

BIOCHEMISTRY, BS (L&S)

Biochemistry is a very broad science that studies the molecules and chemistry of life. Biochemistry focuses on the structure, properties, and interactions of molecules such as proteins, nucleic acids, sugars and lipids. Biochemistry's aim is to understand how these molecules participate in the processes that support the various functions of the living cell. These studies are therefore essential for understanding disease and finding cures, for improving agriculture and the production of food and biofuels, and to produce innovation in biotechnology.

Whereas other biological science majors may focus on cellular, organismal, or population-level biology, biochemistry focuses on processes that occur at the molecular to cellular levels. Therefore, this major has a greater focus on basic and quantitative sciences, such as math and, particularly, on chemistry.

Biochemistry graduates go on to a variety of careers in science and science-related fields. The major is designed to fit the needs of the student who wishes to achieve bachelor's-level training as well as those planning to pursue graduate or professional study. The degree serves as an excellent background for medical school or veterinary school admission, as well as for graduate study in biochemistry or other allied fields (biology, bacteriology, genetics, molecular biology, or oncology).

HOW TO GET IN

HOW TO GET IN

Students may declare the major via an appointment with the undergraduate advisor at any time.

The Biochemistry major is offered through either CALS or the College of Letters & Science (L&S). Students interested in the differences or transferring between CALS and L&S should meet with the advisor to discuss this in more detail.

Students who attend Student Orientation, Advising, and Registration (SOAR) with the College of Agricultural and Life Sciences (CALS) have the option to declare biochemistry at SOAR. Students may otherwise declare after they have begun their undergraduate studies.

Students who intend to major in Biochemistry may not combine this major ("double major") with the Molecular and Cell Biology major.

REQUIREMENTS

UNIVERSITY GENERAL EDUCATION REQUIREMENTS

All undergraduate students at the University of Wisconsin-Madison are required to fulfill a minimum set of common university general education requirements to ensure that every graduate acquires the essential core of an undergraduate education. This core establishes a foundation for living a productive life, being a citizen of the world, appreciating aesthetic values, and engaging in lifelong learning in a continually changing world. Various schools and colleges will have requirements in addition to the requirements listed below. Consult your advisor for assistance, as

needed. For additional information, see the university Undergraduate General Education Requirements (<https://guide.wisc.edu/undergraduate/#requirementsforundergraduatetext>) section of the Guide.

General Education	<ul style="list-style-type: none"> • Breadth—Humanities/Literature/Arts: 6 credits • Breadth—Natural Science: 4 to 6 credits, consisting of one 4- or 5-credit course with a laboratory component; or two courses providing a total of 6 credits • Breadth—Social Studies: 3 credits • Communication Part A & Part B * • Ethnic Studies * • Quantitative Reasoning Part A & Part B *
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* The mortarboard symbol appears before the title of any course that fulfills one of the Communication Part A or Part B, Ethnic Studies, or Quantitative Reasoning Part A or Part B requirements.

COLLEGE OF LETTERS & SCIENCE DEGREE REQUIREMENTS: BACHELOR OF SCIENCE (BS)

Students pursuing a Bachelor of Science degree in the College of Letters & Science must complete all of the requirements below. The College of Letters & Science allows this major to be paired with either the Bachelor of Arts or the Bachelor of Science degree requirements.

BACHELOR OF SCIENCE DEGREE REQUIREMENTS

Mathematics	Complete two courses of 3+ credits at the Intermediate or Advanced level in MATH, COMP SCI, or STAT subjects. A maximum of one course in each of COMP SCI and STAT subjects counts toward this requirement.
Language	Complete the third unit of a language other than English.
L&S Breadth	Complete: <ul style="list-style-type: none"> • 12 credits of Humanities, which must include at least 6 credits of Literature; and • 12 credits of Social Science; and • 12 credits of Natural Science, which must include 6 credits of Biological Science and 6 credits of Physical Science.
Liberal Arts and Science Coursework	Complete at least 108 credits.
Depth of Intermediate/Advanced Coursework	Complete at least 60 credits at the Intermediate or Advanced level.
Major	Declare and complete at least one major.
Total Credits	Complete at least 120 credits.
UW-Madison Experience	Complete both: <ul style="list-style-type: none"> • 30 credits in residence, overall, and • 30 credits in residence after the 86th credit.

