

# BS in Microbiology

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The BS in Microbiology is a specialized implementation of the Biomedical Science Concentration within the Department of Biological Sciences that is modeled on the degree recommendations of the American Society of Microbiology. The Microbiology curriculum stresses the sciences of chemistry, biology, physics, and mathematics essential to the study of microbiology providing a strong foundation for medical and graduate school biomedical studies in infectious disease and immunology, and for advanced studies in environmental and industrial microbiology. The stringency of the program and the extensive laboratory training also prepares graduates for entry level positions in medical and industrial microbiology and has sufficient flexibility to allow preparation for graduate study or for employment in microbiological and allied fields.

## Marketable Skills

1. Communication: Reach mutual understanding through the effective exchange of information, ideas, and feelings.
2. Critical thinking: Analyze and evaluate issues in order to solve problems and develop informed opinions.
3. Organization: Use resources effectively and efficiently in order to stay focused on different tasks.
4. Problem-solving: Find solutions to difficult or complex issues.
5. Research: Be able to search, investigate and critically analyze information in response to a specific research question.
6. Time management: Prioritize goals and organize time to be more productive and efficient.

## Learning Outcomes

1. All students will have basic knowledge about facts and principles of microbiology, cell biology, and molecular biology.
2. Students will develop critical thinking skills and apply those skills to solve problems of scientific relevance.
3. Students will understand and employ microbiology, cell biology, molecular biology techniques in a research laboratory setting (e.g. accurate pipetting).
4. Students will carry out basic experiments in the laboratory, understand experimental controls, and analyze data to make rational conclusions.

The requirements for the BS degree in Cellular and Molecular Biochemistry consist of the general College of Science requirements: completion of at least 120 semester credit hours, a minimum of 37 of which must be in upper-division coursework, and completion of the University's General Education Core, which includes mathematics requirements MATH 1411. In addition, MATH 1312 or STAT 2480 is required.

For more information contact CORE (<https://www.utep.edu/science/core/>) advisors.

## Fast Track

The Fast-Track Program (<http://catalog.utep.edu/admissions/undergraduate/fast-track/#text>) enables outstanding undergraduate UTEP students to receive both undergraduate and graduate credit for up to 15 hours of UTEP course work as determined by participating Master's and Doctoral programs.

Not all undergraduate programs have elected to participate in the Fast Track option, so students should see their departmental graduate advisor for information about requirements and guidelines. A list of courses that have been approved for possible use at the graduate level is found here (<http://catalog.utep.edu/admissions/undergraduate/fast-track/#fasttrackcoursestext>).

## M.B.A. - Master of Business Administration (<http://catalog.utep.edu/grad/college-of-business-administration/business-administration-deans-office/master-of-business-administration/>) / B.S. in Microbiology

Code	Title	Hours
ACCT 5304	Accounting Analysis	3
BLAW 5306	Business Law and Ethics	3
ECON 5311	Managerial Economics	3
FIN 5311	Financial Management	3
MGMT 5311	Organizational Mgmt Seminar	3
MKT 5311	Marketing Management	3
QMB 5311	Quantitative Methods-Business	3
OSCM 5308	Concepts of Production Mgmt	3

## M.S. in Bioinformatics (<http://catalog.utep.edu/grad/college-of-science/college-science-deans-office/bioinformatics-ms/>) / B.S. in Biomedical Sciences; B.S. in Microbiology

Code	Title	Hours
BINF 5351	Intro. Bioinformatics I	3
BINF 5352	Intro. Bioinformatics II	3
BIOL 5351	Intro Bio I: Basic Seq. Comp.	3
BIOL 5352	Intro Bio II: Gene Find/Compar	3

BIOL 5316	Biosystematics	3
BIOL 5326	Advances Immunological Concept	3
BIOL 5329	Physiology of Bacterial Cell	3
BIOL 5340	Structure/Funct Macromolecules	3
BIOL 5342		
BIOL 5343		
BIOL 5344	Molecular Pathogenesis	3

