Biology and Biotechnology Programs

Biology Associate in Science for Transfer Degree

The Associate of Science Degree for Transfer (AST) in Biology is designed for students who plan to transfer to CSU as biology majors. In this program, they gain exposure to the six main topics of biology (cell, molecular, organismal biology, and evolution and ecology). Students who successfully complete the AST in Biology earn specific guarantees for transfer to the CSU system: admission to a CSU with junior status, and priority admission to their local CSU campus and to a program or major in biology or a similar major. Students transferring to a CSU campus will be required to complete no more than 60 units after transfer to earn a bachelor’s degree.

Students are required to complete 60 semester units or 90 quarter units that are eligible for transfer to a California State University, including the following: (1) The Intersegmental General Education Transfer Curriculum (IGETC for STEM) Breadth Requirements (31 units) and (2) 39 semester units with a grade of C or better in the major or area of emphasis and an overall minimum grade point average (GPA) of at least 2.0 in all CSU transferable coursework. Students are advised to consult with a Berkeley City College counselor for additional information and to verify transfer requirements.

Career Opportunities: This program provides a sequential course of study that prepares students for transfer to fouryear institutions with a Biology major or acquisition of Biology proficiency necessary for career fields that emphasize the value of familiarity with biology. This program prepares students to entry level biological lab positions.

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 1A</td>
<td>5</td>
</tr>
<tr>
<td>BIOL 1B</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 1A</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 1B</td>
<td>5</td>
</tr>
<tr>
<td>MATH 3A</td>
<td>5</td>
</tr>
<tr>
<td>PHYS 3A</td>
<td>5</td>
</tr>
<tr>
<td>PHYS 3B</td>
<td>5</td>
</tr>
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Select one of the following courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 30B</td>
<td>4</td>
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<tr>
<td>MATH 13</td>
<td>4</td>
</tr>
<tr>
<td>Major Requirements</td>
<td>39-40</td>
</tr>
<tr>
<td>General Education and Electives</td>
<td>20-21</td>
</tr>
</tbody>
</table>

***Please note that students can only take the IGETC for STEM as the GE pattern for this program.

Program Learning Outcomes

Students who complete this program will be able to:

• Demonstrate skills in the scientific methods used in the biological sciences.
• Explain core concepts of biology: chemical makeup of biomolecules and their importance in the structure and function of the cell; functions of organelles, cellular processing, including respiration, photosynthesis, mitosis, meiosis, transcription/translation, and fundamental biological concepts in classical and molecular genetics, and molecular biology; classification, life cycles, physiology, anatomy and development of animals, plants, fungi, protista and prokaryotes.
• Explain the core concepts of evolution and ecology.
Biotechnology
Associate in Science Degree and Certificate of Achievement*

Biotechnology draws from many disciplines, including genetics, biochemistry, and molecular biology. Recent advances in biotechnology have resulted in the development of products that are having a positive impact on our health, food, and environment. Berkeley City College’s programs, which integrate academic and occupational instruction, prepare you for entry-level employment as bioscience technicians in this exciting field. When you finish this two-year program in biotechnology, you will earn either an Associate in Science degree or a Certificate of Achievement.

Career Opportunities: State and Federal laboratories, academic research laboratories, public and private laboratories, pharmaceutical and biotechnology industries.

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 3</td>
<td>Microbiology</td>
<td>5</td>
</tr>
<tr>
<td>BIOL 10</td>
<td>Introduction to Biology**</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 32</td>
<td>Scientific Literature</td>
<td>2</td>
</tr>
<tr>
<td>BIOL 33</td>
<td>Applied Immunology</td>
<td>6</td>
</tr>
<tr>
<td>BIOL 34</td>
<td>Applied Molecular Genetics</td>
<td>6</td>
</tr>
<tr>
<td>BIOL 50A</td>
<td>Introduction to Biotechnology: Techniques and Methods</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 50B</td>
<td>Protein Chemistry and Fermentation</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 30A</td>
<td>Introductory General Chemistry**</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 30B</td>
<td>Introductory Organic and Biochemistry**</td>
<td>4</td>
</tr>
<tr>
<td>CIS 200</td>
<td>Computer Concepts &amp; Applications**</td>
<td>1.5</td>
</tr>
<tr>
<td>ENGL 1A</td>
<td>Composition and Reading</td>
<td>4</td>
</tr>
<tr>
<td>HUMAN 30A</td>
<td>Human Values/Ethics</td>
<td>3</td>
</tr>
<tr>
<td>PHIL 31A</td>
<td>Human Values/Ethics</td>
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<tr>
<td>MATH 1</td>
<td>Pre-Calculus**</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 10</td>
<td>Introduction to Physics**</td>
<td>4</td>
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</table>

Major Requirements 53.5

General Education Requirement 6.5

Total Units 60

* For the Certificate of Achievement, students must complete the 53.5 major unit requirements only.
**You may substitute higher level courses in biology, chemistry, mathematics, and physics.
# Biotechnology Associate in Science Degree and Certificate of Achievement Two-Year Course Sequence Beginning in the Fall Semester

You can use the following pattern to complete an Associate in Science degree or Certificate of Achievement in biotechnology. This is only one possible pattern. If you wish to earn an associate degree or certificate, you must participate in the Student Success Program (Matriculation), which includes assessing academic skills and developing a Student Education Plan (SEP) with a counselor. This plan will map your sequence of courses to help you complete your degree regardless of the semester you begin classes.

