

CHEMISTRY, B.S.

The Chemistry Major (B.S.) provides very thorough undergraduate training in chemistry and an excellent background for students planning to undertake graduate work or to enter the chemical industry. It differs from the B.A. in requiring additional advanced courses in chemistry and/or related sciences. Students who complete this program will be certified to the American Chemical Society upon graduation as having fulfilled the Society's rigorous requirements for undergraduate professional training. The sequence in which the required courses are taken is important, and the student should work closely with a chemistry advisor in planning a schedule.

The concentration in Chemistry Research offers students the option to specialize in research and be exposed to three or more years of research. The concentration is designed to prepare students for graduate study in chemistry, biochemistry, medicine, and related professions or for employment in chemistry, biochemistry, or related industries. The exposure to research will build strong research, communication, and leadership skills. Such skills are in great demand.

The concentration in Biochemistry offers students the option to specialize in biochemistry within the curriculum leading to the B.S. in Chemistry. This concentration is designed to prepare students for graduate study in biochemistry, medicine and related professions, or for employment in biochemistry or biotechnology related industries. The sequence in which the required courses are taken is important, and the student should work closely with a chemistry advisor in planning a schedule.

Overall Requirements

- 122 credit hours, to include at least 36 credits at or above the 300 course level; note that licensure programs may require credits beyond the minimum listed.
- Only major requirement and related area requirement courses in which grades of C- or better are earned will be counted toward the major. Students must earn a C- or better in prerequisite major requirement and related area requirement courses before advancing to subsequent courses.

Degree Program Requirements

Code	Title	Credit Hours
	University Requirements (https://catalog.uncg.edu/academic-regulations-policies/undergraduate-policies)	
	General Education Core Requirements (GEC) (https://catalog.uncg.edu/academic-regulations-policies/undergraduate-policies/general-education-program/#generaleducationcorerequirementstext)	
	College of Arts and Sciences Additional Requirements (LEC) (https://catalog.uncg.edu/arts-sciences/#additionalundergraduaterequirementstext)	

Major Requirements

Chemistry Concentration Requirements

Code	Title	Credit Hours
Required		29-32
CHE 111	General Chemistry I [†]	
CHE 112	General Chemistry I Laboratory [†]	
CHE 114	General Chemistry II	
CHE 115	General Chemistry II Laboratory	
CHE 331	Quantitative Analysis	
CHE 333	Quantitative Analysis Laboratory	
CHE 342	Inorganic Chemistry	
CHE 351	Organic Chemistry I	
CHE 352	Organic Chemistry II	
CHE 353	Organic Laboratory Techniques	
CHE 355	Intermediate Organic Chemistry Lab	
CHE 402	Chemistry Seminar	
<i>Select one of the following:</i>		
CHE 420	Chemical Principles of Biochemistry	
CHE 556 & CHE 557	Biochemistry I and Biochemistry II	
CHE 442	Advanced Inorganic Chemistry I	
CHE 461	Physical Chemistry I	
CHE 462	Physical Chemistry II	
CHE 463	Physical Chemistry I Laboratory	
CHE 464	Physical Chemistry II Laboratory	
CHE 481	Synthetic Techniques	
CHE 531	Instrumental Analysis	
CHE 533	Instrumental Analysis Laboratory	
CHE 401	Chemistry Seminar Introduction [*]	
Related Area Requirements		
MAT 191	Calculus I ^{††}	
MAT 292	Calculus II	
MAT 293	Calculus III	
PHY 291	General Physics I with Calculus [†]	
PHY 292	General Physics II with Calculus	
<i>Select at least one of the following:</i>		
CHE 490	Internship in Chemistry and Biochemistry	
CHE 493	Honors Work	
CHE 536	Computational Chemistry	
CHE 553	Advanced Organic Chemistry I	
CHE 555	Organometallic Chemistry	
BIO 355	Cell Biology	
BIO 392	Genetics	
BIO 477	Animal Physiology	
BIO 479	Neurobiology	
BIO 506	Advanced Topics in Genetics	
CSC 230	Elementary Data Structures and Algorithms	
CSC 330	Advanced Data Structures	
CSC 339	Concepts of Programming Languages	
CSC 523	Numerical Analysis and Computing	
CSC 524	Numerical Analysis and Computing	

MAT 310	Elementary Linear Algebra
MAT 311	Introduction to Abstract Algebra
MAT 345	Vector and Tensor Analysis
MAT 390	Ordinary Differential Equations
MAT 394	Calculus IV
MAT 395	Introduction to Mathematical Analysis
PHY 321	Introduction to Modern Physics
PHY 323	Mechanics
PHY 325	Electricity and Magnetism I
PHY 327	Thermal Physics
PHY 412	Electronics for Scientists
PHY 413	Microcomputer Interfacing for Scientists
PHY 421	Modern Physics with Quantum Mechanics
PHY 426	Electricity and Magnetism II
CHE 491	Senior Research **
CHE 492	Senior Research **
CHE 570	Special Topics in Chemistry ¹

* This course is taken as an audit.

** The courses count only when combined for a minimum of 2 credits and will count as one course toward fulfilling the requirement.