**M.S. in Biomedical Engineering (<http://catalog.utep.edu/grad/college-of-engineering/metallurgical-materials-engineering/20biomedical-engineering-ms/>)/ B.S. Biomedical Sciences; B.S. in Cellular and Molecular Biochemistry; B.S. in Microbiology**

Code	Title	Hours
BIOL 5301	Select Adv Topics Biol Science *	3
BIOL 5308	Rsrch Funding & Prof Developmt	3
BIOL 5311	Neurobiology of Brain Diseases	3
BIOL 5320	Endocrinology	3
BIOL 5330	Cancer Biology	3
BME 5301	BME for Global Health	3
BME 5302	Telemedicine & Imaging Info.	3
BME 5303	Research & Lab Methods	3
BME 5304	BME Device Design & Regulation	3
BME 5310	Biomaterials	3
BME 5313	Tissue Engineering	3
BME 5321	Biomechatronics	3
BME 5353		3
BME 5390	Special Topics in BME	3

\* Advisor approval needed

## Degree Plan

Required Credits: 120

Code	Title	Hours
<b>University Core Curriculum <sup>C</sup></b>		
Complete the University Core Curriculum requirements. (p. 3)		42
<b>Designated Core <sup>C</sup></b>		
Life and Physical Science		
Select one of the following:		
PHYS 1403 & PHYS 1404	General Physics I and General Physics II	
<b>OR</b>		
PHYS 2320 & PHYS 2120	Introductory Mechanics and Laboratory for PHYS 2320	
and		
PHYS 2321 & PHYS 2121	Introductory Electromagnetism and Laboratory for PHYS 2321	
Mathematics		
MATH 1411	Calculus I	4
<b>Microbiology Major</b>		
Required Courses:		
BIOL 1305 & BIOL 1107	General Biology and Topics in Study of Life I <sup>C</sup>	4
BIOL 1306 & BIOL 1108	Organismal Biology and Organismal Biology Laboratory <sup>C</sup>	4

CHEM 1305 & CHEM 1105	General Chemistry and Laboratory for CHEM 1305	4
CHEM 1306 & CHEM 1106	General Chemistry and Laboratory for CHEM 1306	4
BIOL 3192	Professional Development Sem.	1
BIOL 3314 & BIOL 3115	Molecular Cell Biology and Molecular Cell Biol Laboratory	4
CHEM 2324 & CHEM 2124	Organic Chemistry and Lab for Organic Chemistry 2324 <sup>C</sup>	4
CHEM 2325 & CHEM 2125	Organic Chemistry and Lab for Organic Chemistry 2325 <sup>C</sup>	4
CHEM 3330	Biochem I:Struc & Function	3
MATH 1312 or STAT 2480	Calculus II Elementary Statistical Methods	3
MICR 2340 & MICR 2141	General Microbiology and Gen Microbiology Laboratory	4
MICR 3343 & MICR 3144	Pathogenic Microbiology and Pathogenic Microbiology Lab	4
MICR 3345 & MICR 3146	Microbial Physiology and Microbial Physiology Lab	4
MICR 3349 & MICR 3150	Prokaryotic Molecular Genetic and Prokaryotic Mol Genetic Lab	4
MICR 4353 & MICR 4154	Immunology and Immunology Laboratory	4
Select nine hours of the following:		9
BIOL 3320	Genetics <sup>2</sup>	
BIOL 3330	Histology	
BIOL 4198	Special Problems	
BIOL 4298	Special Problems	
BIOL 4319	G Protein-Coupled Recept Biol	
BIOL 4388	Mammalian Physiology	
BIOL 4395	Topics in Biology	
BIOL 4398	Special Problems	
MICR 4329	Epidemiology	
MICR 4351	General Virology	
MICR 4355	Medical Mycology	
ZOOL 3464	Medical Parasitology	

**Additional Coursework:**

Select eleven hours of additional coursework, of which four hours must be upper-division. 11

**Total Hours** 120

1 Although the UTEP choice is larger, these choices satisfy the requirements of both the core and the major.

2 Strongly recommended.

C Course requires a grade of C or better.

