Microbiology and Immunology, B.S.

Microbiology and immunology are well-established disciplines within the life sciences. Microbiology addresses the biology of bacteria, viruses, and unicellular eukaryotes such as fungi and protozoa. Studies of microorganisms reveal basic information about processes in evolution, genetics, biochemistry, molecular biology, cell biology, structural biology, and ecology. Many bacteria, viruses, and protozoa cause disease in plants and animals. Hence, major areas of medicine and public health focus on these microorganisms.

Much of our knowledge in microbiology comes from the study of prokaryotic organisms, particularly bacteria. In addition to their relevance to infectious disease, these streamlined organisms provide a look at the basic requirements for life. The study of bacterial genetics has resulted in the creation of many genetic tools that are now used frequently to modify and study other organisms. Bacteria can also play an important role in the production of important materials such as biofuels and biopharmaceuticals. Understanding the behaviors of natural communities of bacteria and other organisms, called microbiomes, is an emerging field in our understanding of human health and disease.

The study of viruses (virology) is an important branch of microbiology that has contributed to our understanding of most of the fundamental processes in eukaryotic molecular biology, including the discovery of oncogenes. Viruses provide an excellent tool for the study of disease, cancer, and mechanisms of gene control. With the growing threat of emerging diseases, including global pandemics, and the potential for viral-based biological weapons, the study of virology has recently intensified and gained new perspectives.

Immunology encompasses efforts to understand how multicellular organisms have evolved to survive a variety of challenges to health and survival, including threats by pathogens and cancer cells. This includes an understanding of how the immune system develops, is activated, responds, and shuts down. Basic questions of how immunity functions are entwined with a fundamental understanding of the consequences of microbial infection, in a field called host-pathogen interactions. Immunology also encompasses the study of autoimmunity, the attack of the host by its own immune system, as well as the prevention of a response, known as immunological tolerance.

The major has been designed to span the interconnected disciplines of Microbiology and Immunology, and students have the opportunity to select courses from any of the following three areas: microbiology, immunology, or virology. The curricula overlap considerably, but there are unique courses for each discipline. The major is designed primarily for students who are serious about pursuing careers in microbiology and immunology and is intended to provide its graduates with the appropriate tools and training to successfully pursue professional and graduate degrees emphasizing these disciplines. These include Ph.D., M.D., and combined M.D./Ph.D. programs. Majoring in Microbiology and Immunology will also provide resources for serious students wishing to use a solid background in these disciplines for career goals in business, law, public and environmental policy, education, and other pursuits.

Application Process to Declare the Major: The major in Microbiology and Immunology is open to junior- and senior-level students only. Applications to declare the major can be made at the end of spring quarter, after all change of major requirements have been satisfied. Review of applications submitted at that time and selection to the major by the Microbiology and Immunology Faculty Board is completed during the summer. Information can also be found at the UCI Change of Major Criteria website (http://www.changeofmajor.uci.edu/). Double majors within the School of Biological Sciences or with Public Health Sciences, Biomedical Engineering: Premedical, Nursing Science, or Pharmaceutical Sciences are not permitted.

All students must meet the University Requirements (http://catalogue.uci.edu/informationforadmittedstudents/requirementsforabachelorsdegree/).
All students must meet the School Requirements (http://catalogue.uci.edu/schoolofbiologicalsciences/#schoolrequirementstext).

Major Requirements for Microbiology and Immunology

A. Required Major Courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BIO SCI M121</td>
<td>Immunology with Hematology</td>
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<tr>
<td>BIO SCI M122</td>
<td>General Microbiology</td>
</tr>
<tr>
<td>BIO SCI M124A</td>
<td>Virology</td>
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B. Upper-Division Laboratories:

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BIO SCI M116L</td>
<td>Molecular Biology Laboratory</td>
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<tr>
<td>BIO SCI M118L</td>
<td>Experimental Microbiology Laboratory</td>
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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>BIO SCI M124L</td>
<td>Advanced Immunology Laboratory</td>
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C. Upper-Division Biology Electives:

C1. Select at least four from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BIO SCI D139</td>
<td>Intercellular Signaling and Disease</td>
</tr>
<tr>
<td>BIO SCI E109</td>
<td>Human Physiology</td>
</tr>
<tr>
<td>BIO SCI M119</td>
<td>Advanced Topics in Immunology</td>
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<tr>
<td>BIO SCI M124B</td>
<td>Viral Pathogenesis and Immunity</td>
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</table>
Microbiology and Immunology, B.S.

