General

If proposed changes constitute less than 25% of the total program units, please use the Undergraduate Curriculum Update Request or Graduate Curriculum Update Request instead.

Program Name
Microbiology

Short Title
MICRBS

Admissions Notification?
No

Emphases/Subplans
No

Primary Contact Name
Micah Parrish

Primary Contact Email Address
micahparrish@arizona.edu

Total Degree Units
120

Career
Undergraduate

Describe the proposed changes to the program as well as the rationale for making the specific changes and include any relevant supporting data

We propose to change the Microbiology major to include Emphases in which students can specialize to enhance their preparedness for distinct areas in Microbiology. Students have expressed interest in pursuing the area of Microbiology they are most interested in and connecting with faculty who perform research in that area. The proposed new Microbiology Emphases are: Emerging Infectious Disease and Medical Microbiology (EIDMM), Environmental Microbiology (EM), Food Safety & Microbiology (FSM), General Microbiology (GM), and Plant Pathology and Microbiology (PLP&M).

Students are increasingly seeking programs that provide specialization and opportunities to obtain experiential learning with faculty specializing in the area of Microbiology that they are most interested in exploring. The Emerging Infectious Disease and Medical Microbiology (EIDMM) Emphasis will attract students who are interested in the areas of pre-health, pre-medical, and pre-veterinary in preparation for professional school or health-related graduate school. The Environmental Microbiology (EM) Emphasis will benefit students seeking to understand how the environment influences microbial ecology and pathogen fate in natural and human-constructed systems including soil, surface water, wastewater reclamation facilities, and built environments to prepare students for graduate school and careers in research and industry. The Food Safety & Microbiology (FSM) Emphasis will provide students with the foundation for understanding pathogens and the role of sanitation in creating a safe food supply, preparing them for careers in academia and the food industry. The General Microbiology (GM) Emphasis is based on the current degree program and is ideal for students who wish to obtain a well-rounded degree in Microbiology that prepares them for a diverse career path. The Plant Pathology and Microbiology (PLP&M) Emphasis will give students the opportunity to explore the interactions between plants and microbes, preparing them for research, industry, and graduate school.

Plan Description

Work with Marketing to develop a description for the proposed program. Include the purpose, nature, and highlights of the curriculum, faculty expertise, emphases (if any), etc. Typically, 100-250 words.

The study of small microorganisms can make a difference on a big scale, including leading to lifesaving innovations. Embrace the unknown. Microbiology is the study of microorganisms and the role they play in human, animal and plant health. This Bachelor of Science offers students a base in modern biology, specifically how microorganisms interact with their surroundings. Coursework includes food safety and consumer health; plant pathology and microbiology; environmental microbiology; microbial genomics and biotechnology; and medical microbiology. Students research microbes such as bacteria, viruses, fungi and protozoa and touch on subjects such as bacteriology, parasitology, mycology, immunology and microbial genetics. This program cultivates students' expertise in preparation for highly specialized professions from biotechnology to medical science.

Dual Degree

No

Terminal Degree
No

Research Master's
No

Professional Master's
No

Stackable
No

Associated Plans for Stacking
-

Accelerated Master's Program
No

Associated Plans for AMP
-

Approved WUE Program
No

Approved WRGP Program
No

Impacts & Considerations

Faculty impact – How will faculty workload be allocated and/or will new faculty hires be required to deliver the new, proposed curriculum?
No new faculty hire will be required. All courses are already taught and available to students.

Budgetary impact – Indicate new resources needed and source of funding to implement proposed changes. If reallocating resources, indicate where resources will be taken from and the impact this will have on students/faculty/program/unit.
No new resources will be needed for the School and College to implement the proposed changes.

Transfer Student Consideration – Please explain how you have planned and evaluated the changes you requested in the context of: Mitigating the complexity of the transfer pathway/curriculum; Supporting transfer student success; Ensuring transferability of course work from Arizona community colleges
The course work changes for the Emphases are upper-division courses that students will be taking at the University level, and therefore should not affect transfer students.