Quality of Work • 2.000 in all coursework at UW–Madison
 • 2.000 in Intermediate/Advanced level coursework at UW–Madison

NON-L&S STUDENTS PURSUING AN L&S MAJOR

Non-L&S students who have permission from their school/college to pursue an additional major within L&S only need to fulfill the major requirements. They do not need to complete the L&S Degree Requirements above.

REQUIREMENTS FOR THE MAJOR MATHEMATICS

Mathematics Requirements

Code	Title	Credits
Complete one of the following options:		
MATH 221 & MATH 222	Calculus and Analytic Geometry 1 and Calculus and Analytic Geometry 2	9
MATH 171 & MATH 217 & MATH 222	Calculus with Algebra and Trigonometry I and Calculus with Algebra and Trigonometry II and Calculus and Analytic Geometry 2	14

CHEMISTRY

General Chemistry

Code	Title	Credits
Complete one sequence:		
CHEM 103 & CHEM 104	General Chemistry I and General Chemistry II	9
CHEM 109	Advanced General Chemistry	5
CHEM 115 & CHEM 116	Chemical Principles I and Chemical Principles II (satisfies both general and analytical chemistry requirements)	10

Organic Chemistry

Code	Title	Credits
Complete All:		
CHEM 343	Organic Chemistry I	3
CHEM 344	Introductory Organic Chemistry Laboratory	2
CHEM 345	Organic Chemistry II	3

Analytical Chemistry

Code	Title	Credits
Complete one:		
CHEM 327	Fundamentals of Analytical Science	4
CHEM 329	Fundamentals of Analytical Science	4
CHEM 116	Chemical Principles II (satisfies both general and analytical chemistry requirements)	5

Physical Chemistry

Code	Title	Credits
Complete one:		
CHEM 665	Biophysical Chemistry (Recommended)	3
CHEM 561	Physical Chemistry I	3

BIOLOGY

Students must complete either Option A (introductory + upper-level biology), or Option B (biocore), for 16 total credits of biological science coursework.

Option A (Introductory and Upper-Level Biology) Option A Introductory Biology

Code	Title	Credits
Complete one of the following introductory biology options:		
BIOLOGY/BOTANY/ ZOOLOGY 151 & BIOLOGY/ BOTANY/ ZOOLOGY 152	Introductory Biology and Introductory Biology (recommended)	10
BIOLOGY/ ZOOLOGY 101 & BIOLOGY/ ZOOLOGY 102 & BOTANY/ BIOLOGY 130	Animal Biology and Animal Biology Laboratory and General Botany	10

And Option A Upper-Level Biology

At least 6 credits of upper-level biological science coursework are required (to achieve 16 total credits—more than 6 credits may be required if introductory biology totals less than 10 credits due to transfer credits). Select from the course list below. To see courses offered in specific upcoming semesters, please see the biochemistry website (https://biochem.wisc.edu/undergraduate_program/advanced-biology-courses-undergraduate-program/).

Important: A course may not double count in both the "upper-level biology" and the "biochemistry" requirements for the major. Biochemistry courses on this list can count only for "upper-level biology" if they are above-and-beyond what is needed to fulfill the "biochemistry" portion of the major. For example, if students have taken BIOCHEM 501 (<http://guide.wisc.edu/search/?P=BIOCHEM%20501>), they will need one advanced biochemistry elective to fulfill the biochemistry requirement, and then any additional biochemistry courses taken can count for upper-level biology.

Code	Title	Credits
AGROECOL 370	Grassland Ecology	3
AGROECOL 377	Global Food Production and Health	3
ANAT&PHY 335	Physiology	5
ANAT&PHY 337	Human Anatomy	3
ANAT&PHY 435	Fundamentals of Human Physiology	5
AN SCI/ FOOD SCI 305	Introduction to Meat Science and Technology	4
AN SCI/DY SCI/ NUTR SCI 311	Comparative Animal Nutrition	3

