

**BIOL590****(1-4)**

Investigates various specialties of biology. Repeatable in different areas.

**BIOL648****(1-4)****BIOL681, 682****(1, 1)**

An introduction to graduate studies in biology, the nature and methods of science, and principles of research ethics. During second semester reports are made by each student to the group on topics from current literature and on specific problems in biology. Participation once per week for 2 semesters is required. BIOL681: ; BIOL682:

**BIOL697****(1-4)**

Repeatable to 4 credits.

**BIOL699****(3)**

Repeatable to 6 credits.

# CHEMISTRY AND BIOCHEMISTRY

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Halenz Hall, Room 225  
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chemistry@andrews.edu  
<http://www.andrews.edu/CHEM/>

**Faculty**

G. William Mutch,  
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Steven E. Warren  
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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, pa4 ot IfCrl Dathematics ,matynot hfulflithe pdparatmnt traduateon oequired

# Undergraduate Programs

# Courses

## 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 Master of Science: Interdisciplinary Studies (Mathematics and Physical Sciences). See the Interdisciplinary Studies section, p. 140.

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. Prerequisites: CHEM132.

and one 4-hour lab. Not applicable towards a major in chemistry or biochemistry. Prerequisites: CHEM132; CHEM232 or CHEM200 strongly recommended. (odd years or as needed)

**CHEM231 (3)**

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. Prerequisites: CHEM132.

**CHEM232 (3)**

This course is a continuation of CHEM231. Weekly: 3 lectures and 2 recitations. Prerequisites: a grade of C- or better in CHEM231.

**CHEM241 \$ (1)**

Experiments related to the course content of CHEM231. Weekly: one 4-hour laboratory. Prerequisite: CHEM231 or concurrent enrollment in CHEM231.

**CHEM242 \$ (1)**

Experiments related to the course content of CHEM232. Weekly one 4-hour laboratory. Prerequisite: CHEM232 or concurrent enrollment in CHEM232.

**CHEM300 Alt \$ (2)**

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 (even years or as needed)

**CHEM311 (.5)**

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.

**CHEM312 (.5)**

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.

**CHEM340 \$ (4)**

A survey of environmental and energy-related problems. Topics include air, soil, and water pollution, energy and other resources, solid wastes and recycling, and toxic chemicals. Weekly: 3 lectures

**CHEM410 ♦ \$ (2)**

Principles of chemistry as applied to the methods of analysis and

computers, analog and digital devices. Weekly: 2 lectures and two 4-hour labs. Prerequisites: CHEM200, MATH142.

**CHEM441** ◆ \$ (1)

Experiments related to the course content of CHEM431. Weekly: one 4-hour laboratory. Prerequisite: concurrent enrollment in CHEM431.

**CHEM442** ◆ \$ (1)

Experiments related to the course content of CHEM432. Weekly: one 4-hour laboratory. Prerequisite: concurrent enrollment in CHEM 432.

**CHEM470** ◆ \$ (2)

An advanced laboratory course designed to incorporate a wide variety of modern synthetic techniques of organic, organometallic, and inorganic chemistry. Weekly: two 4-hour labs. Prerequisites: CHEM474,415 or concurrent enrollment in CHEM415.

**CHEM474** (2)