Campus and Location Offerings

Campuses

Campus
University of Arizona - Main

Sub Plan Required
Yes

Locations

Location
Tucson

First Admit Term
Fall 2026

Last Admit Term
-

Teach Out Term
-

Learning Outcomes

Name
Emphasis 1: Emerging Infectious Disease and Medical Microbiology (EIDMM): Learning Outcome #1: Students will be able to analyze the molecular mechanisms underpinning the pathogenesis of a disease-causing microbe in humans, using evidence from current research in microbiology.

Concepts
interconnectedness between microbial diversity and disease, microbial pathogenesis, host-microbe interactions

Competencies
interpreting data from peer-reviewed microbiological research, identifying mechanisms of host-pathogen interaction, synthesizing evidence from multiple microbial case studies

Assessment Methods
Post-module quizzes (direct) and student exit survey (indirect)

Measures
Instructor scoring of quizzes (direct), responses to student exit survey (indirect)

Name
Emphasis 2: Environmental Microbiology (EM): Learning Outcome #1: Students will be able to evaluate the roles of microbial communities in natural and anthropogenic systems and analyze their impacts on environmental and human health.

Concepts
biogeochemical cycling, microbial physiology, microbial impacts on environmental and human health.

Competencies
analyzing how microorganisms function across ecosystems, evaluating the impact of microbial processes on ecosystem and public health, interpreting and presenting data from peer-reviewed microbiological research.

Assessment Methods
Individual/group presentations with created slides (direct) and student exit survey (indirect)

Measures
Rubric evaluations by the instructor and by one other (peer) in a double-blinded fashion, a self-evaluation for their own presentation (direct), and student exit survey results (indirect).

Name
Emphasis 3: General Microbiology (GM): Learning Outcome #1: Students will be able to understand the basis of molecular phylogenetic classifications and apply fundamental principles of evolution underpinning microbial phylogenetics in the identification of unknown organisms.

Concepts
core and pan-genomes, microbial evolution, microbial phylogenetics and classification systems

Competencies
classifying a microbe using laboratory microbial techniques, interpreting results to identify unknown microbial species, applying evolutionary theory

Assessment Methods
Laboratory report identifying two species of bacteria when given an unknown sample (direct) and student exit survey (indirect)

Measures
Instructor evaluation of lab reports using a rubric (direct) and student exit survey results (indirect)

Name
Emphasis 4: Food Safety and Microbiology (FSM): Learning Outcome #1: Students will critically analyze issues affecting food safety to mitigate the risk of foodborne illness in various food commodities.

Concepts
concepts of epidemiology and pathogenicity of foodborne illness, characteristics of food commodities, risk mitigation strategies

Competencies
identifying food safety concepts of epidemiology and pathogenicity of foodborne illness, characteristics of food commodities, risk mitigation strategies issues in specific commodities using peer-reviewed literature, proposing science-based strategies to reduce foodborne illness risk, synthesizing data to support mitigation recommendations

Assessment Methods
Final written project in ACBS 380R (direct) and student exit survey (indirect)

Measures
Instructor evaluation of final project using a rubric (direct) and student exit survey results (indirect)

Name
Emphasis 5: Plant Pathology and Microbiology (PLP&M): Learning Outcome #1: Students will understand plant-microbe interactions and apply principles of plant pathology, microbiology, and biotechnology to improve plant health and develop biotechnological solutions.

Concepts
Plant pathology, microbiology, and biotechnology, microbial impacts on plant health and productivity, innovation in plant and microbial systems

Competencies
Researching plant diseases or biotechnology applications using peer-reviewed literature, characterizing microbial roles in plant systems, propose evidence-based management or innovation strategies, effectively communicating findings

Assessment Methods
A written report and short oral summary in PLP 305 or equivalent (direct) and student exit survey (indirect)

Measures
Instructor evaluation using a rubric assessing critical analysis, use of literature, and proposed strategies (direct) and student exit survey results (indirect)

Program Requirement Updates

To request changes to any program requirements, please (1) copy the original information from the Requirements section below and paste into the appropriate "Current Requirements" field on the left; then (2) make the changes desired in the corresponding "New Requirements" field on the right. To expedite the review process, please **bold** and underline the changes you have made.