AN SCI 314		3	BSE 349	Quantitative Techniques for Biological Systems	3
AN SCI/DY SCI 320	Animal Health and Disease	3	BSE 364	Engineering Properties of Food and Biological Materials	3
AN SCI/DY SCI 361	Introduction to Animal and Veterinary Genetics	2	BSE 365	Measurements and Instrumentation for Biological Systems	3
AN SCI/DY SCI 362	Veterinary Genetics	2	BSE/ENVIR ST 367	Renewable Energy Systems	3
AN SCI/DY SCI 363	Principles of Animal Breeding	2	BSE 460	Biorefining: Energy and Products from Renewable Resources	3
AN SCI/DY SCI 370	Livestock Production and Health in Agricultural Development	3	BSE 461	Food and Bioprocessing Operations	3
AN SCI/DY SCI 414	Ruminant Nutrition & Metabolism	3	BSE 472	Sediment and Bio-Nutrient Engineering and Management	3
AN SCI 415	Application of Monogastric Nutrition Principles	2	BMOLCHEM/ MICROBIO 668	Microbiology at Atomic Resolution	3
AN SCI 431	Beef Cattle Production	3	B M I/STAT 541	Introduction to Biostatistics	3
AN SCI 432	Swine Production	3	B M I/ COMP SCI 576	Introduction to Bioinformatics	3
AN SCI/DY SCI 434	Reproductive Physiology	3	BOTANY 300	Plant Anatomy	4
AN SCI 503		3	BOTANY 305	Plant Morphology and Evolution	4
AN SCI 508		3	BOTANY 330	Algae	3
AN SCI 511		3	BOTANY/ PL PATH 332	Fungi	4
AN SCI 512		3	BOTANY 400	Plant Systematics	4
AN SCI/ FOOD SCI 515	Commercial Meat Processing	2	BOTANY 401	Vascular Flora of Wisconsin	4
AN SCI/F&W ECOL/ ZOOLOGY 520	Ornithology	3	BOTANY/ F&W ECOL 402	Dendrology: Woody Plant Identification and Ecology	3
AN SCI/F&W ECOL/ ZOOLOGY 521	Birds of Southern Wisconsin	3	BOTANY/ANTHRO/ ZOOLOGY 410	Evolutionary Biology	3
AN SCI 610	Quantitative Genetics	3	BOTANY 422	Plant Geography	3
AN SCI/ NUTR SCI 626	Experimental Diet Design	1	BOTANY 455	The Vegetation of Wisconsin	4
B M E/MED PHYS/ PHMCOL- M/PHYSICS/ RADIOL 619	Microscopy of Life	3	BOTANY/ F&W ECOL/ ZOOLOGY 460	General Ecology	4
BIOCHEM/ NUTR SCI 510	Nutritional Biochemistry and Metabolism	3	BOTANY/ENTOM/ ZOOLOGY 473	Plant-Insect Interactions	3
BIOCHEM/ NUTR SCI 560	Principles of Human Disease and Biotechnology	2	BOTANY/AMER IND/ ANTHRO 474	Ethnobotany	3-4
BIOCHEM/ M M & I 575	Biology of Viruses	2	BOTANY 500	Plant Physiology	3-4
BIOCHEM 601	Protein and Enzyme Structure and Function	2	BOTANY/ENTOM/ PL PATH 505	Plant-Microbe Interactions: Molecular and Ecological Aspects	3
BIOCHEM/B M I/ BMOLCHEM/ MATH 609	Mathematical Methods for Systems Biology	3	BOTANY/ENVIR ST/ F&W ECOL/ ZOOLOGY 516	Conservation Biology	3
BIOCHEM/ GENETICS/ MICROBIO 612	Prokaryotic Molecular Biology	3	BOTANY/ PL PATH 563	Phylogenetic Analysis of Molecular Data	3
BIOCHEM/ GENETICS/ MD GENET 620	Eukaryotic Molecular Biology	3	BOTANY/ GENETICS/M M & I/ PL PATH 655	Biology and Genetics of Fungi	3
BIOCHEM/ BOTANY 621	Plant Biochemistry	3	CHEM 575	Advanced Topics in Chemistry (Topics in Chemical Biology)	1-4
BIOCHEM 625	Mechanisms of Action of Vitamins and Minerals	2	CRB 625	Stem Cell Seminar	1
BIOCHEM/ GENETICS 631	Plant Genetics and Development	3	CRB 640	Fundamentals of Stem Cell and Regenerative Biology	3
BIOCHEM/ NUTR SCI 645	Molecular Control of Metabolism and Metabolic Disease	3	CRB 675	Topics in Cell and Regenerative Biology	1-3
			DY SCI 378	Lactation Physiology	3

