Chemistry & Biochemistry

Shinquin Program in Chemistry and Biochemistry

Professor Michael McGinnis; Associate Professors Seth Frisbie, Ethan Guth (Chair and Pre-Health Advisor) and Joseph Rizzolo; Assistant Professors Sarah Gallant and Emma Ste Marie; Senior Lecturer, Anthony Rutkowski; Lecturers Marie Agan (Lab Coordinator) and Page Spiess.

Our graduates are highly desired by industry and government employers for their laboratory skills, and are well qualified for admission to graduate and professional schools. The courses and labs required for these degrees assure that graduates are proficient in the fundamental principles of chemistry and prepared to apply these principles to specialized areas such as environmental, forensic, medicinal, and pharmaceutical chemistry.

Bachelor of Science Degree, Majors Offered:

- Chemistry (p. 2)
- Biochemistry (p. 1) (coursework in this major covers the core pre-requisite classes for the majority of medical and dental schools)

Mission:

Within the mission of Norwich University and the College of Science and Mathematics, the mission of the Chemistry and Biochemistry Department is to offer laboratory-intensive courses that provide an understanding of the chemical and biochemical aspects of the physical environment and to prepare students majoring in the discipline for careers in chemistry and biochemistry related fields as well as for further educational opportunities.

The progress of all students majoring in chemistry and biochemistry will be evaluated by the department at the end of the first and second years. Students receiving an unsatisfactory evaluation will be requested to change majors.

Goals:

- Graduates will have a good understanding and broad knowledge of chemistry in all five areas of the discipline: analytical, biochemistry, inorganic, organic, and physical.
- Graduates will be capable of performing independently and competently in the laboratory.
- Graduates will be prepared for successful employment in a profession employing chemistry and will be prepared for graduate or professional school.

Outcomes:

- Chemistry and biochemistry majors will complete the ETS standardized chemistry major field exam and score on average in the 50th percentile or above.
- Chemistry and biochemistry majors will develop the ability to read the primary literature; to follow procedures found in the literature; to perform a variety of modern laboratory techniques and produce quality results, and to communicate results orally and in writing.
- Ninety percent of graduates who wish to pursue graduate or professional education will be accepted into programs; 100% of graduates desiring employment or commissioning directly from the undergraduate programs will be employed or commissioned within six months of graduation.

Careers for these Majors:

A degree in chemistry or biochemistry serves as an excellent foundation for careers both in and out of science. It can be of particular benefit to students interested in pursuing any of the following careers:

- Agricultural Chemist
- Air Pollution Monitor
- Bio-Analyst or DNA Analyst
- Biochemist
- Biomedical Engineer
- Biostatistician
- Brewmaster
- Clinical Chemist
- Crime Lab Assistant, Forensic Chemist,
- Dentist
- Doctor
- Epidemiologist
- Food and Drug Inspector, Food Safety Auditor
- Food Chemist or Food Scientist
- Laboratory Manager
- Medical Laboratory Technologist
- Patent Agent
- Pest Control Technician
- Petroleum Chemist
- Pharmaceutical Chemist
- Pharmacist, Pharmacologist
- Quality Control Specialist
- Regulatory Affairs Specialist
- Research Assistant
- Sales Representative
- Science Teacher, University Professor
- Toxicologist
- Water Purification Chemist or Water Quality Analyst

Major Biochemistry

Biochemistry (B.S) Curriculum Map 2021-2022 Catalog

All courses listed on the curriculum map are required, although the sequence varies somewhat for courses offered in alternate years. It is difficult for chemistry and biochemistry majors to schedule the required courses unless they follow the outline recommended paying special attention to the alternate year courses.

Course	Cr.	Comp.	Course	Cr.	Comp.
FRESHMAN					
Fall			**Spring**		
BI 101 Principles of Biology I	4		BI 102 Principles of Biology II	4	
CH 103 General Chemistry I (General Education Lab Science)	4		CH 104 General Chemistry II (General Education Lab Science)	4	
EN 110 Writing and Inquiry in Public Contexts	3		EN 111 Writing and Inquiry in Academic Contexts	3	
MA 107 Precalculus Mathematics [1]	4		MA 121 Calculus I (General Education Math)	4	

