

# BACHELOR OF SCIENCE IN BIOCHEMISTRY

1. THE GENERAL EDUCATION AND TOTAL UNIVERSITY CREDIT REQUIREMENTS MUST BE MET (see Note<sup>1</sup> below). A minimum of 128 credits is required for graduation. 36 of these must be upper division credits.

## 2. CORE REQUIREMENTS

Students must satisfy the core requirements listed below.

COURSES IN BIOLOGICAL SCIENCES		CREDITS
BIOL 101, 101L	Biology I	4
BIOL 102, 102L	Biology II	4
BIOL 206	Cell Biology	3
BIOL 235, 235L	General Microbiology	4
BIOL 358	Genetics	3
BIOL 437/CHEM 438	Experimental Biochemistry	1
BIOL g445/CHEM g445	Biochemistry I	3
BIOL g447/CHEM g447	Biochemistry II	3
BIOL g448/CHEM g448	Advanced Experimental Biochemistry	2
BIOL 498/CHEM 498	Seminar in Biochemistry	1
COURSES IN CHEMISTRY		
CHEM 111, 111L	General Chemistry I	5
CHEM 112, 112L	General Chemistry II	4
CHEM 232	Quantitative Analysis	2
CHEM 234	Quantitative Analysis Lab	2
CHEM 301	Organic Chemistry I	3
CHEM 302	Organic Chemistry II	3
CHEM 303	Organic Chemistry I Lab	1
CHEM 304	Organic Chemistry II Lab	1
CHEM 341	Physical Chemistry I <sup>2</sup>	3
CHEM 342	Physical Chemistry II <sup>2</sup>	3
COURSES IN MATH		
MATH 170	Calculus I	4
MATH 175	Calculus II	4
COURSES IN PHYSICS		
PHYS 111	General Physics I <sup>3</sup>	3
PHYS 112	General Physics II <sup>3</sup>	3
PHYS 113	General Physics I Lab <sup>3</sup>	1
PHYS 114	General Physics II Lab <sup>3</sup>	1

### Notes:

1. Students pursuing a Bachelor of Science degree must satisfy goals 1, 2, two of goals 6, 7, and 8, and three of goals 9, 10, 11, and 12. Goal 10 may be satisfied by either 10A or 10B.
2. CHEM 351, 352 may be taken to fulfill the Physical Chemistry requirement in the core curriculum.
3. PHYS 211, 212, 213, 214 may be taken to fulfill the Physics requirement in the core curriculum.

### 3. TRACK REQUIREMENTS

Students must satisfy the requirements for one of the biochemistry tracks listed below. All graduates will earn a B.S. in Biochemistry, irrespective of which track is selected.

TRACK 1: BIOLOGICAL CHEMISTRY		CREDITS
CHEM 211, 213	Inorganic Chemistry and Lab	4
CHEM 331	Instrumental Analysis	2
CHEM 334	Instrumental Analysis Lab	2
CHEM 365	Synthetic Methods	2
CHEM 366	Synthetic Methods Lab	2
CHEM 492	Seminar	1
TRACK 2: BIOCHEMISTRY AND MOLECULAR BIOLOGY		CREDITS
BIOL g444, g444L	Molecular Biology	4
BIOL g461	Advanced Genetics	3
BIOL g434, g434L	Microbial Diversity	4
BIOL 303, g404, or g433	Animal, Plant, or Microbial Physiology	4
BIOL 492	Seminar	1
TRACK 3: PHYSIOLOGICAL BIOCHEMISTRY		CREDITS
BIOL 301	Anatomy and Physiology I	4
BIOL 302	Anatomy and Physiology II	4
PSCI 205	Drugs in Society	2
PSCI 301	Introduction to Pharmacology	3
PSCI 353	Introduction to Methods in Pharmaceutical Sciences	2
BIOL 492	Seminar	1

### 4. ELECTIVES

Students must take a minimum of 12 elective credits from the list below, with at least 3 credits in Biological Sciences (BIOL), 3 credits in Chemistry (CHEM), and 3 credits in Biomedical and Pharmaceutical Sciences (PSCI). Advanced or experimental courses are acceptable. These courses satisfy the electives requirement only if they are not required for a specific Biochemistry track.