DY SCI 535	Dairy Farm Management Practicum	3	F&W ECOL/ LAND ARC/ ZOOLOGY 565	Principles of Landscape Ecology	2
ENTOM/ ZOOLOGY 302	Introduction to Entomology	4	F&W ECOL 590	Integrated Resource Management	3
ENTOM 321	Physiology of Insects	3	F&W ECOL 655	Animal Population Dynamics	3
ENTOM 331	Taxonomy of Mature Insects	4	GEN&WS 533	Special Topics in Gender and Biology	3
ENTOM 351	Principles of Economic Entomology	3	GENETICS 466	Principles of Genetics	3
ENTOM/ ZOOLOGY 371	Medical Entomology: Biology of Vector and Vector-borne Diseases	3	GENETICS 467	General Genetics 1	3
ENTOM 432	Taxonomy and Bionomics of Immature Insects	4	GENETICS 468	General Genetics 2	3
ENTOM/ ZOOLOGY 540	Theoretical Ecology	3	GENETICS 525	Epigenetics	3
ENTOM/GENETICS/ ZOOLOGY 624	Molecular Ecology	3	GENETICS 545	Genetics Laboratory	2
ENVIR ST/ LAND ARC 361	Wetlands Ecology	3	GENETICS/ MD GENET 565	Human Genetics	3
ENVIR ST/ POP HLTH 471	Introduction to Environmental Health	3	GENETICS 566	Advanced Genetics	3
ENVIR ST/ POP HLTH 502	Air Pollution and Human Health	3	M M & I 301	Pathogenic Bacteriology	2
ENVIR ST/ F&W ECOL 515	Natural Resources Policy	3	M M & I 341	Immunology	3
ENVIR ST/ ATM OCN 520	Bioclimatology	3	M M & I/ENTOM/ PATH-BIO/ ZOOLOGY 350	Parasitology	3
FOOD SCI/ MICROBIO 324	Food Microbiology Laboratory	2	M M & I/PATH- BIO 528	Immunology	3
FOOD SCI/ MICROBIO 325	Food Microbiology	3	M M & I 554	Emerging Infectious Diseases and Bioterrorism	2
FOOD SCI 410	Food Chemistry	3	MED PHYS/ H ONCOL 410	Radiobiology	2-3
FOOD SCI 440	Principles of Food Engineering	3	MED PHYS/ B M E/H ONCOL/ PHYSICS 501	Radiation Physics and Dosimetry	3
FOOD SCI 511	Chemistry and Technology of Dairy Products	3	MICROBIO 303	Biology of Microorganisms	3
FOOD SCI 514	Integrated Food Functionality	4	MICROBIO 304	Biology of Microorganisms Laboratory	2
FOOD SCI 550	Fermented Foods and Beverages	2	MICROBIO 305	Critical Analyses in Microbiology	1
FOOD SCI 611	Chemistry and Technology of Dairy Products	3	MICROBIO/AN SCI/ BOTANY 335	The Microbiome of Plants, Animals, and Humans	3
F&W ECOL 300	Forest Measurements	4	MICROBIO 345	Introduction to Disease Biology	3
F&W ECOL 306	Terrestrial Vertebrates: Life History and Ecology	4	MICROBIO 357	General Bioinformatics for Microbiologists	3
F&W ECOL 318	Principles of Wildlife Ecology	3	MICROBIO/ SOIL SCI 425	Environmental Microbiology	3
F&W ECOL 335	Extinction of Species	3	MICROBIO 450	Diversity, Ecology and Evolution of Microorganisms	3
F&W ECOL/ ENVIR ST/ ZOOLOGY 360	Principles of Wildlife Management	3	MICROBIO 470	Microbial Genetics & Molecular Machines	3
F&W ECOL 379	Principles of Wildlife Management	3	MICROBIO 520	Planetary Microbiology: What Life Here Tells Us About Life Out There	3
F&W ECOL 401	Silviculture: Applied Forest Ecology	3	MICROBIO/ SOIL SCI 523	Soil Microbiology and Biochemistry	3
F&W ECOL/ A A E 430	Decision Methods for Natural Resource Managers	3	MICROBIO 525	Field Studies of Planetary Microbiology and Life in the Universe	3
F&W ECOL/ SURG SCI 548	Diseases of Wildlife	3	MICROBIO 526	Physiology of Microorganisms	3
F&W ECOL 550	Forest Ecology	3	MICROBIO 527	Advanced Laboratory Techniques in Microbiology	2
F&W ECOL 561	Wildlife Management Techniques	3	MICROBIO 551	Capstone Research Project in Microbiology	2

