

# 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<sup>2</sup>

Students must satisfy the core requirements listed below.

COURSES IN BIOLOGICAL SCIENCES		CREDITS
BIOL 1101, 1101L	Biology I	4
BIOL 1102, 1102L	Biology II	4
BIOL 2235, 2235L	General Microbiology	4
BIOL 3358	Genetics	3
BIOL 4437/CHEM 4438	Experimental Biochemistry	1
BIOL g4444, g4444L	Cell and Molecular Biology	5
BIOL g4445/CHEM g4445	Biochemistry I	3
BIOL g4447/CHEM g4447	Biochemistry II	3
BIOL g4448/CHEM g4448	Advanced Experimental Biochemistry	2
BIOL 4498/CHEM 4498	Seminar in Biochemistry	1
COURSES IN CHEMISTRY		
CHEM 1111, 1111L	General Chemistry I	5
CHEM 1112, 1112L	General Chemistry II	4
CHEM 2232	Quantitative Analysis	2
CHEM 2234	Quantitative Analysis Lab	2
CHEM 3301	Organic Chemistry I	3
CHEM 3302	Organic Chemistry II	3
CHEM 3303	Organic Chemistry I Lab	1
CHEM 3304	Organic Chemistry II Lab	1
CHEM 3341	Physical Chemistry I <sup>3</sup>	3
CHEM 3342	Physical Chemistry II <sup>3</sup>	3
COURSES IN MATH		
MATH 1170	Calculus I	4
MATH 1175	Calculus II	4
COURSES IN PHYSICS		
PHYS 1111	General Physics I <sup>4</sup>	3
PHYS 1112	General Physics II <sup>4</sup>	3
PHYS 1113	General Physics I Lab <sup>4</sup>	1
PHYS 1114	General Physics II Lab <sup>4</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. Students must pass core courses with a grade of C- or better.
3. CHEM 3351, 3352 may be taken to fulfill the Physical Chemistry requirement in the core curriculum.
4. PHYS 2211, 2212, 2213, 2214 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 2211, 2213	Inorganic Chemistry and Lab	4
CHEM 3331	Instrumental Analysis	2
CHEM 3334	Instrumental Analysis Lab	2
CHEM 4492	Seminar	1
TRACK 2: BIOCHEMISTRY AND MOLECULAR BIOLOGY		
BIOL 3303 and 3303L, g4404, Animal, Plant, or Microbial or g4433 and g4433L	Physiology	4
BIOL g4461	Advanced Genetics	3
BIOL 4492	Seminar	1
TRACK 3: PHYSIOLOGICAL BIOCHEMISTRY		
BIOL 3302	Anatomy and Physiology II	4
PSCI 3301	Introduction to Pharmacology	3
BIOL 4492	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 3301, 3301L	Anatomy and Physiology I	4
BIOL 3302, 3302L	Anatomy and Physiology II	4
BIOL 3303, 3303L	Principles of Animal Physiology	4
BIOL 3324, 3324L	Developmental Biology	4
BIOL g4404	Plant Physiology	4
BIOL g4417	Organic Evolution	3
BIOL g4433, g4433L	Microbial Physiology	4
BIOL g4434, g4434L	Microbial Diversity	4
BIOL g4443	Endocrinology	3
BIOL g4451, g4451L	Immunology	4
BIOL g4415	Human Neurobiology	4
BIOL g4415L	Human Neurobiology Lab	1
BIOL g4449	Human Physiology	4
BIOL g4456	Human Physiology II	4
BIOL g4461	Advanced Genetics	3
BIOL g4463, g4463L	Human Pathophysiology	4
BIOL g4473, g4473L	Industrial Microbiology	4
BIOL g4475	General Virology	3
BIOL g4477	Bacterial Virology Lab	1
OR		
BIOL g4478	Animal Virology Lab	1
BIOL g4481, g4482	Independent Problems	2 (max)
BIOL g4488	Advanced Radiobiology	3

## COURSES IN CHEMISTRY

CHEM 2211, 2213	Inorganic Chemistry and Lab	4	
CHEM 3311, 3312	Introduction to Research	2 (max)	
CHEM 3331, 3334	Instrumental Analysis and Lab	4	
CHEM 3365	Synthetic Methods	2	
CHEM 3366	Synthetic Methods Lab	2	
CHEM g4407	Inorganic Chemistry II <sup>1</sup>		2
CHEM g4433, g4437	Environmental Chemistry and Lab	3	
CHEM g4453	Modern Experimental Physical Chemistry <sup>2</sup>	3	
CHEM g4481, g4482	Independent Problems	2 (max)	

## COURSES IN MATH

MATH 2275	Calculus III	4
MATH 2240	Linear Algebra	3
MATH 3360	Differential Equations	3