Fall Semester Total Cr.:	**15**		**Spring Semester Total Cr.:**	**15**	
SOPHOMORE					
Fall			**Spring**		
CH 214 Communication in Chemistry (or in 3rd year)	1		BI 226 Cell Biology	4	
CH 225 Organic Chemistry I	4		CH 226 Organic Chemistry II	4	
PS 201 General Physics I [2]	4		PS 202 General Physics II [2]	4	
EN 222 Introduction to World Literatures (General Education Goal 3: Literature)	3				
MA 122 Calculus II (General Education Math)	4				
Fall Semester Total Cr.:	**16**		**Spring Semester Total Cr.:**	**12**	
JUNIOR					
Fall			**Spring**		
BI 303 Genetics	4		CH 314 Instrumental Methods	3	
CH 204 Quantitative Analysis	4		CH 315 Analysis Laboratory (taken with CH 314)	1	
CH 327 Physical Chemistry I	3		CH 328 Physical Chemistry II (or Free Elective)	3	
General Education Social Science (http://catalog.norwich.edu/residentialprogramscatalog/generaleducationgoals/)	3		General Education History (http://catalog.norwich.edu/residentialprogramscatalog/generaleducationgoals/)	3	
General Education Leadership (http://catalog.norwich.edu/residentialprogramscatalog/generaleducationgoals/)	1-3		General Education Arts & Humanities (http://catalog.norwich.edu/residentialprogramscatalog/generaleducationgoals/)	3	
			General Education Ethics (http://catalog.norwich.edu/residentialprogramscatalog/generaleducationgoals/)	3	
Fall Semester Total Cr.:	**15-17**		**Spring Semester Total Cr.:**	**16**	
SENIOR					
Fall			**Spring**		
BI 304 Physiology	4		CH 325 Biochemistry II (or BI 226)	4	
CH 324 Biochemistry I	4		CH 422 Chemical Synthesis and Examination II (Capstone)	3	
CH 413 Chemistry Seminar (Capstone)	1		Free Elective	3	
Free Elective	3		Free Elective	3	
Free Elective	3		Free Elective	3	
Fall Semester Total Cr.:	**15**		**Spring Semester Total Cr.:**	**16**	
TOTAL CREDITS FOR THIS MAJOR: 120-122					

1 MA 107 can be substituted with a Free Elective credit if Math Placement Test places a student into MA 121

2 PS 211 - PS 212 may be substituted for PS 201 - PS 202

Major Chemistry

Chemistry (B.S.) - Curriculum Map 2021-2022 Catalog

All courses listed on the curriculum map are required, although the sequence varies somewhat for courses offered in alternate years. It is difficult for chemistry and biochemistry majors to schedule the required courses unless they follow the outline recommended paying special attention to the alternate year courses.

Course	Cr.	Comp.	Course	Cr.	Comp.
FRESHMAN					
Fall			**Spring**		
CH 103 General Chemistry I (General Education Lab Science)	4		CH 104 General Chemistry II (General Education Lab Science)	4	
EN 110 Writing and Inquiry in Public Contexts	3		EN 111 Writing and Inquiry in Academic Contexts	3	
MA 121 Calculus I (General Education Math)	4		MA 122 Calculus II (General Education Math)	4	

General Education Arts & Humanities (http://catalog.norwich.edu/residentialprogramscatalog/generaleducationgoals/)	3		MA 241 Mathematical Computation and Modeling (or Free Elective) [1]	3	
Fall Semester Total Cr.:	**14**		**Spring Semester Total Cr.:**	**14**	
SOPHOMORE					
Fall			**Spring**		
CH 214 Communication in Chemistry (or in 3rd year)	1		CH 226 Organic Chemistry II	4	
CH 204 Quantitative Analysis	4		MA 224 Differential Equations	4	
CH 225 Organic Chemistry I	4		PS 212 University Physics II	4	
PS 211 University Physics I	4		General Education Leadership (http://catalog.norwich.edu/residentialprogramscatalog/generaleducationgoals/)	1-3	
EN 222 Introduction to World Literatures (General Education Goal 3: Literature)	3				
Fall Semester Total Cr.:	**16**		**Spring Semester Total Cr.:**	**13-15**	
JUNIOR					
Fall			**Spring**		
CH 327 Physical Chemistry I	3		CH 314 Instrumental Methods	3	
CH 337 Physical Chemistry Laboratory I (taken with CH 327)	1		CH 315 Analysis Laboratory (taken with CH 314)	1	
Free Elective	3		CH 328 Physical Chemistry II	3	
Math/Science Elective	3-4		CH 338 Physical Chemistry Laboratory II (taken with CH 328)	1	
BI 101 Principles of Biology I	4		Science/Math Elective	4-3	
			Free Elective	3	
Fall Semester Total Cr.:	**14-15**		**Spring Semester Total Cr.:**	**15-14**	
SENIOR					
Fall			**Spring**		
CH 324 Biochemistry I (or CH 204 Quantitative Analysis)	4		CH 438 Advanced Inorganic Chemistry (or Math/Science Elective)	3	
CH 413 Chemistry Seminar	1		CH 422 Chemical Synthesis and Examination II	3	
CH 421 Chemical Synthesis and Examination I	3		General Education Ethics (http://catalog.norwich.edu/residentialprogramscatalog/generaleducationgoals/)	3	
General Education Social Science (http://catalog.norwich.edu/residentialprogramscatalog/generaleducationgoals/)	3		General Education History (http://catalog.norwich.edu/residentialprogramscatalog/generaleducationgoals/)	3	
Free Elective	3		Free Elective	3	
Free Elective	3		Free Elective	3	
Fall Semester Total Cr.:	**17**		**Spring Semester Total Cr.:**	**18**	
TOTAL CREDITS FOR THIS MAJOR: 121-123					

1 EG 110 may be substituted for MA 241.

Minor

Chemistry Minor 2021-2022 Catalog

A Chemistry or Biochemistry major is ineligible to declare this minor.

CH Elective	3
CH Elective	3
CH Elective (200 level or higher)	3
CH Elective (200 level or higher)	3
CH Elective (200 level or higher)	3
CH Elective (200 level or higher)	3
Total Cr.	**18**