MICROBIO 626	Microbial and Cellular Metabolomics	3	ZOOLOGY 301	Invertebrate Biology and Evolution Lab	2
NEURODPT 629	Molecular and Cellular Mechanisms of Memory	3	ZOOLOGY 304	Marine Biology	2
NTP/ NEURODPT 610	Cellular and Molecular Neuroscience	4	ZOOLOGY/ ENVIR ST 315	Limnology-Conservation of Aquatic Resources	2
NTP/NEURODPT/ PSYCH 611	Systems Neuroscience	4	ZOOLOGY 316	Laboratory for Limnology-Conservation of Aquatic Resources	2-3
NUTR SCI 332	Human Nutritional Needs	3	ZOOLOGY 425	Behavioral Ecology	3
NUTR SCI/ A A E 350	World Hunger and Malnutrition	3	ZOOLOGY 430	Comparative Anatomy of Vertebrates	5
NUTR SCI 379	Introduction to Epidemiology	3	ZOOLOGY 470	Introduction to Animal Development	3
NUTR SCI 431	Nutrition in the Life Span	3	ZOOLOGY/ ENVIR ST 510	Ecology of Fishes	3
ONCOLOGY 401	Introduction to Experimental Oncology	2	ZOOLOGY/ ENVIR ST 511	Ecology of Fishes Lab	2
ONCOLOGY/ M&ENVTOX/ PHM SCI/PHMCOL- M/POP HLTH 625	Toxicology I	3	ZOOLOGY/ PSYCH 523	Neurobiology	3
PHM SCI 310	Drugs and Their Actions	2	ZOOLOGY/ GEOSCI 542	Invertebrate Paleontology	3
PHM SCI/B M E 430	Biological Interactions with Materials	3	ZOOLOGY 555	Laboratory in Developmental Biology	3
PHYSICS/B M E/ MED PHYS/ PHMCOL-M/ RADIOL 619	Microscopy of Life	3	ZOOLOGY 570	Cell Biology	3
PL PATH 300	Introduction to Plant Pathology	4	ZOOLOGY 603	Endocrinology	3-4
PL PATH 517	Plant Disease Resistance	2-3	ZOOLOGY 611	Comparative and Evolutionary Physiology	3
PL PATH 559	Diseases of Economic Plants	3	ZOOLOGY 612	Comparative Physiology Laboratory	2
PL PATH 602	Ecology, Epidemiology and Control of Plant Diseases	3	ZOOLOGY/ ANTHRO/ PSYCH 619	Biology of Mind	3
PL PATH 622	Plant-Bacterial Interactions	2-3			
PL PATH/M M & I/ ONCOLOGY 640	General Virology-Multiplication of Viruses	3			
PLANTSCI 300	Cropping Systems	3			
PLANTSCI 302	Forage Management and Utilization	3			
PLANTSCI 320	Environment of Cultivated Plants	3			
PLANTSCI 338	Plant Breeding and Biotechnology	3			
PLANTSCI 340	Plant Genome Engineering and Editing	3			
PLANTSCI 501	Principles of Plant Breeding	3			
PLANTSCI/ ATM OCN 532	Environmental Biophysics	3			
PLANTSCI 550	Molecular Approaches for Crop Improvement	3			
PSYCH 454	Behavioral Neuroscience	3			
PSYCH 513	Hormones, Brain, and Behavior	4			
PSYCH 612	Neuropharmacology	3			
SOIL SCI 323	Soil Biology	3			
SOIL SCI 326	Plant Nutrition Management	3			
SOIL SCI/ F&W ECOL 451	Environmental Biogeochemistry	3			
SOIL SCI/ CIV ENGR/ M&ENVTOX 631	Toxicants in the Environment: Sources, Distribution, Fate, & Effects	3			
ZOOLOGY 300	Invertebrate Biology and Evolution	3			

Option B (Biocore)

Biocore is an honors-level, integrated sequence of lecture and lab courses that covers introductory and intermediate biology topics. Students must apply and be accepted to the program to take BIOCORE classes.

Code	Title	Credits
Complete these lecture courses:		
BIOCORE 381	Evolution, Ecology, and Genetics	3
BIOCORE 383	Cellular Biology	3
BIOCORE 485	Principles of Physiology	3
BIOCORE 587	Biological Interactions	3
Complete two of these lab classes:		
BIOCORE 382	Evolution, Ecology, and Genetics Laboratory	4
BIOCORE 384	Cellular Biology Laboratory	
BIOCORE 486	Principles of Physiology Laboratory	

Total Credits 16

PHYSICS (CALCULUS-BASED)

Physics Requirements

Code	Title	Credits
Complete one of the following options: ¹		
PHYSICS 207 & PHYSICS 208	General Physics and General Physics (recommended)	10

PHYSICS 201 & PHYSICS 202 General Physics and General Physics 10

BIOCHEMISTRY

One set of introductory coursework and the capstone course are required, for a total of three BIOCHEM courses.

