

BIOLOGY

Biology Program Learning Outcomes (<https://catalog.csudh.edu/program-learning-outcomes/natural-behavioral-sciences/biology/>)

College of Natural and Behavioral Sciences

Department of Biology

Bachelor of Arts

Degree Roadmap

Bachelor of Science

Cellular and Molecular Biology Option

Ecology and Environmental Biology Option

Microbiology Option

Minors

Biology

Microbiology

Subject Matter Preparation Program

Specific Biological Sciences Subject Matter Authorization

Master of Science

Faculty

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Program Description

The Biology Program at CSU Dominguez Hills is designed to provide students with intensive, progressive and balanced learning experiences in cell and molecular biology, organismal biology, population and community biology, and environmental science.

The Biology Department offers students eight programs from which to choose:

1. An undergraduate program which awards the Bachelor of Arts Degree;
2. Three undergraduate major options that award the Bachelor of Science Degree: a Cellular and Molecular Biology Option, an Ecology and Environmental Biology Option and a Microbiology Option;
3. Two minor programs: a General Minor and a Microbiology Minor;
4. A Biological Science Subject Matter Preparation Program for students pursuing a secondary teaching credential;
5. A graduate program which awards the Master of Science Degree.

Subject Matter Preparation Program

The Subject Matter Preparation Program is authorized by the California Commission on Teacher Credentialing. This course of study includes a number of prescribed courses that address proficiency standards for content knowledge required for the Single Subject credential in Biological

Sciences. Interested students should contact the departmentally designated advisor for current information.

Specific Biological Sciences Subject Matter Authorization (32 units)

Holders of a Single Subject or Multiple Subject credential issued by the California Commission on Teacher Credentialing may secure an additional Specific Biological Sciences Subject Matter Authorization that allows the holder to teach the specific subjects in grades preschool, K-12, and classes organized primarily for adults.

For other requirements governing issuance of this authorization, consult the Teacher Education section of this catalog or contact the College of Education Student Services Center.

Features

The most important feature of the Biology Department is its excellent faculty, of which all full-time and most part-time members hold a doctoral degree. They are dedicated to excellence in teaching and are active in basic and applied research and other scholarly activities. The department currently has more than \$1.5 million in private foundation, federal and international research grants. Another attractive feature of the department is its small class size. This allows students to interact frequently and effectively with instructors both within and outside of class. It also permits instructors to easily identify students in need of additional assistance, and to supply such assistance.

The Biology Department's teaching and research facilities are modern and well equipped. Special facilities and equipment that are available for student use include a tissue culture laboratory, a next-generation sequencer, a greenhouse and a nature preserve. In addition to on-campus facilities, students may study marine biology and desert biology through the use of facilities available in the Southern California Ocean Studies Consortium and the Desert Studies Consortium. Excellent computer and library facilities also are available.

Since the Biology faculty maintain several diverse research programs that are well supported with public and private funds, the department can provide both undergraduate and graduate students with opportunities to actively participate in research. Biology students have been successful, not only in conducting research, but in presenting reports at scientific meetings, publishing their findings, and in receiving national recognition for the high quality of their work.

Academic Advisement

The Biology Department requires that each semester prior to or during registration, students meet with their biology advisor to review their progress, select new courses, update their advisement file (departmental files are maintained for all majors and graduate students), and to discuss any special problems they may have encountered.

Preparation

Students who plan to enter the biology program directly from high school should prepare by completing four years of English, including composition; algebra, geometry, trigonometry, and pre-calculus if available; and at least one year each of biology, chemistry and physics.

Students transferring from a community college should have completed one semester of calculus or, if not taken in high school, algebra, geometry and trigonometry, and one year each of introductory chemistry and biology (3 semester course) designed for the transfer major.