Current Minimum Credit Units
28

New Minimum Credit Units
37

Current Supporting Coursework Requirements

MCB 181R – Introductory Biology I
MCB 181L – Introductory Biology I Lab
ECOL 182R – Introductory Biology II
ECOL 182L – Introductory Biology II Lab
MIC 285R – Principles of Microbiology
MIC 285L – Principles of Microbiology Lab
CHEM 151 – General Chemistry I
CHEM 152 – General Chemistry II
CHEM 241A – Organic Chemistry I
CHEM 243A – Organic Chemistry I Lab
CHEM 241B – Organic Chemistry II
CHEM 243B – Organic Chemistry II Lab
BIOC 384 – Foundations in Biochemistry
PHYS 110 – Intro. Studio Physics I (or take PHYS 102 and PHYS 181)
PHYS 111 Studio Physics II (or take PHYS 103 and PHYS 182)

New Supporting Coursework Requirements

Complete 1 Math Course from the following: MATH 113, MATH 119A, MATH 122A/B, MATH 125, MATH 129

MCB 181R – Introductory Biology I

MCB 181L – Introductory Biology I Lab

ECOL 182R – Introductory Biology II

ECOL 182L – Introductory Biology II Lab

MIC 285R – Principles of Microbiology

MIC 285L – Principles of Microbiology Lab

CHEM 151 – General Chemistry I

CHEM 152 – General Chemistry II

CHEM 241A – Organic Chemistry I

CHEM 243A – Organic Chemistry I Lab

CHEM 241B – Organic Chemistry II

CHEM 243B – Organic Chemistry II Lab

BIOC 384 – Foundations in Biochemistry

PHYS 110 – Intro. Studio Physics I (or take PHYS 102 and PHYS 181)

UPDATE:

PHYS 103/182 or PHYS 111 moving from Supporting Coursework to be Major Electives course options

Current Core Coursework Requirements
Microbiology Core (20 units)

MIC 328R Microbial Physiology (3)

MIC 350 Core Concepts in Molecular Microbiology (3)

MIC 419 Immunology (4)

MIC 421B Microbiological Techniques (5)

MIC 428R Microbial Genetics (3)

MIC 428L Microbial Genetics Lab (2)

Current Elective Coursework
Core electives (8 units)

ACBS 310, ACBS 313, ACBS 317, ACBS 329A, ACBS 377, ACBS 380L, ACBS 380R, ACBS 395A, ACBS 399, ACBS 399H, ACBS 403L, ACBS 403R, ACBS 405, ACBS 409, ACBS 423, ACBS 427R, ACBS 438, ACBS 443, ACBS 466, ACBS 467, ACBS 491, ACBS 492, ACBS 493, ACBS 499, ACBS 499H, ARL 452, BE 467, BIOC 385, BIOC 443, ECOL 310, ECOL 320, ECOL 320H, ECOL 326, ECOL 329A, ECOL 403L, ECOL 403R, ECOL 409, ENTO 310, ENTO 403L, ENTO 403R, ENVS 408, ENVS 425, ENVS 426, ENVS 475, MCB 340, MCB 410, MCB 411, MCB 422, MCB 433, MCB 473, MIC 305, MIC 310, MIC 320, MIC 329A, MIC 340, MIC 350, MIC 393, MIC 399, MIC 399H, MIC 403L, MIC 403R, MIC 420, MIC 423, MIC 425, MIC 426, MIC 427L, MIC 427R, MIC 430, MIC 430L, MIC 433, MIC 438, MIC 443, MIC 450, MIC 452, MIC 456, MIC 493, MIC 499, MIC 499H, NSC 377, NSC 380R, NSC 430L, PCOL 423, PLP 305, PLP 320, PLP 329A, PLP 427L, PLP 427R, PLP 452, PLS 333, PLS 340, PLS 434, PLS 456