Introductory Courses

Code	Title	Credits
Select one of the following options:		
BIOCHEM 507 & BIOCHEM 508	General Biochemistry I and General Biochemistry II (recommended)	6-7

OR

BIOCHEM 501	Introduction to Biochemistry	3
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And one of the following advanced biochemistry electives:

BIOCHEM/ NUTR SCI 510	Nutritional Biochemistry and Metabolism	
BIOCHEM/ NUTR SCI 560	Principles of Human Disease and Biotechnology	
BIOCHEM/ M M & I 575	Biology of Viruses	
BIOCHEM 601	Protein and Enzyme Structure and Function	
BIOCHEM/B M I/ BMOLCHEM/ MATH 609	Mathematical Methods for Systems Biology	
BIOCHEM/ GENETICS/ MICROBIO 612	Prokaryotic Molecular Biology	
BIOCHEM/ GENETICS/ MD GENET 620	Eukaryotic Molecular Biology	
BIOCHEM/ BOTANY 621	Plant Biochemistry	
BIOCHEM 625	Mechanisms of Action of Vitamins and Minerals	
BIOCHEM/ GENETICS 631	Plant Genetics and Development	
BIOCHEM/ NUTR SCI 645	Molecular Control of Metabolism and Metabolic Disease	

Capstone

Code	Title	Credits
BIOCHEM 551	Biochemical Methods	4

Total Credits **4**

RESIDENCE AND QUALITY OF WORK

- 2.000 GPA in all BIOCHEM and major courses
- 2.000 GPA on at least 15 upper-level major credits in Residence.²
- 15 credits in BIOCHEM, taken on campus

¹ Students should consult with their advisor to discuss options if they have credit for PHYSICS 103 (<http://guide.wisc.edu/search/?P=PHYSICS>

and PHYSICS 104 (<http://guide.wisc.edu/search/?P=PHYSICS%20104>).

² Major courses numbered 300-699 are considered Upper-Level in the major for purposes of this requirement.

HONORS IN THE MAJOR

Students may declare Honors in the Biochemistry Major in consultation with their Biochemistry undergraduate advisor. To be admitted to Honors in the Major in Biochemistry, students must have declared a major in Biochemistry and have a 3.300 overall university GPA.

HONORS IN THE MAJOR IN BIOCHEMISTRY: REQUIREMENTS

To earn honors in the major in biochemistry, students must satisfy the requirements for the major (above) as well as the following requirements. All courses used for honors in the major requirements must receive "B" or better grades to fulfill requirements.

- Earn a 3.300 University GPA
- Earn a 3.300 GPA for all BIOCHEM courses, and all courses accepted in the major
- Complete BIOCHEM 507 and BIOCHEM 508 for Honors
- Complete a two-semester Senior Honors Thesis for 6 credits total
- Complete at least 14 credits of any combination of the following coursework:
 - Honors courses that would fulfill the Biology or Biochemistry requirements in the major (see above)
 - Statistics coursework (does not need to be taken for honors): STAT 301, STAT 371, or STAT/B M I 541
 - Biochemistry elective coursework beyond the major requirements (does not need to be taken for honors): NUTR SCI/ BIOCHEM 510, BIOCHEM/NUTR SCI 560, M M & I/ BIOCHEM 575, BIOCHEM 601, MATH/B M I/ BIOCHEM/BMOLCHEM 609, MICROBIO/BIOCHEM/ GENETICS 612, MD GENET/BIOCHEM/GENETICS 620, BOTANY/BIOCHEM 621, BIOCHEM 625, BIOCHEM/ GENETICS 631, BIOCHEM/NUTR SCI 645
 - Honors coursework in MATH, CHEM, or PHYSICS, from the list below:

Math

Code	Title	Credits
MATH 341	Linear Algebra	3
MATH 375	Topics in Multi-Variable Calculus and Linear Algebra	5
MATH 376	Topics in Multi-Variable Calculus and Differential Equations	5
MATH 521	Analysis I	3
MATH 522	Analysis II	3
MATH 541	Modern Algebra	3
MATH 542	Modern Algebra	3