COURSES IN BIOLOGICAL SCIENCES		CREDITS
BIOL 301, 301L	Anatomy and Physiology I	4 cr
BIOL 302, 302L	Anatomy and Physiology II	4 cr
BIOL 303, 303L	Principles of Animal Physiology	4 cr
BIOL 324, 324L	Developmental Biology	4 cr
BIOL g404, g404L	Plant Physiology	4 cr
BIOL g444, g 444L	Molecular Biology	4 cr
BIOL g417	Organic Evolution	3 cr
BIOL g433, g433L	Microbial Physiology	4 cr
BIOL g434, g434L	Microbial Diversity	4 cr
BIOL g443	Endocrinology	3 cr
BIOL g451, g451L	Immunology	4 cr
BIOL g415	Human Neurobiology	4 cr
BIOL g415L	Human Neurobiology Lab	1 cr
BIOL g449	Human Physiology	4 cr
BIOL g456	Human Physiology II	4 cr
BIOL g461	Advanced Genetics	3 cr
BIOL g463, g463L	Human Pathophysiology	4 cr
BIOL g473, g473L	Industrial Microbiology	4 cr

BIOL g475	General Virology	3 cr
BIOL g477	Bacterial Virology Lab	1 cr
OR		
BIOL g478	Animal Virology Lab	1 cr
BIOL g481, g482	Independent Problems	2 cr (max)
BIOL g488	Advanced Radiobiology	3 cr

#### COURSES IN CHEMISTRY

CHEM 211, 213	Inorganic Chemistry and Lab	4 cr
CHEM 311, 312	Introduction to Research	2 cr (max)
CHEM 331, 334	Instrumental Analysis and Lab	4 cr
CHEM 365, 366	Synthetic Methods and Lab	4 cr
CHEM g407	Inorganic Chemistry II <sup>1</sup>	2 cr
CHEM g433, g437	Environmental Chemistry and Lab	3 cr
CHEM g453	Modern Experimental Physical Chemistry <sup>2</sup>	3 cr
CHEM g481, g482	Independent Problems	2 cr (max)

#### COURSES IN MATH

MATH 275	Calculus III	4 cr
MATH 240	Linear Algebra	3 cr
MATH 360	Differential Equations	3 cr

#### COURSES IN BIOMEDICAL AND PHARMACEUTICAL SCIENCES

PSCI 205	Drugs in Society	2 cr
PSCI 301	Introduction to Pharmacology	3 cr
PSCI 353	Introduction to Methods in Pharmaceutical Sciences	2 cr
PSCI 308	Drug Discovery	3 cr
PSCI 368	Introduction to Toxicology	3 cr
PSCI 402	Immunopharmacology	2 cr
PSCI 403	Infectious Diseases and Natural Products	3 cr
PSCI 407	Pharmacogenomics	2 cr
PSCI 408	Medicinal Chemistry	3 cr
PSCI 431	Cancer Biology	3 cr
PSCI 434	Pharmacokinetics	3 cr

1. Prerequisites include CHEM 211, Engineering Physics I and II (211, 212) and Physical Chemistry 351 and 352.
2. Prerequisites include CHEM 334, Engineering Physics I and II (211, 212) and Physical Chemistry 351 and 352.

