre-Medical Studies.

- 1203. Astronomy.**  
The astronomical universe from the descriptive viewpoint. Some night observations will be included. **Spring.**
- 1212. Fundamentals of Acoustics.**  
The physics of acoustics. Vibrating strings, membranes and air columns as related to musical instruments will be discussed. **Spring of even-numbered years.**
- 2004, 2014. University Physics I, II.**  
Introductory courses in physics using calculus, designed for the physical science and engineering majors. Lecture three hours, laboratory three hours per week. Prerequisite: MATH 2014, Corequisite MATH 2024. **Fall, Spring.**
- 2123. Statics.**  
A study of forces in equilibrium, especially stresses in loaded structures. Analytical methods are emphasized. Prerequisite: PHYS 2014. Prerequisite or Corequisite: MATH 2024. **Fall.**
- 2133. Dynamics.**  
A study of the kinetics and kinematics of a particle and of rigid bodies. Prerequisite: PHYS 2123. **On Demand.**
- 3004. Introduction to Modern Physics.**  
An elementary development of the principles of modern physics. [WAC] Lecture three hours, laboratory four hours per week. Prerequisite: PHYS 1014 or 2014. Corequisite: MATH 2024. **Fall.**
- 3013. Optics.**  
Geometrical and physical optics. Prerequisite: PHYS 1014 or 2014. Corequisite: MATH 3034. **Fall of odd-numbered years.**
- 3034. Electricity and Magnetism.**  
A study of the principles of electricity and magnetism including fields, potential, capacitance, resistance, and inductance. Lecture three hours, laboratory three hours per week. Prerequisites: PHYS 1014 or 2014; MATH 3034. **Spring.**
- 3044. Electronics.**  
An introduction to the fundamentals of electronics. Lecture three hours, laboratory four hours per week. Prerequisite: PHYS 1014 or 2014. **Spring.**
- 3123. Electrical Circuits.**  
An introduction to the fundamental concepts of electrical circuits, including DC circuits, AC circuit analysis, network theorems, transient analysis, complex frequency and resonance phenomena and computer solutions to circuits. Prerequisite: PHYS 3034. **Fall.**
- 3203. Strength of Materials.**  
Stress and deformation of members in tension, compression, torsion and bending, and the design of these members, columns, statically indeterminate beams and simple connections. Prerequisite: PHYS 2123. **On Demand.**

- 4003. Mechanics.**  
A study of the fundamentals of mechanics as applied to particles, systems of particles and rigid bodies including harmonic, oscillators and central force fields. Prerequisites: PHYS 1004 or 2004; MATH 2024. **Fall.**
- 4023. Thermodynamics.**  
A study of the basic principles of classical thermodynamics and statistical mechanics. Prerequisites: PHYS 1014 or 2014; MATH 3034. **Fall of even-numbered years.**
- 4041. Senior Laboratory.**  
Experiments in thermometry, solid state, atomic and molecular physics. Open only to Senior Physics students.
- 4043. Introduction to Quantum Mechanics.**  
An introduction to the postulates and rules of quantum mechanics. Prerequisite: PHYS 4003; MATH 3043. **Spring of odd-numbered years.**
- 4053. Mathematical Physics.**  
Mathematical methods applied to physics. Prerequisites: PHYS 1014 or 2014; MATH 3034. **On Demand.**
- 4061. Introduction to Physics Research.**  
To introduce the student to the theory, techniques and methods of laboratory and library research. Open only to Senior Physics students. **Fall, Spring.**
- 4103. Advanced Modern Physics.**  
A continuation of PHYS 3003; an intermediate course in atomic, nuclear and solid-state physics. Prerequisite: PHYS 3004. **Spring of odd-numbered years.**
- 4183. Electromagnetic Fields.**  
Vector analysis applied to electromagnetic fields; dielectric and magnetic materials; Maxwell's equations; radiation. Prerequisite: PHYS 3034; MATH 3043. **Spring of odd-numbered years.**
- 4263. Advanced Mechanics.**  
A continuation of PHYS 4003; rigid bodies, moving coordinate systems, continuous media, Lagrange's equations. Prerequisite: PHYS 4003; MATH 3034, 3043. **Spring.**
- 4801-4893. Individual Study, Group Study, Research.**  
This course is offered to provide competent students with an opportunity to do independent study and research or to study special topics. **On Demand.**

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<sup>1</sup>May be taken at Henderson State University.