**Microbiology**

**Interdepartmental Undergraduate Major**

Undergraduate study for the bachelor of science degree with a major in microbiology. In the Microbiolgy curriculum, principal emphasis is placed on understanding microorganisms and their interrelationships with other organisms in nature, the application of microbiology in medicine, agriculture and industry, and the study of fundamental life processes as exemplified by microorganisms. Areas of emphasis include: medical microbiology; environmental and industrial microbiology; and food microbiology.

Graduates of the Interdepartmental Undergraduate Microbiology Program will learn about the diversity and complexity of microbial life represented by procaryotes, eucaryotes and viruses. In addition to being able to explain fundamental principles of microbial growth, physiology, genetics, biochemistry, and ecology, students will be able to evaluate the impact that the microbial world has on human, animal and plant health, as well as on environmental quality, industry and biotechnology. Graduates are able to design and implement experimental approaches to address specific questions. In addition, graduates are able to communicate scientifically, using a variety of media.

Students graduating in microbiology find career opportunities in a wide variety of areas including: hospital and clinical laboratories; federal, state, and local government agencies; research and development; dairy and food processing industries; and the pharmaceutical and fermentation industries. Some fields of microbiology, especially advanced research, may require further training. Undergraduate work in the program is designed to provide sound preparation for graduate study, training for bachelors-level employment, and admission to professional programs such as medicine, veterinary medicine and dentistry.

Preveterinary preparation may be accomplished through the curriculum major in this program (see College of Veterinary Medicine, Admission Requirements).

**Curriculum in Microbiology**

[www.micro.iastate.edu](http://www.micro.iastate.edu)

Administered by an interdepartmental committee.

**Total Degree Requirement: 128 cr.**

Only 65 cr. from a two-year institution may apply which may include up to 16 technical cr.; 9 P-NP cr. of free electives; 2.00 minimum GPA.

**International Perspective: 3 cr.**

**U.S. Diversity: 3 cr.**

**Electives: 7-12**

**Communications Proficiency:**

- English composition - with a C or better 6
- Speech fundamentals - with a C or better 3

**Communication/Library:**

- ENGL 150 Critical Thinking and Communication 3
- ENGL 250 Written, Oral, Visual, and Electronic Composition 3
- SP CM 212 Fundamentals of Public Speaking 3
- One course from the following: 3
  - ENGL 302 Business Communication
  - ENGL 309 Report and Proposal Writing
  - ENGL 312 Biological Communication
  - ENGL 314 Technical Communication
- LIB 160 Information Literacy 1

**Total Credits**

13

**Humanities and Social Sciences:**

- Approved Humanities list 3
- Approved Social Science list 3

**Ethics: 3 cr.**

3 cr. from approved list.

**Mathematical Sciences:**

One of the following: 7-8

- MATH 145 Applied Trigonometry
- & MATH 160 and Survey of Calculus
- MATH 165 Calculus I
- & MATH 166 and Calculus II
- MATH 181 Calculus and Mathematical Modeling for the Life Sciences I
- & MATH 182 and Calculus and Mathematical Modeling for the Life Sciences II

One of the following: 3-4

- STAT 101 Principles of Statistics
- STAT 104 Introduction to Statistics

**Total Credits**

10-12

**Physical Sciences:**

- CHEM 177 General Chemistry I 4
- CHEM 177L Laboratory in General Chemistry I 1
- CHEM 178 General Chemistry II 3
- PHYS 111 General Physics 5
- PHYS 112 General Physics 5
- CHEM 331 Organic Chemistry I 3
- CHEM 331L Laboratory in Organic Chemistry I 1
- CHEM 332 Organic Chemistry II 3

One of the following: 3-6

- BBMB 404 Biochemistry I
- or BBMB 405 Biochemistry II
- or BBMB 301 Survey of Biochemistry

**Total Credits**

28-31

**Biological Sciences:**

- BIOL 211 Principles of Biology I 3
- BIOL 211L Principles of Biology Laboratory I 1
- BIOL 212 Principles of Biology II 3
- BIOL 212L Principles of Biology Laboratory II 1
- BIOL 313 Principles of Genetics 3
- BIOL 313L Genetics Laboratory 1
- BIOL 314 Principles of Molecular Cell Biology 3

**Total Credits**

15

**Microbiology:**

**Core courses:**

- MICRO 110 Professional and Educational Preparation in Microbiology 1
- MICRO 302 Biology of Microorganisms 3
- MICRO 302L Microbiology Laboratory 1
- MICRO 310 Medical Microbiology 3
- MICRO 310L Medical Microbiology Laboratory 1
- MICRO 320 Molecular and Cellular Bacteriology 4
- MICRO 440 Laboratory in Microbial Physiology, Diversity, and Genetics 4
- MICRO 450 Undergraduate Capstone Colloquium 2
- MICRO 451 Senior Survey in Microbiology R

One of the following: 3

- MICRO 430 Procaryotic Diversity and Ecology
- MICRO 456 Principles of Mycology
- MICRO 477 Bacterial-Plant Interactions

Nine credit hours from the following: 9

- MICRO 374 Insects and Our Health
- MICRO 402 Microbial Genetics and Genomics
- MICRO 407 Microbiological Safety of Foods of Animal Origins
- MICRO 408 Virology
- MICRO 419 Foodborne Hazards
- MICRO 420 Food Microbiology
- MICRO 421 Food Microbiology Laboratory
Minor

The program offers a minor in microbiology which may be earned by accumulating a minimum of 15 credits of microbiology courses.

Graduate Study

The program offers work for the degrees master of science and doctor of philosophy in microbiology and for a minor for students majoring in other programs. The interdepartmental microbiology major is offered through faculty housed in twelve departments, including Agronomy; Animal Science; Biochemistry, Biophysics and Molecular Biology; Civil, Construction and Environmental Engineering; Entomology; Food Science and Human Nutrition; Genetics, Developmental and Cell Biology; Geological and Atmospheric Sciences; Plant Pathology and Microbiology; Veterinary Diagnostic and Production Animal Medicine; Veterinary Microbiology and Preventive Medicine; and Veterinary Pathology. Faculty coordinate graduate education and research in a wide range of topics fundamental to the discipline of microbiology. Specific information about individual faculty and their research areas is available at www.micrograd.iastate.edu.

Prerequisites to graduate study include a sound undergraduate background in chemistry, mathematics and biology, including microbiology and genetics.

Graduates in the Microbiology Graduate program have a broad-based knowledge in the fundamentals of microbiology as well as advanced knowledge in specific areas as determined by their areas of research focus. Students completing the thesis have the technical, research, critical-thinking, problem-solving, and computer skills to design, implement, and conduct research using a variety of current techniques and equipment. They are also able to communicate research results effectively with scientific peer groups in both oral and written formats.