Career Possibilities

A student in the Biology Department will be prepared to pursue a variety of career opportunities, depending on the curricular program chosen. An undergraduate major may choose any of the options. The Cellular and Molecular Biology Option can fulfill the major entrance requirements for professional schools of medicine, dentistry, veterinary medicine, pharmacy, optometry, podiatry and medical technology, or prepare the student for further graduate study in biology. Biology graduates from CSU Dominguez Hills have competed successfully for admission to professional and graduate schools in California and elsewhere. Students also may use the Cellular and Molecular Biology Option to prepare for careers in teaching, research, government, academia or the biotechnology industry. The Ecology and Environmental Biology option will prepare students for graduate studies or careers with federal, state, and local agencies, non-governmental organizations (NGOs) and consultants, and careers in teaching, among others. The Microbiology Option provides training in microbiology, medical microbiology, immunology and related courses (virology, mycology and parasitology) for students interested in a career in applied biology, biomedical research or allied fields.

Students may prepare for a career in teaching science at the secondary level (junior high or high school) by completing an approved "Subject Matter Preparation Program." Completion of such a program is the first step in meeting the state requirements for a teaching credential. Interested students should consult the departmentally designated advisor for current information.

The Master of Science program in Biology will provide students with an in-depth background suitable for pursuing a career in biological research, teaching or in a related field such as public health, psychology and human services. Students may develop a program of courses and research that is tailor-made to their individual needs within the areas of expertise of their advising faculty. The graduate program also can establish a strong foundation for professional training in medicine, dentistry, paramedical areas and Ph.D. programs.

Graduation with Honors

An undergraduate student may be a candidate for graduation with Honors in Biology provided the following criteria are satisfied:

A minimum of 36 units in residence at CSU Dominguez Hills; A minimum grade point average of 3.5 in all courses used to satisfy the upper division requirements in the major; Recommendation by the Biology Department faculty.

Students who achieve Honors in Biology will have the information recorded on their transcripts and diplomas.

Pre-Health Professions in Biology

Students who choose a career in the health professions, e.g. medicine, pharmacy, dentistry, physician assistant, veterinary medicine, etc. must satisfy certain pre-requisites for entry into those schools/programs that offer those degrees. Very often, these students chose biology as a major since many of the prerequisites are required courses in biology; however, any major will work as long as the prerequisites are met. Regardless of their major, students choosing to become a health professional need to meet with a CSUDH Pre-Advisor. Currently these individuals are Dr. Thomas Landefeld (Biology) and Dr. Patrick Still (Chemistry).

In general, the courses required for these schools/programs include General Biology (BIO 120 Principles of Biology I (3)/BIO 122 Principles

of Biology II (3), General Chemistry (CHE 110 General Chemistry I (5)/CHE 112 General Chemistry II (5)), Organic Chemistry (CHE 310 Organic Chemistry I (4)/CHE 312 Organic Chemistry II (3)) and Physics (PHY 120 Elements Of Physics I (4)/PHY 122 Elements Of Physics II (4)), all with laboratories. As it turns out, not all programs have the same course requirements. For example, for medicine, due to the new MCAT, in addition to the prerequisites already mentioned, one semester of biochemistry (CHE 450 Biochemistry I (4)) is strongly recommended whereas for other programs, e.g. pharmacy, two semesters of biochemistry with laboratory may be required. Also some of the programs require courses that are not offered at CSUDH, e.g. human anatomy with lab and human physiology with lab. (Many students take there at community colleges). The important point is that different programs require different prerequisites so the student must work closely with a Pre-health Advisor for each program as well as each institution.

In addition to the prerequisite courses, most programs require other components for their application, e.g.

1. a standardized test such as the MCAT, DAT, OAT, etc.
2. GPAs, both the overall and BCPM (biology, chemistry, physics and math);
3. a personal statement;
4. Letters of recommendation and finally
5. experience associated with the eventual health profession, e.g. some exposure to clinical situations such as volunteering, internships, etc.