¹ The course counts only when taken for multiple instances for a combined minimum of 2 credits and will count as one course toward fulfilling the requirement.

† Counts toward GEC GNS requirement.

†† Counts toward GEC GMT requirement.

Chemistry Research Concentration Requirements

Code	Title	Credit Hours
Required		54
CHE 111	General Chemistry I [†]	
CHE 112	General Chemistry I Laboratory [†]	
CHE 114	General Chemistry II	
CHE 191	Introduction to Research	
CHE 331	Quantitative Analysis	
CHE 333	Quantitative Analysis Laboratory	
CHE 342	Inorganic Chemistry	
CHE 351	Organic Chemistry I	
CHE 352	Organic Chemistry II	
CHE 353	Organic Laboratory Techniques	
CHE 355	Intermediate Organic Chemistry Lab	
CHE 402	Chemistry Seminar	
CHE 406	Introductory Physical Chemistry	
or CHE 461	Physical Chemistry I	
CHE 499	Senior Thesis	
CHE 291	Sophomore Research *	
CHE 292	Sophomore Research *	
CHE 391	Junior Research *	
CHE 392	Junior Research *	
CHE 491	Senior Research *	
CHE 492	Senior Research **	
CHE 401	Chemistry Seminar Introduction ¹	

Select two courses of the following:

CHE 420	Chemical Principles of Biochemistry
CHE 556	Biochemistry I
& CHE 557	and Biochemistry II
CHE 442	Advanced Inorganic Chemistry I
CHE 481	Synthetic Techniques
CHE 531	Instrumental Analysis
CHE 553	Advanced Organic Chemistry I
CHE 555	Organometallic Chemistry

Related Area Requirements 10

MAT 191 Calculus I ^{††}

MAT 292 Calculus II

Select one sequence of the following:

PHY 211 General Physics I
& PHY 212 and General Physics II [†]

PHY 291 General Physics I with Calculus
& PHY 292 and General Physics II with Calculus [†]

* Each of the courses are taken for 3 credits

** Course is taken for 2 credits

¹ This course is taken as an audit.

† Counts toward GEC GNS requirement.

†† Counts toward GEC GMT requirement.

Biochemistry Concentration Requirements

Code	Title	Credit Hours
Required		45
CHE 111	General Chemistry I [†]	
CHE 112	General Chemistry I Laboratory [†]	
CHE 114	General Chemistry II	
CHE 115	General Chemistry II Laboratory	
CHE 331	Quantitative Analysis	
CHE 333	Quantitative Analysis Laboratory	
CHE 342	Inorganic Chemistry	
CHE 351	Organic Chemistry I	
CHE 352	Organic Chemistry II	
CHE 353	Organic Laboratory Techniques	
CHE 355	Intermediate Organic Chemistry Lab	
CHE 402	Chemistry Seminar	
CHE 407	Introductory Physical Chemistry Laboratory	
CHE 461	Physical Chemistry I	
CHE 462	Physical Chemistry II	
CHE 531	Instrumental Analysis	
CHE 533	Instrumental Analysis Laboratory	
CHE 556	Biochemistry I	
CHE 557	Biochemistry II	
CHE 558	Biochemistry Laboratory	
CHE 401	Chemistry Seminar Introduction *	
Related Area Requirements		3-4
Select 3-4 credits from		
CHE 491	Senior Research	
or CHE 492	Senior Research	

BIO 111	Principles of Biology I
BIO 112	Principles of Biology II
BIO 392	Genetics
or BIO 355	Cell Biology
MAT 191	Calculus I ^{††}
MAT 292	Calculus II
PHY 291	General Physics I with Calculus [†]
PHY 292	General Physics II with Calculus

* This course is taken as an audit.

† Counts toward GEC GNS requirement.

Chemistry Major with Comprehensive Science High School Teaching Licensure Concentration Requirements

The Comprehensive Science High School Licensure (CHEM) program provides a strong background in chemistry as well as licensure for high school chemistry teaching. In addition, successful completion of this program qualifies candidates to teach other high school science subjects as well.

Code	Title	Credit Hours
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Required²⁹⁻³²

CHE 111	General Chemistry I [†]
CHE 112	General Chemistry I Laboratory [†]
CHE 114	General Chemistry II
CHE 115	General Chemistry II Laboratory
CHE 331	Quantitative Analysis
CHE 333	Quantitative Analysis Laboratory
CHE 342	Inorganic Chemistry
CHE 351	Organic Chemistry I
CHE 352	Organic Chemistry II
CHE 353	Organic Laboratory Techniques
CHE 355	Intermediate Organic Chemistry Lab
CHE 402	Chemistry Seminar

Select one of the following:

CHE 420	Chemical Principles of Biochemistry
CHE 556 & CHE 557	Biochemistry I and Biochemistry II
CHE 442	Advanced Inorganic Chemistry I
CHE 461	Physical Chemistry I
CHE 462	Physical Chemistry II
CHE 463	Physical Chemistry I Laboratory
CHE 464	Physical Chemistry II Laboratory
CHE 481	Synthetic Techniques
CHE 531	Instrumental Analysis
CHE 533	Instrumental Analysis Laboratory
CHE 401	Chemistry Seminar Introduction [*]

