

## Biological Sciences Certificate of Achievement - Active

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Department: Biology

Approval: September 2012

CCSF's Biological Sciences Certificate offers basic courses in chemistry and biology to serve students with diverse goals, including transfer to biology programs at U.C., C.S.U. or other four-year institutions. Biological Sciences Certificates will be able to take most or all of their lower division courses at CCSF before they transfer, but should see a counselor to confirm their program of study. Additional courses might be required to transfer to particular institutions. The Biological Sciences Certificate is suitable for students planning to transfer into programs in the biological sciences, including general biology, cell or molecular biology, organism biology, marine biology, botany, zoology, ecology, evolution, genetics, anatomy, physiology, microbiology, and agricultural sciences. The Certificate is also designed for students planning to transfer into a premedical, preveterinary, pre-dental, pharmacy, or chiropractic degree program.

Through the core units of the Biological Sciences Certificate, students will gain the scientific knowledge necessary to investigate problems and ideas presented in upper division biology courses, as well as to critically evaluate scientific information. The laboratory work will train students to use current laboratory technologies, equipment and techniques to engage in the research process using scientific methods and to investigate research questions safely.

### Learning Outcomes

Upon completion of this program, students will be able to:

- Demonstrate understanding of the processes of science, the scientific method, and the relationship between scientific research and established knowledge.
- Express biological scientific literacy in oral and written communication.
- Demonstrate content knowledge in biology.
- Demonstrate fundamental lab skills.
- Evaluate biological data, draw reasonable conclusions, recognize the ethical implications of these conclusions, and apply these conclusions to personal, community, and scientific problems.

The minimum time for completion of this certificate is 4 semesters. Completion time will vary based on student preparation and number of classes completed per semester.

### ***Courses Required for the Certificate of Achievement in Biological Sciences***

<b>Course</b>	<b>Units</b>
<b>Required courses:</b>	
BIO 100A - General Biology	5.00
BIO 100B - General Biology	5.00
CHEM 101A - General College Chemistry	6.00
CHEM 101B - General College Chemistry	5.00
CHEM 208A - Organic Chemistry	4.00
CHEM 208B - Organic Chemistry	4.00
MATH 110A - Calculus I	5.00

MATH 110B - Calculus II	5.00
PHYC 2A - Introductory Physics	3.00
PHYC 2AL - Introductory Physics Laboratory	1.00
PHYC 2B - Introductory Physics	3.00
PHYC 2BL - Introductory Physics Laboratory	1.00
	Total: 47.00
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