New Core Coursework Requirements
Microbiology Core (17 units)

MIC 328R Microbial Physiology (3)

MIC 329A Microbial Diversity (3)

MIC 350 Core Concepts in Molecular Microbiology (3)

MIC 421B Microbiological Techniques (5)

MIC 428R Microbial Genetics (3)

New Elective Coursework
Microbiology Electives List *(all Emphases)*:

ACBS 310 Living in Symbiosis (3)

ACBS 313 Principles of Animal Genetic Systems (3)

ACBS 317 One Health: A Microbial Perspective (3)

ACBS 320 Principles of Dairy Processing & Safety (3)

ACBS 355 Intro. to Food Processing & Food Safety Prev. Controls (3)

ACBS 377 Food Toxicology (3)

ACBS 380R Food Safety & Microbiology (3)

ACBS 380L Food Safety & Microbiology Lab (1)

ACBS 395A An ACBS Guide (1)

ACBS 403R Biology of Animal Parasites (3)

ACBS 403L Parasitology Laboratory (1)

ACBS 405 Principles of Livestock Health Management (3)

ACBS 409 Environmental Physiology of Domestic Animals (3)

ACBS 420 Meat Animal Composition (3)

ACBS 423 Mechanisms of Disease (3)

ACBS 437 Food Safety Laws & Legal Policies (3)

ACS 438 Ecology of Infectious Disease (3)

ACBS 443 Research Animal Methods (3)

ACBS 466 Principles of Disease (3)

ACBS 467 Computation in Biomedicine (3)

BIOC 385 Metabolic Biochemistry (3)

ECOL 320 Genetics (4)

ECOL 320H – Genetics, honors section (3)

ECOL 326 Genomics (3)

ECOL 345 Biodiversity and the Tree of Life (3)

ECOL 409 Evolution of Infectious Diseases (3)

ENVS 305 Pollution Science (3)

ENVS 408 Scientific Writing for Env., Ag., & Life Sciences (3)

ENVS 410 Microbial Biogeochemistry & Global Change (3)

ENVS 425 Environmental Microbiology (3)

ENVS 426 Environmental Microbiology Lab (2)

ENVS 475 Freshwater & Marine Algae (4)

MCB 410 Cell Biology (3)

MCB 411 Molecular Biology (3)

MCB 422 Problem Solving with Genetic Tools (3)

MCB 473 Recombinant DNA Methods & Applications (4)

MIC 320 Microbiomes (3)

MIC 340 Introduction to Biotechnology (3)

MIC 420 Pathogenic Bacteriology (3)

MIC 430 Food Microbiology & Biotechnology (3)

MIC 430L Food Microbiology & Biotechnology Lab (2)

MIC 450 Veterinary Microbiology (3)

MIC 452 Antibiotics: A Biological Perspective (3)

PLP 305 Introductory Plant Pathology (3)

PLP 427R General Mycology (3)

PLP 427L General Mycology Lab (2)

PLS 434 Industrial Biotechnology (3)

PLS 333 General Virology (3)

PLS 360 Plant Physiology (3)

PLS 361 Plant Physiology Lab (1)

PLS 450 Plant Anatomy & Morphology (4)

PLS 456 Topics in Biotechnology (3)

Up to 3 units of the following may count as Microbiology Electives for all Emphases, if Microbiology related:

ACBS 491 Preceptorship (1-3)

ACBS/MIC 492 Directed Research (1-3)

MIC 399/499 Independent Study (1-3)

MIC 493 Internship (1-3)

Current Additional Requirements
Communications: Complete 1 Communication Course from the following options: ALC 422 (3), COMM 101 (3), COMM 119 (3)

