

# CHEMISTRY AND BIOCHEMISTRY

Halenz Hall, Room 225  
(269) 471-3247 or 471-3248  
chemistry@andrews.edu  
http://www.andrews.edu/CHEM/

## Faculty

G. William Mutch, *Chair*  
David E. Alonso  
Getahun Merga  
Desmond H. Murray  
D. David Nowack  
Steven E. Warren  
Peter A. Wong

Academic Programs	Credits
BS: Chemistry	38
BS: Chemistry (Approved by the American Chemical Society (ACS) Committee on Professional Training)	44
BS: Biochemistry	34
Minor in Chemistry	20

Students who plan to major in chemistry or biochemistry are expected to have entrance credit in the preparatory subjects of chemistry and mathematics (including algebra and trigonometry); a background in physics is desirable. Those who do not have entrance credit or equivalent training in these subjects, particularly mathematics, may not fulfill the department graduation requirements in four years.

Students are encouraged to plan early for an on-campus or off-campus research experience required of all students in the Bachelor of Science degree programs in chemistry and strongly recommended for those in the Bachelor of Science degree program in biochemistry. This experience may take the form of a cooperative educational-research experience or research in an academic, industrial, or governmental laboratory setting. Interested students should consult the department chair.

## AMERICAN CHEMICAL SOCIETY CERTIFICATION

Students desiring American Chemical Society certification must

- Complete the required courses for the (ACS) Bachelor of Science degree in chemistry as spelled out in this bulletin
- Achieve a minimum GPA of 3.00 in all chemistry courses taken at Andrews University
- Satisfactorily complete a research or cooperative educational experience in chemistry
- Pass at least one advanced course selected from the following: CHEM470, 474 or 475.

A complete statement of certification requirements is available from the department chair.

## UNDERGRADUATE PROGRAMS

### Core Courses—30

CHEM131, 132, 200, 231, 232, 241, 242, 311, 312, 411, 412, 431, 441, BCHM421

### BS: Chemistry—38

**Major Requirements:** Core plus CHEM415, 440.

**Research/Cooperative Experience:** An on-campus or off-campus research or cooperative educational experience. The student may satisfy this requirement by matriculating in CHEM495, HONS497, 498 or IDSC380.

**Cognate Courses:** CPTR125 or CPTR151; MATH141, 142; PHYS241, 242, 271, 272.

### BS: Chemistry—44

(American Chemical Society approved)

**Major Requirements:** Core plus CHEM440, 415, 432, 442; and one course selected from the following: CHEM470, 474, or 475.

**Research/Cooperative Experience:** An on-campus or off-campus research or cooperative educational experience. The student may satisfy this requirement by matriculating in CHEM495, HONS497, 498 or IDSC380.

**Cognate Courses:** MATH141, 142, 286; CPTR125 or CPTR151; PHYS241, 242, 271, 272.

Courses in economics and marketing are strongly recommended. A reading knowledge of German or French, although not required for professional undergraduate education in chemistry, is strongly recommended for students planning advanced study.

### BS: Biochemistry—34

**Major Requirements:** Core plus BCHM422, 430.

**Cognate Courses:** BIOL165, 166; MATH141, 142; PHYS141, 142 (or PHYS241, 242, 271, 272); and two courses selected from BIOL371, 372; FDNT485; ZOOL315, 464, 465.

Students desiring a career in biochemistry might be better served by adding the biochemistry courses to the Bachelor of Science degree in chemistry, but the Bachelor of Science degree in biochemistry can be strengthened by the addition of CHEM415, 440, and 495.

### Minor in Chemistry—20

CHEM131, 132, 231, 232, plus 4 credits of majors level chemistry or biochemistry.

## GRADUATE PROGRAM

The Department of Chemistry and Biochemistry collaborates in offering the MS: Mathematics and Science with the departments of Mathematics, Biology, and Physics. See the program description under Mathematics and Science, p. 151.

**COURSES**

See inside front cover for symbol code.