All of these aspects of the applications are looked at "en masse" to determine those individuals who are to be interviewed for available positions. **Again, working with a Pre-health Advisor will serve to greatly enhance one's application. Call 310-243-3381.**

Bachelor of Arts in Biology

Total Course Requirements for the Bachelor's Degree

See the "Requirements for the Bachelor's Degree (<https://catalog.csudh.edu/general-information/baccalaureate-degrees-undergraduate-studies/>)" in the University Catalog for complete details on general degree requirements. A minimum of 40 units, including those required for the major, must be upper division.

Elective Requirements

Completion of elective courses (beyond the requirements listed below) to reach a total of a minimum of 120 units.

General Education Requirements (49 units)

See the "General Education (<https://catalog.csudh.edu/general-information/double-counting-general-education-courses/general-education/>)" requirements in the University Catalog or the Class Schedule for the most current information on General Education requirements and course offerings.

Graduation Writing Assessment Requirement

See the "Graduation Writing Assessment Requirement (<https://catalog.csudh.edu/general-information/graduate-writing-examination/>)" in the University Catalog.

Minor Requirements

Single-field major. No minor is required, though it is recommended.

Major Requirements (64-67 units)

All courses applied to the B.A. in Biology must be passed with a grade of "C" or better.

A. Prerequisite Courses (41 units)

BIO 120 Principles of Biology I (3)
 BIO 121 Principles of Biology Lab I (1)
 BIO 122 Principles of Biology II (3)
 BIO 123 Principles of Biology II Lab (1)
 BIO 124 Principles of Biology III (3)
 BIO 125 Principles of Biology Lab III (1)
 BIO 220 Molecular Biology (3)
 BIO 221 Molecular Biology Laboratory (1)
 CHE 110 General Chemistry I (5)
 CHE 112 General Chemistry II (5)
 CHE 316 Survey of Organic Chemistry (3)
 and
 CHE 317 Survey of Organic Chemistry Laboratory (1)
 MAT 131 Elementary Statistics and Probability (3)
 PHY 120 Elements Of Physics I (4)
 PHY 122 Elements Of Physics II (4)

B. Core Upper Division Requirements (10 units)

BIO 320 Cell Biology (3)
 BIO 340 Genetics (3)
 BIO 342 Cell And Genetics Lab (1)
 BIO 490 Senior Project (3)

C. Additional Upper Division Requirements (13-16 units)**1. Select one course and the respective laboratory from the following (4 units)**

BIO 310 Plant Physiology (3)
 BIO 311 Plant Physiology Laboratory (1)
 BIO 312 Animal Physiology (3)
 BIO 313 Animal Physiology Laboratory (1)
 BIO 314 Developmental Biology (3)
 BIO 315 Developmental Biology Lab (1)
 BIO 326 General Microbiology (3)
 BIO 327 General Microbiology Laboratory (1)

2. Electives (9-12 units)

Select three additional upper division courses from Biology (BIO) or CHE 450 Biochemistry I (4).

BIO 490 Senior Project (3): Major students may substitute this course for General Education Area E. Please contact the University Advisement Center to request the course substitution.

Bachelor of Science in Biology

Total Course Requirements for the Bachelor's Degree

See the "Requirements for the Bachelor's Degree (<https://catalog.csudh.edu/general-information/baccalaureate-degrees-undergraduate-studies/>)" in the University Catalog for complete details on general degree requirements. A minimum of 40 units, including those required for the major, must be upper division.

Elective Requirements

Completion of elective courses (beyond the requirements listed below) to reach a total of a minimum of 120 or a maximum of 132 units.

General Education Requirements (49 units)

See the "General Education (<https://catalog.csudh.edu/general-information/double-counting-general-education-courses/general-education/>)" requirements in the University Catalog or the Class Schedule for the most current information on General Education requirements and

course offerings. Please note that Biology Majors are not required to take classes listed in Area B of the General Education requirements.

Graduation Writing Assessment Requirement

See the "Graduation Writing Assessment Requirement (<https://catalog.csudh.edu/general-information/graduate-writing-examination/>)" in the University Catalog.