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BIO SCI M125</td>
<td>Molecular Biology of Cancer</td>
</tr>
<tr>
<td>BIO SCI M131</td>
<td>Innate Immunity, Infection, and Pathogenesis</td>
</tr>
<tr>
<td>BIO SCI M137</td>
<td>Microbial Genetics</td>
</tr>
<tr>
<td>BIO SCI M143</td>
<td>Human Parasitology</td>
</tr>
<tr>
<td>BIO SCI M153</td>
<td>Vascular Biology: Blood Vessels in Health and Disease</td>
</tr>
<tr>
<td>BIO SCI M180</td>
<td>Biotechnological Applications of Energy and Environmental Research</td>
</tr>
<tr>
<td>BIO SCI N127</td>
<td>Foundations in Neuroimmunology</td>
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<tr>
<td>MOL BIO 205</td>
<td>Molecular Viroimmunology</td>
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</table>

C2. Select two from C1 or the following:

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BIO SCI D103</td>
<td>Cell Biology</td>
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<tr>
<td>BIO SCI D137</td>
<td>Eukaryotic and Human Genetics</td>
</tr>
<tr>
<td>BIO SCI M114</td>
<td>Advanced Biochemistry</td>
</tr>
<tr>
<td>BIO SCI M116</td>
<td>Advanced Molecular Biology</td>
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<tr>
<td>BIO SCI M144</td>
<td>Cell Organelles and Membranes</td>
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</tbody>
</table>

NOTE: No course may be used to satisfy more than one requirement.

Application Process to Declare the Major: The major in Microbiology and Immunology is open to junior- and senior-level students only. Applications to declare the major can be made at any time, but typically in the spring of the sophomore year. Review of applications submitted at that time and selection to the major by the Microbiology and Immunology Faculty Board is completed during the summer. Information can also be found at the UCI Change of Major Criteria website (http://www.changeofmajor.uci.edu/). Double majors within the School of Biological Sciences or with Public Health Sciences, Biomedical Engineering: Premedical, Nursing Science, or Pharmaceutical Sciences are not permitted.

Freshman

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<tr>
<th>Fall</th>
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<th>Spring</th>
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<tbody>
<tr>
<td>BIO SCI 93</td>
<td>BIO SCI 94</td>
<td>CHEM 1C - 1LC</td>
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<tr>
<td>CHEM 1A</td>
<td>CHEM 1B</td>
<td>MATH 5A (or General Education)</td>
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<tr>
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Sophomore

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<tbody>
<tr>
<td>BIO SCI 97</td>
<td>BIO SCI 98</td>
<td>CHEM 51C - 51LC</td>
</tr>
<tr>
<td>CHEM 51A</td>
<td>CHEM 51B-51LB</td>
<td>General Education</td>
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<td>CHEM 1LD</td>
<td>General Education</td>
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<td>MATH 5B (or General Education)</td>
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Junior

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<tr>
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<tr>
<td>PHYSICS 3A</td>
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<td>PHYSICS 3C-3LC</td>
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<tr>
<td>BIO SCI M124A</td>
<td>U-D Bio Elective</td>
<td>BIO SCI M122</td>
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<td>BIO SCI 100</td>
<td>BIO SCI M121</td>
<td>General Education or U-D Lab</td>
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<td>BIO SCI 199</td>
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Senior

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<tr>
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<tbody>
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<td>U-D Biology Elective</td>
<td>U-D Biology Elective</td>
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<tr>
<td>BIO SCI 199</td>
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<td>BIO SCI 199</td>
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1 Students have the option of taking HUMAN 1AS, HUMAN 1BS, HUMAN 1CS or WRITING 40, WRITING 50, WRITING 60 in order to fulfill the lower-division writing requirement.

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