## University Core Curriculum

The department may make specific suggestions for courses which are most applicable towards your major.

All courses require a C or better

### I. Communication (six hours)

Code	Title	Hours
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Courses in this category focus on developing ideas and expressing them clearly, considering the effect of the message, fostering understanding, and building the skills needed to communicate persuasively. Courses involve the command of oral, aural, written, and visual literacy skills that enable people to exchange messages appropriate to the subject, occasion, and audience.

Select six hours of the following: 6

For students whose secondary education was in English:

COMM 1611	Written and Oral Communication
ENGL 1313	Writing About Literature
RWS 1301	Rhetoric & Composition I
RWS 1302	Rhetoric & Composition 2
RWS 1601	Rhetoric, Composition & Comm

For students whose secondary education was not in English:

ESOL 1311	Expos Engl Compos-Spkr Esl
ESOL 1312	Res & Crit Writng Spkr Esl

**Total Hours** 6

## II. American History (six hours)

Code	Title	Hours
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Courses in this category focus on the consideration of past events and ideas relative to the United States, with the option of including Texas History for a portion of this component area. Courses involve the interaction among individuals, communities, states, the nation, and the world, considering how these interactions have contributed to the development of the United States and its global role.

HIST 1301	History of U.S. to 1865	3
HIST 1302	History of U.S. Since 1865	3

**Total Hours** 6

## III. Language, Philosophy & Culture (three hours)

Code	Title	Hours
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Courses in this category focus on how ideas, values, beliefs, and other aspects of culture express and affect human experience. Courses involve the exploration of ideas that foster aesthetic and intellectual creation in order to understand the human condition across cultures.

Select one of the following: 3

AFST 2300	Intro-African Amer Studies
CHIC 2302	Latina/o Presence in the U.S.
ENGL 2311	English Literature
ENGL 2312	English Literature
ENGL 2313	Intro to American Fiction
ENGL 2314	Intro to American Drama
ENGL 2318	Intro to American Poetry
FREN 2322	Making of the "Other" Americas
HIST 2301	World History to 1500
HIST 2302	World History Since 1500
PHIL 1301	Introduction to Philosophy
PHIL 2306	Ethics
RS 1301	Introduct to Religious Studies
SPAN 2340	Seeing & Naming: Conversations
WS 2300	Introduction to Womens Studies
WS 2350	Global Feminisms

**Total Hours** 3

## IV. Mathematics (three hours)

Code	Title	Hours
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Courses in this category focus on quantitative literacy in logic, patterns, and relationships. Courses involve the understanding of key mathematical concepts and the application of appropriate quantitative tools to everyday experience.

Select one of the following: 3

MATH 1309	College Algebra
MATH 1310	Trigonometry and Conics
MATH 1319	Math in the Modern World
MATH 1320	Math for Social Sciences I

MATH 1411	Calculus I
MATH 1508	Precalculus <sup>1,2</sup>
MATH 2301	Math for Social Sciences II
STAT 1380	Statistical Literacy
STAT 2480	Elementary Statistical Methods

1 A higher-level course in the calculus sequence can be substituted.

2 TCCN MATH 1314 will also satisfy this requirement.

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**Total Hours**
**3**
**V. Life & Physical Sciences (six hours)**

Code	Title	Hours
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Courses in this category focus on describing, explaining, and predicting natural phenomena using the scientific method. Courses involve the understanding of interactions among natural phenomena and the implications of scientific principles on the physical world and on experiences.