Minor Requirements

Single field major, no minor required. However, for students who wish to complete the Biochemistry minor, Organic Chemistry is considered a pre-requisite class for both programs and therefore can be double counted for both major and minor requirements.

Major Requirements (76-84 units)

Students must select one of the options listed.

All courses applied to the B.S. in Biology must be passed with a grade of "C" or better.

Cellular and Molecular Biology Option (76-81 units)**A. Lower Division Requirements (41-44 units)**

BIO 120 Principles of Biology I (3)
 BIO 121 Principles of Biology Lab I (1)
 BIO 122 Principles of Biology II (3)
 BIO 123 Principles of Biology II Lab (1)
 BIO 124 Principles of Biology III (3)
 BIO 125 Principles of Biology Lab III (1)
 BIO 220 Molecular Biology (3)
 BIO 221 Molecular Biology Laboratory (1)
 CHE 110 General Chemistry I (5)
 CHE 112 General Chemistry II (5)
 MAT 131 Elementary Statistics and Probability (3)
 MAT 171 Survey of Calculus for Management and Life Sciences (4)
 or
 MAT 191 Calculus I (5)
 PHY 120 Elements Of Physics I (4)
 and
 PHY 122 Elements Of Physics II (4)
 or
 PHY 130 General Physics I (5)
 and
 PHY 132 General Physics II (5)

B. Upper Division Requirements (35-37 units)**1. Required courses (21-23 units)**

BIO 320 Cell Biology (3)
 BIO 340 Genetics (3)
 BIO 342 Cell And Genetics Lab (1)
 BIO 421 Advanced Molecular Biology (3)
 or
 BIO 440 Molecular Genetics (3)
 BIO 490 Senior Project (3)
 CHE 310 Organic Chemistry I (4)
 or
 CHE 300 Organic Chemistry I (3)
 and
 CHE 311 Organic Chemistry Lab I (1)
 or
 CHE 301 Organic Chemistry Lab I (1)
 CHE 312 Organic Chemistry II (3)
 or
 CHE 302 Organic Chemistry II (3)
 and

CHE 313 Organic Chemistry Laboratory II (2)

or

CHE 303 Organic Chemistry Lab II (1)

2. Select one course and the respective lab from the following (4 units)

BIO 310 Plant Physiology (3)

BIO 311 Plant Physiology Laboratory (1)

BIO 312 Animal Physiology (3)

BIO 313 Animal Physiology Laboratory (1)

BIO 314 Developmental Biology (3)

BIO 315 Developmental Biology Lab (1)

BIO 326 General Microbiology (3)

BIO 327 General Microbiology Laboratory (1)

3. Select a minimum of 10 additional units of upper division Biology or Chemistry Courses (10 units)

Ecology and Environmental Biology Option (76-81 units)

A. Lower Division Requirements (41-44 units)

BIO 120 Principles of Biology I (3)

BIO 121 Principles of Biology Lab I (1)

BIO 122 Principles of Biology II (3)

BIO 123 Principles of Biology II Lab (1)

BIO 124 Principles of Biology III (3)

BIO 125 Principles of Biology Lab III (1)

BIO 220 Molecular Biology (3)

BIO 221 Molecular Biology Laboratory (1)

CHE 110 General Chemistry I (5)

CHE 112 General Chemistry II (5)

MAT 131 Elementary Statistics and Probability (3)

MAT 171 Survey of Calculus for Management and Life Sciences (4)

or

MAT 191 Calculus I (5)

PHY 120 Elements Of Physics I (4)

and

PHY 122 Elements Of Physics II (4)

or

PHY 130 General Physics I (5)

and

PHY 132 General Physics II (5)

B. Upper Division Requirements (35-37 units)

1. Required courses (18 units)

BIO 312 Animal Physiology (3)

BIO 313 Animal Physiology Laboratory (1)

BIO 330 Botany (3)

BIO 331 Botany Laboratory (1)