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1st Semester /Fall</strong></td>
<td></td>
</tr>
<tr>
<td>BIOL 10 Introduction to Biology</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 30A Introduction to Inorganic Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>ENGL 1A Composition and Reading</td>
<td>4</td>
</tr>
<tr>
<td>MATH 1 Pre-Calculus</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>16</td>
</tr>
<tr>
<td><strong>2nd Semester /Spring</strong></td>
<td></td>
</tr>
<tr>
<td>BIOL 3 Microbiology</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 30B Introductory Organic and Biochemistry</td>
<td>4</td>
</tr>
<tr>
<td>CIS 1 Introduction to Computer Information Systems</td>
<td>4</td>
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<tr>
<td><strong>Total</strong></td>
<td>13</td>
</tr>
<tr>
<td><strong>3rd Semester /Fall</strong></td>
<td></td>
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<tr>
<td>BIOL 33 Applied Immunology</td>
<td>6</td>
</tr>
<tr>
<td>HUMAN 30A Human Values/Ethics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 10 Introduction to Physics</td>
<td>4</td>
</tr>
<tr>
<td>Social Science Requirement</td>
<td>3</td>
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<tr>
<td><strong>Total</strong></td>
<td>16</td>
</tr>
<tr>
<td><strong>4th Semester /Spring</strong></td>
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<tr>
<td>BIOL 32 Scientific Literature</td>
<td>2</td>
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<tr>
<td>BIOL 34 Molecular Genetics</td>
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<tr>
<td>BIOL 230B Introduction to Instrumentation II</td>
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<tr>
<td>ENGL 53 Technical Writing</td>
<td>3</td>
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<tr>
<td>Ethnic Studies Requirement</td>
<td>3</td>
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<td><strong>Total</strong></td>
<td>16</td>
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</table>

**Program Learning Outcomes**

Students who complete the program will be able to:

- Demonstrate facility with laboratory mathematics, and ability to follow scientific protocols, operate standard equipment, handle hazardous materials, work aseptically and make solutions.
- Demonstrate ability to understand and interpret scientific research papers, use scientific databases, construct scientific research papers and use presentation software.
- Demonstrate an ability to select appropriate laboratory tools and experimental materials to conduct experiments, interpret and analyze results, troubleshoot and maintain lab manuals.
- Demonstrate ability to conduct scientific work as a member of a team and alone.
- Demonstrate general knowledge of the ethical issues and key concepts in the fields of general biology, microbiology, immunology, molecular genetics and protein chemistry.
Biotechnology
Certificate of Proficiency

Biotechnology draws from many disciplines, including genetics, immunology, chemistry, physics, and mathematics and computer science. Recent advances in biotechnology have resulted in major contributions to the fields of medicine, public health and agriculture. Berkeley City College’s program, which integrates academic and occupational instruction, prepares students for employment in a broad range of laboratories, including those found in industry, research institutions, public health departments, hospitals and clinics. The Certificate of Proficiency is a first step into this exciting field and prepares students for entry level laboratory assistant positions. The Certificate of Achievement and the Associate in Science degree in Biotechnology allow students to pursue a variety of positions as bioscience technicians.

Career Opportunities: Entry level positions as a laboratory assistant in industry, research, public health, hospital and clinical laboratories.

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 10</td>
<td>Introduction to Biology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 50A</td>
<td>Introduction to Biotechnology: Techniques and Methods</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 30A</td>
<td>Introductory General Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>CIS 200</td>
<td>Computer Concepts &amp; Applications</td>
<td>1.5</td>
</tr>
<tr>
<td>MATH 201</td>
<td>Elementary Algebra</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Total Units</td>
<td>16.5</td>
</tr>
</tbody>
</table>

Recommended Preparation for this certificate may include:

ENGL 264A Preparation for Composition, Reading, and Research 5

Important Note About This Publication for Students with Disabilities

This publication is available in an alternate media format upon request. Should you need further accommodations, contact Disabled Students Programs and Services (DSPS) at 981-2826.
Biotechnology
Certificate of Proficiency
One Semester or One Year Course
Starting Either in Fall or Spring Semester

This certificate can be completed in one semester providing pre-requisites are met. The following pattern is offered as an example for those desiring to complete the certificate in one year. Students enrolled in this certificate program must participate in the Student Success Program (Matriculation), which includes assessing academic skills and developing a Student Education Plan (SEP) with a counselor. This plan will map a sequence of courses to help students complete the certificate regardless of the semester they begin classes.

Recommended Preparation prior to enrollment in the program—course offered in the Summer, Fall and Spring Semesters:

<table>
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<th>Course</th>
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<tr>
<td>ENGL 264A Preparation for Composition, Reading, and Research</td>
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<tr>
<td>1st Semester/Fall or Spring</td>
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<tr>
<td>BIOL 10 Introduction to Biology</td>
<td>4</td>
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<tr>
<td>CIS 200 Computer Concepts &amp; Applications</td>
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<td>MATH 201 Elementary Algebra</td>
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<td>BIOL 50A Introduction to Biotechnology: Techniques and Methods</td>
<td>3</td>
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<tr>
<td>CHEM 30A Introductory General Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
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</tbody>
</table>

Program Learning Outcomes

Students who complete the program will be able to:

- Demonstrate facility with laboratory mathematics, and an ability to follow scientific protocols, operate standard equipment, handle hazardous materials, work aseptically, and make solutions.
- Demonstrate ability to maintain a detailed and clearly written laboratory manual that contains properly labeled tables and figures and sufficient direction to allow one to repeat the experiments.
- Demonstrate ability to work with a team and individually and to assume responsibility for assigned work.