Select one of the following:

1-4

ASTR 1107	Astronomy Lab I
ASTR 1307	Elem Astronomy-Solar System
ASTR 1308	Elem Astr Stars & Galaxies
BIOL 1103	Introductory Biology Lab
BIOL 1104	Human Biology Laboratory
BIOL 1107	Topics in Study of Life I
BIOL 1108	Organismal Biology Laboratory
BIOL 1203	Introductory Biology
BIOL 1304	Human Biology
BIOL 1305	General Biology
BIOL 1306	Organismal Biology
BIOL 2111	Human Anat/Physio Lab I
BIOL 2113	Human Anat/Physio Lab II
BIOL 2311	Human Anat/Physiology I
BIOL 2313	Human Anat/Physiology II
CHEM 1105	Laboratory for CHEM 1305
CHEM 1106	Laboratory for CHEM 1306
CHEM 1107	Intro General Chemistry Lab
CHEM 1108	Intro Organic & Biochem Lab
CHEM 1305	General Chemistry
CHEM 1306	General Chemistry
CHEM 1307	Intro to General Chemistry
CHEM 1308	Intro Organic & Biochemistry
ESCI 1101	Environmental Sci. Lab
ESCI 1102	Non-major Lab for ESCI 1301
ESCI 1202	Intro to Environment Science 2
ESCI 1301	Intro to Environmental Sci
GEOG 1106	Laboratory for GEOG 1306
GEOG 1306	Physical Geography
GEOL 1103	Lab for GEOL 1313
GEOL 1104	Lab for GEOL 1314
GEOL 1111	Principles of Earth Sci - Lab
GEOL 1112	Laboratory for Geology 1212
GEOL 1211	Principles of Earth Sciences
GEOL 1212	Principles of Earth Science
GEOL 1230	The Blue Planet
GEOL 1231	Natural Hazards
GEOL 1313	Intro to Physical Geology

GEOL 1314	Intro to Historical Geol	
HSCI 2302	Fundamentals of Nutrition	
HSCI 2303	Wellness Dynamics	
MICR 2330	Microorganisms and Disease	
PHYS 1403	General Physics I	
PHYS 1404	General Physics II	
PHYS 2120	Laboratory for PHYS 2320	
PHYS 2121	Laboratory for PHYS 2321	
PHYS 2320	Introductory Mechanics	
PHYS 2321	Introductory Electromagnetism	
<b>Total Hours</b>		<b>6</b>

## VI. Political Science (six hours)

Code	Title	Hours
Courses in this category focus on consideration of the Constitution of the United States and the constitutions of the states, with special emphasis on that of Texas. Courses involve the analysis of governmental institutions, political behavior, civic engagement, and their political and philosophical foundations.		
Required Courses:		
POLS 2310	Introduction to Politics	3
POLS 2311	American Gover & Politics	3
<b>Total Hours</b>		<b>6</b>

## VII. Social and Behavioral Sciences (three hours)

Code	Title	Hours
Courses in this category focus on the application of empirical and scientific methods that contribute to the understanding of what makes us human. Courses involve the exploration of behavior and interactions among individuals, groups, institutions, and events, examining their impact on the individual, society, and culture.		
Select one of the following:		3
ANTH 1301	Intro-Phys Anth/Archeolog	
ANTH 1302	Intro-Cultural Anthropology	
ANTH 1310	Cultural Geography	
ANTH 2320	Intro to Linguistics	
CE 2326	Econ for Engrs & Scientists	
CHIC 2311	Intro to Chicano Studies	
ASIA 2300	Asian American Studies	
COMM 2350	Interpersonal Communication	
COMM 2372	Mass Media and Society	
ECON 2303	Principles of Macroeconomics	
ECON 2304	Principles of Microeconomics	
EDPC 1301	Introduction to Ed Psychology	
EDU 1342	Action Research in Classrooms	
ENGL 2320	Introduction to Linguistics	
GEOG 1310	Cultural Geography	
LEAD 2300	Leadership in Action	
LING 2320	Introduction to Linguistics	
LING 2340	Lang. Inside & Out: Sel Topics	
PSYC 1301	Introduction to Psychology	
SOCI 1301	Introduction to Sociology	
SOCI 1310	Cultural Geography	
<b>Total Hours</b>		<b>3</b>