BIO 332 Ecology (3)

BIO 333 Ecology Laboratory (1)

BIO 340 Genetics (3)

BIO 490 Senior Project (3)

2. Restricted elective courses. Select a series from the following (4-10 units)

CHE 310 Organic Chemistry I (4)

or

CHE 300 Organic Chemistry I (3)

and

CHE 311 Organic Chemistry Lab I (1)

or

CHE 301 Organic Chemistry Lab I (1)

CHE 312 Organic Chemistry II (3)

or

CHE 302 Organic Chemistry II (3)

and

CHE 313 Organic Chemistry Laboratory II (2)

or

CHE 303 Organic Chemistry Lab II (1)

or

CHE 316 Survey of Organic Chemistry (3)

and

CHE 317 Survey of Organic Chemistry Laboratory (1)

3. Open elective courses (9-15 units)

Select a minimum of 9-15 additional units of upper division Biology, Chemistry, Anthropology or Earth Science courses approved by a Biology advisor. (9-15 units).

Microbiology Option (79-84 units)

A. Lower Division Requirements (41-44 units)

BIO 120 Principles of Biology I (3)

BIO 121 Principles of Biology Lab I (1)

BIO 122 Principles of Biology II (3)

BIO 123 Principles of Biology II Lab (1)

BIO 124 Principles of Biology III (3)

BIO 125 Principles of Biology Lab III (1)

BIO 220 Molecular Biology (3)

BIO 221 Molecular Biology Laboratory (1)

CHE 110 General Chemistry I (5)

CHE 112 General Chemistry II (5)

MAT 131 Elementary Statistics and Probability (3)

MAT 171 Survey of Calculus for Management and Life Sciences (4)

or

MAT 191 Calculus I (5)

PHY 120 Elements Of Physics I (4)

and

PHY 122 Elements Of Physics II (4)

or

PHY 130 General Physics I (5)

and

PHY 132 General Physics II (5)

B. Upper Division Requirements (29-31 units)

BIO 320 Cell Biology (3)

BIO 324 Microbiology with Clinical Applications (3)

BIO 325 Microbiology with Clinical Applications Laboratory (1)

BIO 340 Genetics (3)

BIO 425 Medical Bacteriology (2)

BIO 435 Medical Bacteriology Laboratory (2)

BIO 426 Immunology (3)

BIO 436 Immunology Laboratory (1)

BIO 490 Senior Project (3)

CHE 310 Organic Chemistry I (4)

or

CHE 300 Organic Chemistry I (3)

and

CHE 311 Organic Chemistry Lab I (1)

or

CHE 301 Organic Chemistry Lab I (1)

CHE 312 Organic Chemistry II (3)

or

CHE 302 Organic Chemistry II (3)

and

CHE 313 Organic Chemistry Laboratory II (2)

or

CHE 303 Organic Chemistry Lab II (1)

C. Electives: Select a minimum of 9 units from the following:

BIO 420 Histotechnique (2)

and

BIO 419 Histotechnique Laboratory (2)

BIO 421 Advanced Molecular Biology (3)

BIO 422 Histology (3)

and

BIO 424 Histology Laboratory (1)

BIO 428 Virology (3)

BIO 458 Human Parasitology (3)

and

BIO 459 Human Parasitology Laboratory (1)

BIO 491 Seminar in Biological and Biomedical Research (1)

CHE 450 Biochemistry I (4)

and

CHE 451 Biochemistry I Lab (1)

or

CHE 456 Clinical Chemistry (3)

BIO 490 Senior Project (3): Major students may substitute this course for General Education Area E. Please contact the University Advisement Center to request the course substitution.

Minor in Biology (26-27 units)

The Biology Minor requires 26-27 units: 17 units are lower division requirements, which may also be used, where allowed, to satisfy General Education requirements; 9-10 units of upper division biology courses are required.