Chemistry

Code	Title	Credits
CHEM 109	Advanced General Chemistry	5
CHEM 115	Chemical Principles I	5
CHEM 116	Chemical Principles II	5

CHEM 343	Organic Chemistry I	3
CHEM 345	Organic Chemistry II	3
CHEM 344	Introductory Organic Chemistry Laboratory	2
CHEM 329	Fundamentals of Analytical Science	4
CHEM 547	Advanced Organic Chemistry	3
CHEM 561	Physical Chemistry I	3
CHEM 563	Physical Chemistry Laboratory I	1
CHEM 562	Physical Chemistry II	3
CHEM 564	Physical Chemistry Laboratory II	1
CHEM 665	Biophysical Chemistry	3

Physics

Code	Title	Credits
PHYSICS 201	General Physics	5
PHYSICS 202	General Physics	5
PHYSICS 207	General Physics	5
PHYSICS 208	General Physics	5
PHYSICS 241	Introduction to Modern Physics	3
PHYSICS 247	A Modern Introduction to Physics	5
PHYSICS 248	A Modern Introduction to Physics	5
PHYSICS 249	A Modern Introduction to Physics	4

UNIVERSITY DEGREE REQUIREMENTS

Total Degree To receive a bachelor's degree from UW–Madison, students must earn a minimum of 120 degree credits. The requirements for some programs may exceed 120 degree credits. Students should consult with their college or department advisor for information on specific credit requirements.

Residency Degree candidates are required to earn a minimum of 30 credits in residence at UW–Madison. "In residence" means on the UW–Madison campus with an undergraduate degree classification. "In residence" credit also includes UW–Madison courses offered in distance or online formats and credits earned in UW–Madison Study Abroad/Study Away programs.

Quality of Work Undergraduate students must maintain the minimum grade point average specified by the school, college, or academic program to remain in good academic standing. Students whose academic performance drops below these minimum thresholds will be placed on academic probation.

LEARNING OUTCOMES

LEARNING OUTCOMES

1. Identify the fundamental biochemical principles that underlie all biological processes.
2. Communicate biochemical knowledge in both written reports and oral presentations to scientists and non-scientists.
3. Evaluate how biochemistry relates to other scientific disciplines and to contemporary issues in our society.
4. Demonstrate professional and ethical responsibility in scientific research.

5. Design and conduct quantitative experiments and/or interpret data to address a scientific question.

FOUR-YEAR PLAN

FOUR-YEAR PLAN

This Four-Year Plan is only one way a student may complete an L&S degree with this major. Many factors can affect student degree planning, including placement scores, credit for transferred courses, credits earned by examination, and individual scholarly interests. In addition, many students have commitments (e.g., athletics, honors, research, student organizations, study abroad, work and volunteer experiences) that necessitate they adjust their plans accordingly. Informed students engage in their own unique Wisconsin Experience by consulting their academic advisors, Guide, DARS, and Course Search & Enroll for assistance making and adjusting their plan.

SAMPLE BIOCHEMISTRY FOUR-YEAR PLAN

Freshman

Fall	Credits Spring	Credits
CHEM 103 or 109	4-5 CHEM 104 (if needed)	5
MATH 221	5 MATH 222	4
Communications Part A	3 BIOCHEM 207 (recommended elective)	2
BIOCHEM 100 ¹	1 Social Science Breadth	3
	13	14

Sophomore

Fall	Credits Spring	Credits
ZOOLOGY/BIOLOGY/ BOTANY 151 ²	5 ZOOLOGY/BIOLOGY/ BOTANY 152	5
CHEM 343	3 CHEM 344	2
Literature Breadth	3 CHEM 345	3
Social Science Breadth	3 Ethnic Studies	3
INTER-LS 210	1 Social Science Breadth	3
	15	16

Junior

Fall	Credits Spring	Credits
BIOCHEM 507	3 BIOCHEM 508	3-4
PHYSICS 207 or 201	5 PHYSICS 208 or 202	5
Humanities Breadth	3 CHEM 327	4
Electives	4 Literature Breadth	3
	15	15

Senior

Fall	Credits Spring	Credits
CHEM 665 or BIOCHEM 551	3-4 BIOCHEM 551 or CHEM 665	3-4
Upper-Level Biology for major	3 Upper-Level Biology for major	3
Social Science Breadth	3 Humanities Breadth	3
Electives	3 Electives	3
BIOCHEM 691 or 681 (if needed) ³	3 BIOCHEM 692 or 682 (if needed)	3
	16	16