**VIII. Creative Arts (three hours)**

Code	Title	Hours
Courses in this category focus on the appreciation and analysis of creative artifacts and works of the human imagination. Courses involve the synthesis and interpretation of artistic expression and enable critical, creative, and innovative communication about works of art.		
Select one of the following:		
ART 1300	Art Appreciation	3
ARTH 1305	History of Art I	
ARTH 1306	History of Art II	
CHIC 1311	Chicana/o Fine Arts Appreciat	
DANC 1304	Introduction to Dance	
FILM 1390	Intro-Art of Motion Pict.	
MUSL 1324	Music Appreciation	
MUSL 1327	Jazz to Rock	
MUSL 2321	Music, Culture, and Society	
THEA 1313	Introduction to Theatre	
<b>Total Hours</b>		<b>3</b>

**IX. Component Area Option (six hours)**

Code	Title	Hours
a. A minimum of 3 SCH must meet the definition and corresponding Core Objectives specified in one of the foundational component areas. b. As an option for up to 3 semester credit hours of the Component Area Option, an institution may select course(s) that: (i) Meet(s) the definition specified for one or more of the foundational component areas; and (ii) Include(s) a minimum of three Core Objectives, including Critical Thinking Skills, Communication Skills, and one of the remaining Core Objectives of the institution's choice.		
BUSN 1301	Intro to Global Business	
COMM 1301	Public Speaking	
COMM 1302	Business/Profession Comm	
CS 1310	Intro-Computational Thinking	
CS 1320	Computer Programming Sci/Engr	
EL 1301	Eng Innovation and Leadership	
ENGR 1302	Engineering Design Experience	
ENGR 1303	Applied Engineering Analysis	
LEAD 1300	Introduction to Leadership	
SCI 1301	Inquiry in Math & Science	
SPLP 1312	Comm. Var. Across the Lifespan	
UNIV 1301	Seminar/Critical Inquiry	
<b>Total Hours</b>		<b>0</b>

**4-Year Sample Degree Plan****BS in Microbiology (Starting with Calculus)**

Code	Title	Hours
<b>BS IN MICROBIOLOGY (STARTING WITH CALCULUS)</b>		
<b>FRESHMAN</b>		
<b>Fall</b>		
RWS 1301	Rhetoric & Composition I	3
SCI 1301	Inquiry in Math & Science	3
BIOL 1305 & BIOL 1107	General Biology and Topics in Study of Life I	4
MATH 1411	Calculus I	4
<b>Spring</b>		
RWS 1302	Rhetoric & Composition 2	3
PSYC 1301	Introduction to Psychology	3

BIOL 1306 & BIOL 1108	Organismal Biology and Organismal Biology Laboratory	4
CHEM 1305 & CHEM 1105	General Chemistry and Laboratory for CHEM 1305	4
<b>SOPHOMORE</b>		
<b>Fall</b>		
HIST 1301	History of U.S. to 1865	3
CHEM 1306 & CHEM 1106	General Chemistry and Laboratory for CHEM 1306	4
PHYS 1403	General Physics I	4
MICR 2340 & MICR 2141	General Microbiology and Gen Microbiology Laboratory	4
<b>Spring</b>		
HIST 1302	History of U.S. Since 1865	3
COMM 1301	Public Speaking	3
CHEM 2324 & CHEM 2124	Organic Chemistry and Lab for Organic Chemistry 2324	4
PHYS 1404	General Physics II	4
<b>JUNIOR</b>		
<b>Fall</b>		
CHEM 2325 & CHEM 2125	Organic Chemistry and Lab for Organic Chemistry 2325	4
BIOL 3314 & BIOL 3115	Molecular Cell Biology and Molecular Cell Biol Laboratory	4
Upper-Division Menu Elective		3
Lower-Division Elective		4
<b>Spring</b>		
Creative Arts Core		3
STAT 2480 or MATH 1312	Elementary Statistical Methods Calculus II	3-4
CHEM 3330	Biochem I:Struc & Function	3
BIOL 3192	Professional Development Sem.	1
MICR 3343 & MICR 3144	Pathogenic Microbiology and Pathogenic Microbiology Lab	4
Lower Division Elective		3
<b>SENIOR</b>		
<b>Fall</b>		
POLS 2310	Introduction to Politics	3
PHIL 2306	Ethics	3
MICR 3345 & MICR 3146	Microbial Physiology and Microbial Physiology Lab	4
Upper Division Menu Elective		3
MICR 4353 & MICR 4154	Immunology and Immunology Laboratory	4
<b>Spring</b>		
POLS 2311	American Gover & Politics	3
Upper-Division Menu Elective		3
MICR 3349 & MICR 3150	Prokaryotic Molecular Genetic and Prokaryotic Mol Genetic Lab	4
Upper-Division Elective		4
<b>Total Hours</b>		<b>120-121</b>