Requirements**A. Lower Division Requirements (17 units)**

BIO 120 Principles of Biology I (3)

BIO 121 Principles of Biology Lab I (1)

BIO 122 Principles of Biology II (3)

BIO 123 Principles of Biology II Lab (1)

BIO 124 Principles of Biology III (3)

BIO 125 Principles of Biology Lab III (1)

CHE 110 General Chemistry I (5)

B. Upper Division Requirements (9-10 units)

Select 9 to 10 units of upper-division biology courses for which the prerequisites have been met; BIO 250 Elem Hum Anat & Physiol (3) and BIO 251 Elem Hum Anatomy Phys Lab (1) or BIO 220 Molecular Biology (3) and BIO 221 Molecular Biology Laboratory (1) may be included in these units, but at least six units must be at the 300- or 400- level. Six units must be taken in residence. No more than three units may be from BIO 394 Independent Study (1-3), BIO 496 Internship in Biology (3), or BIO 498 Directed Research in Biology (3), combined.

Minor in Microbiology (44-47 units)

The Microbiology Minor requires 44-47 units: 18 units are lower division courses, which also may be used, where allowed, to satisfy General Education requirements; 26-29 units of upper division biology and chemistry courses are required.

Requirements**A. Lower Division Requirements (18 units)**

BIO 120 Principles of Biology I (3)

BIO 121 Principles of Biology Lab I (1)

BIO 122 Principles of Biology II (3)

BIO 123 Principles of Biology II Lab (1)

CHE 110 General Chemistry I (5)

CHE 112 General Chemistry II (5)

B. Upper Division Requirements (26-29 units)**1. Required Courses (18-21 units)**

BIO 320 Cell Biology (3)

or

CHE 450 Biochemistry I (4)

and

CHE 451 Biochemistry I Lab (1)

BIO 324 Microbiology with Clinical Applications (3)

BIO 325 Microbiology with Clinical Applications Laboratory (1)

BIO 426 Immunology (3)

BIO 436 Immunology Laboratory (1)

BIO 428 Virology (3)

CHE 310 Organic Chemistry I (4)

and

CHE 311 Organic Chemistry Lab I (1)

or

CHE 316 Survey of Organic Chemistry (3)

and

CHE 317 Survey of Organic Chemistry Laboratory (1)

2. Select 8 units from the following (8 units)

BIO 310 Plant Physiology (3)

BIO 311 Plant Physiology Laboratory (1)

BIO 425 Medical Bacteriology (2)

BIO 435 Medical Bacteriology Laboratory (2)

BIO 458 Human Parasitology (3)

BIO 459 Human Parasitology Laboratory (1)

CHE 452 Biochemistry II (4)

Subject Matter Preparation Program in Biology

The Subject Matter Preparation Program is authorized by the California Commission on Teacher Credentialing. This course of study includes a number of prescribed courses that address proficiency standards for content knowledge required for the Single Subject credential in Biological Sciences. Interested students should contact the departmentally designated advisor for current information.

Specific Biological Sciences Subject Matter Authorization (32 units)

Holders of a Single Subject or Multiple Subject credential issued by the California Commission on Teacher Credentialing may secure an additional Specific Biological Sciences Subject Matter Authorization that allows the holder to teach the specific subjects in grades preschool, K-12, and classes organized primarily for adults.

For other requirements governing issuance of this authorization, consult the Teacher Education section of this catalog or contact the College of Education Student Services Center.