Related Area Requirements

MAT 191	Calculus I ^{††}
MAT 292	Calculus II
MAT 293	Calculus III
PHY 291	General Physics I with Calculus [†]

PHY 292	General Physics II with Calculus
<i>Select at least one of the following:</i>	
CHE 490	Internship in Chemistry and Biochemistry
CHE 491	Senior Research
CHE 492	Senior Research
CHE 493	Honors Work
CHE 536	Computational Chemistry
CHE 553	Advanced Organic Chemistry I
CHE 555	Organometallic Chemistry
CHE 570	Special Topics in Chemistry
BIO 355	Cell Biology
BIO 392	Genetics
BIO 477	Animal Physiology
BIO 479	Neurobiology
BIO 506	Advanced Topics in Genetics
CSC 230	Elementary Data Structures and Algorithms
CSC 330	Advanced Data Structures
CSC 339	Concepts of Programming Languages
CSC 523	Numerical Analysis and Computing
CSC 524	Numerical Analysis and Computing
MAT 310	Elementary Linear Algebra
MAT 311	Introduction to Abstract Algebra
MAT 345	Vector and Tensor Analysis
MAT 390	Ordinary Differential Equations
MAT 394	Calculus IV
MAT 395	Introduction to Mathematical Analysis
PHY 321	Introduction to Modern Physics
PHY 323	Mechanics
PHY 325	Electricity and Magnetism I
PHY 327	Thermal Physics
PHY 412	Electronics for Scientists
PHY 413	Microcomputer Interfacing for Scientists
PHY 421	Modern Physics with Quantum Mechanics
PHY 426	Electricity and Magnetism II
TED 559	Teaching Practices and Curriculum in Science
CHE 491	Senior Research ^{**}
CHE 492	Senior Research ^{**}
CHE 570	Special Topics in Chemistry ¹

Additional Requirements²

BIO 111	Principles of Biology I
BIO 112	Principles of Biology II
GES 103	Introduction to Earth Science
<i>Select one or more of the following:</i>	
GES 111	Physical Geology
GES 205	Environmental Change: Its Nature and Impact
GES 319	Weather and Climate
GES 314	Physical Geography: Landscape Processes

* This course is taken as an audit.

** These courses count only when combined for a minimum of 2 credits and will count as one course toward fulfilling the requirement.

¹ The course counts only when taken for multiple instances for a combined minimum of 2 credits and will count as one course toward fulfilling the requirement.

² Additional requirements for teacher licensure, beyond the Chemistry Major requirements, include completion of the Secondary Licensure Requirements as listed under VII Teacher Licensure Requirements. In addition, students must take 14 credits in biology and earth science including the courses as listed.

† Counts toward GEC GNS requirement.

†† Counts toward GEC GMT requirement.

Teacher Licensure Requirements

Contact the School of Education Office of Student Services at 336-334-3410 for more information.

The courses below must be taken in a specified sequence, terminating in student teaching in the spring semester of the senior year. See below and the online Secondary Education Handbook for more information.

Code	Title	Credit Hours
Required		28
TED 535	Literacy in the Content Area	
ERM 401	Assessment I: Accountability in Our Nation's Schools	
ERM 402	Assessment II: Standardized Tests	
ERM 403	Assessment III: Classroom Assessment	
TED 444	Educational Psychology for the Secondary Grades	
TED 445	Human Diversity, Teaching, and Learning [*]	
TED 559	Teaching Practices and Curriculum in Science ^{**}	
TED 465	Student Teaching and Seminar: Secondary School ¹	
LIS 120	Introduction to Instructional Technology for Educational Settings (strongly recommended)	

^{*} This course requires 25 hours of internship in the schools.

^{**} This course requires 50 hours of internship in the schools.

¹ This course should be taken for 12 credits

Sequence

The courses should be taken in the sequence below.

Course	Title	Credit Hours
Junior		
Fall		
ERM 401	Assessment I: Accountability in Our Nation's Schools	1
TED 401	Child and Adolescent Development and Learning	1

TED 445	Human Diversity, Teaching, and Learning	3
<hr/>		Credit Hours
Spring		5
ERM 402	Assessment II: Standardized Tests	1
SES 401	Understanding and Teaching Students with Disabilities in Inclusive Settings	1
TED 403	Teaching English Learners with Diverse Abilities	1
LIS 120	Introduction to Instructional Technology for Educational Settings	1
<hr/>		Credit Hours
Senior		4
Fall		
ERM 403	Assessment III: Classroom Assessment	1
TED 535	Literacy in the Content Area	3
TED 559	Teaching Practices and Curriculum in Science	3
<hr/>		Credit Hours
Spring		7
TED 465	Student Teaching and Seminar: Secondary School	12
<hr/>		Credit Hours
		12
<hr/>		Total Credit Hours
		28

Electives

Electives should be sufficient to complete the 122 credit hours required for the degree. Additional advanced mathematics courses are advised. Additional chemistry courses above the 100 level may be taken.