**BS in Microbiology (Starting with Pre-Calculus)**

Code	Title	Hours
<b>BS IN MICROBIOLOGY (STARTING WITH PRECALCULUS)</b>		
<b>FRESHMAN</b>		
<b>Fall</b>		
RWS 1301	Rhetoric & Composition I	3
SCI 1301	Inquiry in Math & Science	3
BIOL 1305 & BIOL 1107	General Biology and Topics in Study of Life I	4
MATH 1508	Precalculus	5
<b>Spring</b>		
RWS 1302	Rhetoric & Composition 2	3
COMM 1301	Public Speaking	3
BIOL 1306 & BIOL 1108	Organismal Biology and Organismal Biology Laboratory	4
CHEM 1305 & CHEM 1105	General Chemistry and Laboratory for CHEM 1305	4
<b>SOPHOMORE</b>		
<b>Fall</b>		
HIST 1301	History of U.S. to 1865	3
CHEM 1306 & CHEM 1106	General Chemistry and Laboratory for CHEM 1306	4
PHYS 1403	General Physics I	4
MICR 2340 & MICR 2141	General Microbiology and Gen Microbiology Laboratory	4
<b>Spring</b>		
HIST 1302	History of U.S. Since 1865	3
PSYC 1301	Introduction to Psychology	3
Creative Arts Core		3
CHEM 2324 & CHEM 2124	Organic Chemistry and Lab for Organic Chemistry 2324	4
PHYS 1404	General Physics II	4
<b>JUNIOR</b>		
<b>Fall</b>		
Language, Philosophy, and Culture Core		3
CHEM 2325 & CHEM 2125	Organic Chemistry and Lab for Organic Chemistry 2325	4
Upper Division Menu Elective		3
MATH 1411	Calculus I	4
Lower-Division Elective		3
<b>Spring</b>		
CHEM 3330	Biochem I:Struc & Function	3
BIOL 3314 & BIOL 3115	Molecular Cell Biology and Molecular Cell Biol Laboratory	4
MICR 3343 & MICR 3144	Pathogenic Microbiology and Pathogenic Microbiology Lab	4
Lower-Division Elective		4
<b>SENIOR</b>		
<b>Fall</b>		
POLS 2310	Introduction to Politics	3
MICR 3345 & MICR 3146	Microbial Physiology and Microbial Physiology Lab	4
Upper Division Menu Elective		3

STAT 2480 or MATH 1312	Elementary Statistical Methods Calculus II	3-4
BIOL 3192	Professional Development Sem.	1
MICR 4353 & MICR 4154	Immunology and Immunology Laboratory	4
<b>Spring</b>		
POLS 2311	American Gover & Politics	3
Upper-Division Menu Elective		3
MICR 3349 & MICR 3150	Prokaryotic Molecular Genetic and Prokaryotic Mol Genetic Lab	4
Lower-Division Elective		4
<b>Total Hours</b>		<b>125-126</b>