**RECOMMENDED PLAN OF STUDY FOR TRACK 1**

<b>Freshman Year</b>						
Fall			Spring			
BIOL 101, 101L	Biology I	4 cr	BIOL 102, 102L	Biology II		4 cr
CHEM 111, 111L	General Chemistry I	5 cr	CHEM 112, 112L	General Chemistry II		4 cr
MATH 170	Calculus I	4 cr	MATH 175	Calculus II		4 cr
ENG 101	English Comp.	<u>3 cr</u>	ENG 102	English Comp.		<u>3 cr</u>
		16 cr				15 cr
<b>Sophomore Year</b>						
BIOL 206	Cell Biology	3 cr	BIOL 358	Genetics		3 cr
BIOL 235, 235L	General Microbiology	4 cr	CHEM 302	Organic Chemistry II		3 cr
CHEM 301	Organic Chemistry I	3 cr	CHEM 304	Organic Chemistry II Lab		1 cr
CHEM 303	Organic Chem I Lab	1 cr	PHYS 112	Gen Physics II		3 cr
PHYS 111	Gen Physics I	3 cr	PHYS 114	Gen Physics II Lab		1 cr
PHYS 113	Gen Physics I Lab	<u>1 cr</u>	COMM 101	Principles of Speech		3 cr
		15 cr	Goal 6/7/8			<u>3 cr</u>
						17 cr
<b>Junior Year</b>						
BIOL g445/ CHEM g445	Biochemistry I	3 cr	BIOL g447/ CHEM g447	Biochemistry II		3 cr
BIOL 437/ CHEM 438	Experimental Biochemistry	1 cr	BIOL g448/ CHEM g448	Advanced Experimental Biochemistry		2 cr
CHEM 211, 213	Inorganic Chemistry and Lab	4 cr	CHEM 232	Quantitative Analysis		2 cr
CHEM 341	Physical Chemistry I	3 cr	CHEM 234	Quantitative Analysis Lab		2 cr
Goal 6/7/8		3 cr	CHEM 342	Physical Chemistry II		3 cr
Goal 9 -12		<u>3 cr</u>	Goal 9-12			<u>3 cr</u>
		17 cr				15 cr
<b>Senior Year</b>						
CHEM 331	Instrumental Analysis	2 cr	CHEM 334	Instrumental Analysis Lab		2 cr
CHEM 365	Synthetic Methods	2 cr	CHEM 366	Synthetic Methods Lab		2 cr
CHEM 492	Senior Seminar	1 cr	Elective	(BIOL, CHEM, or PSCI)		4 cr
Elective	(BIOL, CHEM, or PSCI)	4 cr	Elective	(BIOL, CHEM, or PSCI)		4 cr
Goal 9-12		3 cr	BIOL 498/ CHEM 498	Seminar in Biochemistry		1 cr
Elective		3 cr	Elective			<u>3 cr</u>
Elective		<u>2 cr</u>				
		17 cr				16 cr

**RECOMMENDED PLAN OF STUDY FOR TRACK 2**

<b>Freshman Year</b>						
<b>Fall</b>			<b>Spring</b>			
BIOL 101, 101L	Biology I	4 cr	BIOL 102, 102L	Biology II		4 cr
CHEM 111, 111L	General Chemistry I	5 cr	CHEM 112, 112L	General Chemistry II		4 cr
MATH 170	Calculus I	4 cr	MATH 175	Calculus II		4 cr
ENG 101	English Comp.	<u>3 cr</u>	ENG 102	English Comp.		<u>3 cr</u>
		16 cr				15 cr
<b>Sophomore Year</b>						
BIOL 206	Cell Biology	3 cr	BIOL358	Genetics		3 cr
BIOL 235, 235L	General Microbiology	4 cr	CHEM 302	Organic Chemistry II		3 cr
CHEM 301	Organic Chemistry I	3 cr	CHEM 304	Organic Chemistry II Lab		1 cr
CHEM 303	Organic Chem I Lab	1 cr	PHYS 112	Gen Physics II		3 cr
PHYS 111	Gen Physics I	3 cr	PHYS 114	Gen Physics II Lab		1 cr
PHYS 113	Gen Physics I Lab	<u>1 cr</u>	COMM 101	Principles of Speech		3 cr
			Goal 6/7/8			<u>3 cr</u>
		15 cr				17 cr
<b>Junior Year</b>						
BIOL g445/ CHEM g445	Biochemistry I	3 cr	BIOL g447/ CHEM g447	Biochemistry II		3 cr
BIOL 437/ CHEM 438	Experimental Biochemistry	1 cr	BIOL g448/ CHEM g448	Advanced Experimental Biochemistry		2 cr
BIOL g444, g444L	Molecular Biology	4 cr	CHEM 232	Quantitative Analysis		2 cr
CHEM 341	Physical Chemistry I	3 cr	CHEM 234	Quantitative Analysis Lab		2 cr
Goal 6/7/8		3 cr	CHEM 342	Physical Chemistry II		3 cr
Goal 9 -12		<u>3 cr</u>	Goal 9-12			<u>3 cr</u>
		17 cr				15 cr
<b>Senior Year</b>						
BIOL g433, g433L	Microbial Physiology or Elective (BIOL, CHEM, or PSCI)	4 cr	BIOL 303, 303L, g404, g404L	Animal or Plant Physiology or Elective (BIOL, CHEM, or PSCI)		4 cr
BIOL 492	Senior Seminar	1 cr	BIOL g461	Advanced Genetics		3 cr
Elective	(BIOL, CHEM, or PSCI)	4 cr	BIOL g434, g434L	Microbial Diversity		4 cr
Goal 9-12		3 cr	Elective	(BIOL, CHEM, or PSCI)		4 cr
Elective		3 cr	BIOL 498/ CHEM 498	Seminar in Biochemistry		<u>1 cr</u>
Elective		<u>2 cr</u>				
		17 cr				16 cr