	<b>(Credits)</b>		<b>§ (4)</b>
<b>BCHM120</b> <i>Introduction to Biological Chemistry</i> A survey of major concepts in biochemistry such as structures of biological molecules, their functions, energy metabolism, regulation of biochemical pathways; for nursing, dietetics, and allied health students. Weekly: 3 lectures, 1 recitation, and a 3-hour lab. Not applicable towards a major or minor in chemistry or biochemistry. Prerequisite: CHEM110. <i>Spring</i>	§ (4)		
<b>BCHM421</b> <i>Biochemistry I</i> Study of the fundamental principles of enzyme kinetics and mechanisms based on the structure and chemistry of biomolecules including amino acids, carbohydrates, lipids, proteins, nucleotides, nucleic acids, and biological membranes. Weekly: 4 lectures. Prerequisite: CHEM232. <i>Fall</i>	◆ (4)		
<b>BCHM422</b> <i>Biochemistry II</i> Continuation of BCHM421 including selected topics of hormone and regulatory biochemistry, and the study of the four primary neurotransmitter systems—acetylcholine, catecholamines, serotonin, and gamma-aminobutyric acid. Weekly: 3 lectures. Prerequisites: BCHM421. <i>Spring</i>	◆ (3)		
<b>BCHM430</b> <i>Biochemistry Lab</i> Introduction to quantitative and qualitative methods for the isolation, purification and identification of biological materials and applications of enzyme kinetics. Weekly: 4 hours of lab. Prerequisite: BCHM421 and registration in BCHM422. <i>Spring</i>	◆ § (1)		
<b>CHEM100</b> <i>Consumer Chemistry</i> A one-semester course primarily for non-science majors presenting an introduction to fundamental concepts of chemistry to convey an appreciative understanding of the nature of chemistry and how it is applied to our daily lives. Topics of consumer chemistry to be studied will be selected from fuels, energy, polymers, fertilizers, pesticides, food and food additives, household cleaners, cosmetics and personal care chemicals, pharmaceuticals, and air and water pollution. Meets the physical science general education requirement and may substitute for Scientific Inquiry. Three lectures per week and one 3-hour laboratory. Not applicable toward a major or minor in chemistry or biochemistry.	§ (4)		
<b>CHEM110</b> <i>Introduction to Inorganic and Organic Chemistry</i> An introduction to the principles and applications of inorganic and organic chemistry; for nursing, dietetics, and allied health students. Meets the natural/physical science general education restricted choice requirement. Weekly: 3 lectures, 1 recitation, and a 3-hour lab. <i>Fall</i>	§ (4)		
<b>CHEM131</b> <i>General Chemistry I</i> This first course in chemistry is for students planning to major in science and engineering. Topics include stoichiometry, atomic and molecular structure, bonding, states of matter, solutions, chemical kinetics, and chemical equilibrium. Weekly: 3 lectures, 2 recitations, and a 3-hour lab. Prerequisite: MPE≥P3 or MATH166 or MATH141; High school chemistry or physics strongly recommended. <i>Fall</i>	§ (4)		
<b>CHEM132</b> <i>General Chemistry II</i> A continuation of CHEM131 with topics including thermodynamics, acid and base chemistry, descriptive and nuclear chemistry. Weekly: 3 lectures, 2 recitations, and a 3-hour lab. Prerequisite: a grade of C- or better in CHEM131. <i>Spring</i>			§ (4)
<b>CHEM200</b> <i>Quantitative Analysis</i> Lecture topics include statistics, chemical equilibrium, titrimetric procedures, gravimetric procedures, and electrochemistry. Laboratory experiments include gravimetric procedures and titrimetric procedures of acid and base systems and redox systems, electrochemistry, and an introduction to instrumental methods. Weekly: 2 lectures and two 4-hour labs. Prerequisite: CHEM132. <i>Fall</i>			§ (4)
<b>CHEM231</b> <i>Organic Chemistry I</i> The chemistry of carbon-containing compounds with emphasis on nomenclature, molecular structure, spectra-structure relationships, and a mechanistic approach to organic reactions. Weekly: 3 lectures and 2 recitations. Prerequisite: CHEM132. <i>Fall</i>			(3)
<b>CHEM232</b> <i>Organic Chemistry II</i> This course is a continuation of CHEM231. Weekly: 3 lectures and 2 recitations. Prerequisite: a grade of C- or better in CHEM231. <i>Spring</i>			(3)
<b>CHEM241</b> <i>Organic Chemistry Laboratory I</i> Experiments related to the course content of CHEM231. Weekly: one 4-hour laboratory. Prerequisite: CHEM231 or concurrent enrollment in CHEM231. <i>Fall</i>			§ (1)
<b>CHEM242</b> <i>Organic Chemistry Laboratory II</i> Experiments related to the course content of CHEM232. Weekly: one 4-hour laboratory. Prerequisite: CHEM232 or concurrent enrollment in CHEM232. <i>Spring</i>			§ (1)
<b>CHEM300</b> <i>Laboratory Glassblowing</i> Practice of fundamental glassblowing skills common to both scientific and creative glass blowing. Two projects are required. The student may choose between scientific and creative projects. Weekly: 1 lecture demonstration and 4 hours of lab. Not applicable towards a major or minor in chemistry or toward the General Education requirement in natural science. Offered <i>Fall</i> (even years or as needed)			Alt § (2)
<b>CHEM311</b> <i>Seminar in Chemistry</i> Departmental seminar series devoted to topics in current chemical research by students, faculty, and guest speakers. This course is required of, and open only to, junior chemistry and biochemistry majors, and attendance for both semesters is required for one credit; freshmen and sophomores are encouraged to attend. Grading is on an S/U basis. A deferred grade (DG) is assigned Fall Semester and is removed upon successful completion of CHEM312. Weekly: 1 seminar. Prerequisite: CHEM232. <i>Fall</i>			(.5)
<b>CHEM312</b> <i>Seminar in Chemistry</i> Continuation of CHEM311. This course is required of, and open only to, junior chemistry and biochemistry majors; freshmen and sophomores are encouraged to attend. Grading is on S/U basis. Weekly: 1 seminar. Prerequisite: CHEM311. <i>Spring</i>			(.5)