Statistics: Complete 1 Statistics Course from the following options: AREC 239 (4), MATH 163 (3), MATH 263 (3), PSY 230 (3), SBS 200 (4)

New Additional Requirements
Communications: Complete 1 Communication Course from the following options: ALC 422 (3), COMM 101 (3), COMM 119 (3)

Statistics: Complete 1 Statistics Course from the following options: AREC 239 (4), **BIOS 376 (3)**, MATH 163 (3), MATH 263 (3), PSY 230 (3), SBS 200 (4)

Current Minor Requirements
-

New Minor Requirements
-

Current Student Handbook
-

New Student Handbook
-

Current Emphasis Requirements
None

New Emphasis Requirements
Emphasis Requirements:

Emerging Infectious Disease and Medical Microbiology (EIDMM) Emphasis *Required*:

MIC 419 Immunology (4)

MIC 420 Pathogenic Bacteriology (3)

ACBS 317 One Health: A Microbial Perspective (3)

MIC 428L Microbial Genetics Lab (2)

Additional Electives: choose 8 units from full Microbiology electives list (at end)

Emphasis Requirements:

Environmental Microbiology Emphasis *Required*:

ENVS 410 Microbial & Biogeochemistry & Global Change (3)

ENVS 425 Environmental Microbiology (3)

ENVS 426 Environmental Microbiology Lab (2)

ENVS 475 Freshwater & Marine Algae (4)

ENVS 305 Pollution Science (3)

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Additional Electives: choose 5 units from full Microbiology electives list (at end)

-

Emphasis Requirements:

Food Safety & Microbiology Emphasis *Required:*

ACBS 355 Intro. to Food Processing & Food Safety Prev. Controls (3)

ACBS 380R Food Safety & Microbiology (3)

ACBS 380L Food Safety & Microbiology Lab (1)

MIC 430 Food Microbiology & Biotechnology (3)

MIC 430L Advanced Food Science & Microbiology Lab (2)

Electives: choose 8 units from full Microbiology electives list (at end)

Emphasis Requirements:

General Microbiology Emphasis:

Electives, choose 20 units from Microbiology Electives (see full list below)

Emphasis Requirements:

Plant Pathology & Microbiology Emphasis *Required:*

PLP 305 Intro. to Plant Pathology (3)

PLS 340 Intro. to Biotechnology (3)

PLP 428L Microbial Genetics Lab (2)

PLP/MIC 427R General Mycology (3)

PLS 434 Industrial Biotechnology (3)

Emphasis *Electives:*

choose 6 units from full Microbiology electives list (at end)

Emphases/Subplans

Emerging Infectious Disease and Medical Microbiology (EIDMM)

Name
-

First Term Valid
Fall 2026

Environmental Microbiology (EM)

Name
-

First Term Valid
Fall 2026

General Microbiology (GM)

Name
-

First Term Valid
Fall 2026

Food Safety and Microbiology (FSM)

Name
-

First Term Valid
Fall 2026

Plant Pathology and Microbiology (PLP&M)

Name
-

First Term Valid
Fall 2026

Subplan Campus & Locations

Subplan Campuses

Subplan (specializations.name)
All new emphases

Subplan Campus
University of Arizona - Main

Subplan Locations

Subplan Location
Tucson

Subplan First Admit Term
Fall 2026

Subplan Last Admit Term
-

Subplan Teach Out Term
-

Dependencies

Instructional Methods

Plan Extras

Please list any additional changes not entered elsewhere on form
NOTE: FIRST YEAR SEMINAR (1 unit)
Microbiology students are strongly encouraged to take
a first-year seminar or colloquium of their choice, but it is not required for the BS:

ACBS 195 - Living Dangerously (Spring only)
MIC 195D - Colloquium: This Wormy World (Fall only)
MIC 195F - Plagues, Peoples, & Society (Spring only)
MIC 195G - Careers in Microbiology (Fall only)