**RECOMMENDED PLAN OF STUDY FOR TRACK 3**

<b>Freshman Year</b>						
<b>Fall</b>			<b>Spring</b>			
BIOL 101, 101L	Biology I	4 cr	BIOL 102, 102L	Biology II		4 cr
CHEM 111, 111L	General Chemistry I	5 cr	CHEM 112, 112L	General Chemistry II		4 cr
MATH 170	Calculus I	4 cr	MATH 175	Calculus II		4 cr
ENG 101	English Comp.	<u>3 cr</u>	ENG 102	English Comp.		<u>3 cr</u>
		16 cr				15 cr
<b>Sophomore Year</b>						
BIOL 206	Cell Biology	3 cr	BIOL358	Genetics		3 cr
BIOL 235, 235L	General Microbiology	4 cr	CHEM 302	Organic Chemistry II		3 cr
CHEM 301	Organic Chemistry I	3 cr	CHEM 304	Organic Chemistry II Lab		1 cr
CHEM 303	Organic Chem I Lab	1 cr	PHYS 112	Gen Physics II		3 cr
PHYS 111	Gen Physics I	3 cr	PHYS 114	Gen Physics II Lab		1 cr
PHYS 113	Gen Physics I Lab	<u>1 cr</u>	COMM 101	Principles of Speech		3 cr
		15 cr	Goal 6/7/8			<u>3 cr</u>
						17 cr
<b>Junior Year</b>						
BIOL g445/ CHEM g445	Biochemistry I	3 cr	BIOL g447/ CHEM g447	Biochemistry II		3 cr
BIOL 437/ CHEM 438	Experimental Biochemistry	1 cr	BIOL g448/ CHEM g448	Advanced Experimental Biochemistry		2 cr
BIOL 301, 301L	Anatomy & Physiology I	4 cr	BIOL 302, 302L	Anatomy & Physiology II		4 cr
CHEM 341	Physical Chemistry I	3 cr	CHEM 342	Physical Chemistry II		3 cr
Goal 6/7/8		3 cr	PSCI 353	Intro to Methods in Pharm Sci		2 cr
Goal 9 -12		<u>3 cr</u>	Goal 9-12			<u>3 cr</u>
		17 cr				17 cr
<b>Senior Year</b>						
PSCI 301	Introduction to Pharmacology	3 cr	CHEM 232	Quantitative Analysis		2 cr
PSCI 205	Drugs in Society	2 cr	CHEM 234	Quantitative Analysis Lab		2 cr
BIOL 492	Senior Seminar	1 cr	Elective (BIOL, CHEM, or PSCI)			4 cr
Elective (BIOL, CHEM, or PSCI)		4 cr	Elective (BIOL, CHEM, or PSCI)			4 cr
Goal 9-12		3 cr	BIOL 498/ CHEM 498	Seminar in Biochemistry		1 cr
Elective		<u>2 cr</u>	Elective			<u>3 cr</u>
		15 cr				16 cr