Total Credits 120

- ¹ First-year students interested in exploring the major can enroll in BIOCHEM 100.
- ² Students may wish to consider pursuing the Biology Core Curriculum (Biocore) Honors certificate. For more details about how BIOCORE coursework can help them meet requirements for this major, see the Requirements page (<https://guide.wisc.edu/undergraduate/letters-science/college-wide/biochemistry-bs/#requirementstext>). Students should consult with their advisor to identify the biological science sequence that best suits their academic and personal goals.
- ³ Senior Thesis, Directed Study, or work experience in laboratory are recommended, but are not required for the major. However, a Senior Honors Thesis is required to earn Honors in the Major.

and connect with supportive alumni and employers who open doors of opportunity.

- What you can do with your major (<https://successworks.wisc.edu/what-you-can-do-with-your-major/>) (Major Skills & Outcomes Sheets)
- Make a career advising appointment (<https://successworks.wisc.edu/make-an-appointment/>)
- Learn about internships and internship funding (<https://successworks.wisc.edu/finding-a-job-or-internship/>)
- Try “Jobs, Internships, & How to Get Them,” (<https://successworks.wisc.edu/canvas/>) an interactive guide in Canvas for enrolled UW–Madison students

ADVISING AND CAREERS

ADVISING AND CAREERS

DECLARE OR CANCEL THIS MAJOR

Contact the academic advisor assigned to your last name: biochemmicrobio.wisc.edu/advising (<https://biochemmicrobio.wisc.edu/advising/>)

HOW TO SEEK ADVISING

- To schedule an appointment with the advisor, use Starfish (<https://advising.wisc.edu/facstaff/starfish/starfish-student-resources/>).
- Send an email with brief questions to biochemmicrobio-advisor@wisc.edu.
- Drop-in advising hours for quick (10–15 minute) questions, on a first-come, first-serve basis, are posted on the Biochemistry / Microbiology Undergraduate Advising Hub website (<https://biochemmicrobio.wisc.edu/>) each semester.

CAREER EXAMPLES

- Take your skills to a rewarding career in product development, quality control, hospitals, biotechnology, university labs, pharmaceuticals, forensics, and more. Possibilities at top organizations and leading companies include positions such as protein purification scientist, lab manager, medical scribe, clinical research coordinator, and food safety and quality chemist.
- Pursue a professional degree in medical, dental, or veterinary school, using your background in biochemistry to aid your admission and success.
- Build on your research experience and continue graduate studies in biochemistry or a related field to shape a career in academia as a professor or in industry.
- Use your science background to inform patent law, science policy and ethics, sales and marketing for science and technology companies, scientific article publishing, and related fields.

SUCCESSWORKS

SuccessWorks (<https://successworks.wisc.edu/>) at the College of Letters & Science helps you turn the academic skills learned in your classes into a fulfilling life, guiding you every step of the way to securing jobs, internships, or admission to graduate school.

Through one-on-one career advising, events, and resources, you can explore career options, build valuable internship and research experience,

WISCONSIN EXPERIENCE

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The following opportunities can help students connect with other students interested in biochemistry, build relationships with faculty and staff, and contribute to out-of-classroom learning:

- The American Society for Biochemistry and Molecular Biology (ASBMB) UW–Madison Student Chapter (<https://win.wisc.edu/organization/ASBMB/>) is a student organization for students interested in biochemistry. ASBMB provides information about careers and job opportunities, how to get involved in research, and volunteer and outreach opportunities.
- Several biochemistry faculty members offer experiential study abroad programs, where students can immerse themselves in research or global health field experiences. Students can review the Biochemistry Major Advising Page (<https://studyabroad.wisc.edu/academics/major-advising-pages-maps/biochemistry/>) on the International Academic Programs website for information on these and other programs, as well as requirements that can typically be fulfilled abroad and things to consider when fitting study abroad into an academic plan.
- Students are encouraged to get involved in research, whether in the biochemistry department or through other life science or chemistry-related departments. Research can be performed for either course credit or pay, depending on the opportunity. The Biochemistry website (<https://biochem.wisc.edu/academics/undergraduate-major-programs/>) and the advisors can provide more information on finding research opportunities. Summer funding awards for research are available through the department.