## COURSES IN BIOMEDICAL AND PHARMACEUTICAL SCIENCES

PSCI 2205	Drugs in Society	2
PSCI 3301	Introduction to Pharmacology	3
PSCI 3353	Introduction to Methods in Pharmaceutical Sciences	2
PSCI 3308	Drug Discovery	3
PSCI 3368	Introduction to Toxicology	3
PSCI 4402	Immunopharmacology	2
PSCI 4403	Infectious Diseases and Natural Products	3
PSCI 4407	Pharmacogenomics	2
PSCI 4408	Medicinal Chemistry	3
PSCI 4431	Cancer Biology	3
PSCI 4434	Pharmacokinetics	3
PSCI 4440	Fundamentals of Nanoscience	3

1. Prerequisites include CHEM 2211, Engineering Physics I and II (2211, 2212) and Physical Chemistry 3351 and 3352.
2. Prerequisites include CHEM 3334, Engineering Physics I and II (2211, 2212) and Physical Chemistry 3351 and 3352.

**RECOMMENDED PLAN OF STUDY FOR TRACK 1**

<b>Freshman Year</b>					
Fall			Spring		
BIOL 1101, 1101L	Biology I	4 cr	BIOL 1102, 1102L	Biology II	4 cr
CHEM 1111, 1111L	General Chemistry I	5 cr	CHEM 1112, 1112L	General Chemistry II	4 cr
MATH 1170	Calculus I	4 cr	MATH 1175	Calculus II	4 cr
ENG 1101	English Comp.	<u>3 cr</u>	ENG 1102	English Comp.	<u>3 cr</u>
		16 cr			15 cr
<b>Sophomore Year</b>					
BIOL 2235, 2235L	General Microbiology	4 cr	BIOL 3358	Genetics	3 cr
CHEM 3301	Organic Chemistry I	3 cr	CHEM 3302	Organic Chemistry II	3 cr
CHEM 3303	Organic Chem I Lab	1 cr	CHEM 3304	Organic Chemistry II Lab	1 cr
PHYS 1111	Gen Physics I	3 cr	PHYS 1112	Gen Physics II	3 cr
PHYS 1113	Gen Physics I Lab	1 cr	PHYS 1114	Gen Physics II Lab	1 cr
Elective		<u>3 cr</u>	COMM 1101	Principles of Speech	3 cr
		15 cr	Goal 6/7/8		<u>3 cr</u>
					17 cr
<b>Junior Year</b>					
BIOL g4445/ CHEM g4445	Biochemistry I	3 cr	BIOL g4447/ CHEM g4447	Biochemistry II	3 cr
BIOL 4437/ CHEM 4438	Experimental Biochemistry	1 cr	BIOL g4448/ CHEM g4448	Advanced Experimental Biochemistry	2 cr
CHEM 2211, 2213	Inorganic Chemistry and Lab	4 cr	CHEM 2232	Quantitative Analysis	2 cr
CHEM 3341	Physical Chemistry I	3 cr	CHEM 2234	Quantitative Analysis Lab	2 cr
Goal 6/7/8		3 cr	CHEM 3342	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 3331	Instrumental Analysis	2 cr	CHEM 3334	Instrumental Analysis Lab	2 cr
BIOL g4444, g4444L	Cell and Molecular Biology	5 cr	Elective	(BIOL, CHEM, or PSCI)	4 cr
Elective	(BIOL, CHEM, or PSCI)	4 cr	Elective	(BIOL, CHEM, or PSCI)	4 cr
CHEM 4492	Senior Seminar	1 cr	BIOL 4498/ CHEM 4498	Seminar in Biochemistry	1 cr
Goal 9-12		3 cr	Elective		3 cr
Elective		<u>2 cr</u>	Elective		<u>2 cr</u>
		17 cr			16 cr

**RECOMMENDED PLAN OF STUDY FOR TRACK 2**

<b>Freshman Year</b>					
Fall			Spring		
BIOL 1101, 1101L	Biology I	4 cr	BIOL 1102, 1102L	Biology II	4 cr
CHEM 1111, 1111L	General Chemistry I	5 cr	CHEM 1112, 1112L	General Chemistry II	4 cr
MATH 1170	Calculus I	4 cr	MATH 1175	Calculus II	4 cr
ENG 1101	English Comp.	<u>3 cr</u>	ENG 1102	English Comp.	<u>3 cr</u>
		16 cr			15 cr
<b>Sophomore Year</b>					
BIOL 2235, 2235L	General Microbiology	4 cr	BIOL 3358	Genetics	3 cr
CHEM 3301	Organic Chemistry I	3 cr	CHEM 3302	Organic Chemistry II	3 cr
CHEM 3303	Organic Chem I Lab	1 cr	CHEM 3304	Organic Chemistry II Lab	1 cr
PHYS 1111	Gen Physics I	3 cr	PHYS 1112	Gen Physics II	3 cr
PHYS 1113	Gen Physics I Lab	1 cr	PHYS 1114	Gen Physics II Lab	1 cr
Elective		<u>3 cr</u>	COMM 1101	Principles of Speech	3 cr
		15 cr	Goal 6/7/8		<u>3 cr</u>
					17 cr
<b>Junior Year</b>					
BIOL g4445/ CHEM g4445	Biochemistry I	3 cr	BIOL g4447/ CHEM g4447	Biochemistry II	3 cr
BIOL 4437/ CHEM 4438	Experimental Biochemistry	1 cr	BIOL g4448/ CHEM g4448	Advanced Experimental Biochemistry	2 cr
BIOL g4444, g4444L	Cell and Molecular Biology	5 cr	CHEM 2232	Quantitative Analysis	2 cr
CHEM 3341	Physical Chemistry I	3 cr	CHEM 2234	Quantitative Analysis Lab	2 cr
Goal 6/7/8		3 cr	CHEM 3342	Physical Chemistry II	3 cr
Goal 9 -12		<u>3 cr</u>	Goal 9-12		<u>3 cr</u>
		18 cr			15 cr
<b>Senior Year</b>					
BIOL g4433, g4433L	Microbial Physiology or Elective (BIOL, CHEM, or PSCI)	4 cr	BIOL 3303, 3303L, g4404	Animal or Plant Physiology or Elective (BIOL, CHEM, or PSCI)	4 cr
Elective	(BIOL, CHEM, or PSCI)	4 cr	Elective	(BIOL, CHEM, or PSCI)	4 cr
BIOL 4492	Senior Seminar	1 cr	BIOL g4461	Advanced Genetics	3 cr
Goal 9-12		3 cr	BIOL 4498/ CHEM 4498	Seminar in Biochemistry	1 cr
Elective		3 cr	Elective		<u>3 cr</u>
Elective		<u>2 cr</u>			
		17 cr			15 cr

**RECOMMENDED PLAN OF STUDY FOR TRACK 3**

<b>Freshman Year</b>						
<b>Fall</b>			<b>Spring</b>			
BIOL 1101, 1101L	Biology I	4 cr	BIOL 1102, 1102L	Biology II	4 cr	
CHEM 1111, 1111L	General Chemistry I	5 cr	CHEM 1112, 1112L	General Chemistry II	4 cr	
MATH 1170	Calculus I	4 cr	MATH 1175	Calculus II	4 cr	
ENG 1101	English Comp.	<u>3 cr</u>	ENG 1102	English Comp.	<u>3 cr</u>	
		16 cr			15 cr	
<b>Sophomore Year</b>						
BIOL 2235, 2235L	General Microbiology	4 cr	BIOL3358	Genetics	3 cr	
CHEM 3301	Organic Chemistry 1	3 cr	CHEM 3302	Organic Chemistry II	3 cr	
CHEM 3303	Organic Chem I Lab	1 cr	CHEM 3304	Organic Chemistry II Lab	1 cr	
PHYS 1111	Gen Physics I	3 cr	PHYS 1112	Gen Physics II	3 cr	
PHYS 1113	Gen Physics I Lab	1 cr	PHYS 1114	Gen Physics II Lab	1 cr	
Elective		<u>3 cr</u>	COMM 1101	Principles of Speech	3 cr	
		15 cr	Goal 6/7/8		<u>3 cr</u>	
					17 cr	
<b>Junior Year</b>						
BIOL g4445/ CHEM g4445	Biochemistry 1	3 cr	BIOL g4447/ CHEM g4447	Biochemistry II	3 cr	
BIOL 4437/ CHEM 4438	Experimental Biochemistry	1 cr	BIOL g4448/ CHEM g4448	Advanced Experimental Biochemistry	2 cr	
PSCI 3301	Introduction to Pharmacology	3 cr	BIOL 3302, 3302L	Anatomy & Physiology II	4 cr	
CHEM 3341	Physical Chemistry I	3 cr	CHEM 3342	Physical Chemistry II	3 cr	
Goal 6/7/8		3 cr	Goal 9-12		3 cr	
Goal 9 -12		<u>3 cr</u>	Elective		<u>2 cr</u>	
		16 cr			17 cr	
<b>Senior Year</b>						
BIOL g4444, g4444L	Cell and Molecular Biology	5 cr	CHEM 2232	Quantitative Analysis	2 cr	
Elective (BIOL, CHEM, or PSCI)		4 cr	CHEM 2234	Quantitative Analysis Lab	2 cr	
BIOL 4492	Senior Seminar	1 cr	Elective (BIOL, CHEM, or PSCI)		4 cr	
Goal 9-12		3 cr	Elective (BIOL, CHEM, or PSCI)		4 cr	
Elective		<u>3 cr</u>	BIOL 4498/ CHEM 4498	Seminar in Biochemistry	1 cr	
			Elective		<u>3 cr</u>	
		16 cr			16 cr	