Complete each of the following courses or equivalent as approved by the Biology Department Advisor:

A. Lower Division (21 units)

BIO 120 Principles of Biology I (3)

BIO 121 Principles of Biology Lab I (1)

BIO 122 Principles of Biology II (3)

BIO 123 Principles of Biology II Lab (1)

BIO 124 Principles of Biology III (3)

BIO 125 Principles of Biology Lab III (1)

BIO 250 Elem Hum Anat & Physiol (3)
 BIO 251 Elem Hum Anatomy Phys Lab (1)
 CHE 110 General Chemistry I (5)

B. Upper Division (11 units)

BIO 324 Microbiology with Clinical Applications (3)
 BIO 325 Microbiology with Clinical Applications Laboratory (1)
 BIO 336 Environmental Biology (3)
 BIO 360 Marine Biology (3)
 BIO 361 Marine Biology Laboratory (1)

Master of Science in Biology

About the Master's Program

About the Program

The Master of Science Program in Biology is a two-year program in which a student must complete a series of both core and elective courses and engage in independent scientific research that culminates in a thesis. This graduate program is designed to be a flexible degree that can help students reach their career goals, whether that be further study in a doctoral program or employment in science education, health sciences or environmental fields.

In the first semester of the program, the student will choose a research mentor who will provide guidance for the thesis research and help the student set their curriculum. Three members of the student's thesis committee, including the research mentor, will need to be selected by the end of the first year of the program.

To accommodate students with other professional commitments, many graduate classes are scheduled in the late afternoon and evening.

Admission Requirements

Requirements for admission as a classified graduate student are a bachelor's degree in biology or a related field with a minimum grade point average of 2.75 in upper division courses, and completion of the Graduation Writing Assessment Requirement (GWAR) at the graduate level. Students should also have strong motivation in conducting original research. All students should have completed a course in each of the subject areas listed below:

Subject Area

- Cell Biology or Evolution or Ecology
- Genetics
- Upper Division Experimental Laboratory
- Physiology or Developmental Biology
- Statistics or Calculus

Students who do not satisfy all these requirements may complete the requirements while enrolled through Extended Education. Students who meet all but one requirement may be admitted as a conditionally classified graduate student at the discretion of the Biology Graduate Committee. They must meet any conditions by the end of the first year as a conditional graduate student.

The Biology Graduate Committee makes all final decisions on graduate admissions.

Admission Procedures

All applicants are required to complete a Cal State Apply application. The following documents should be submitted in the 4th Quadrant at Cal State Apply:

1. CV/resume,
2. Unofficial transcripts (submit official transcripts to the Office of Admissions),
3. A personal statement, and
4. Three letters of recommendation.

Applicants with a baccalaureate degree from a non-English speaking university are also required to submit proof of English proficiency. Please visit <http://www.csudh.edu/englishproficiency> (<http://www.csudh.edu/englishproficiency/>) for details. Applicants should address in their personal statement why they are interested in the program and which research area(s) they wish to pursue. Applicants interested in ecology and/or evolutionary biology must contact the appropriate faculty member(s) in the Biology Department before submitting their Cal State Apply application. Applicants interested in cellular and molecular biology should indicate potential research mentors in their personal statement, and they are also encouraged to contact possible mentors.

For more information regarding the university application for admission, please visit: <https://www.csudh.edu/future-students/apply/graduate/>

Degree Requirements (30 units)

The Master of Science Degree in Biology requires completion of 30 units, at least 15 of which must be graduate (500-level) courses in biology.

A. Required Courses (16 units)

BIO 501 Biological Literature (3)
 BIO 502 Biostatistics (3)
 BIO 504 Research Techniques in Biology (3)
 BIO 510 Urban Environmental Science (3)
 or
 BIO 520 Adv In Cell & Molecul Bio (3)
 BIO 590 Graduate Seminar (2)

Students will take BIO 590 Graduate Seminar (2) twice for a total of 4 units.

B. Electives (14 units)

Select from the following:

Other graduate (500 level) courses in biology. A required course indicated as being repeatable may be used both as a required course and as an elective.
 Upper division (400 level) courses in biology.
 BIO 597 Directed Reading (1-3)
 BIO 598 Directed Research (1-3)
 BIO 599 Thesis (1-4)

Note: Students may count a maximum of nine units of BIO 597 Directed Reading (1-3), BIO 598 Directed Research (1-3), and BIO 599 Thesis (1-4) combined. However, no more than six units of BIO 599 Thesis (1-4) may be applied to the degree.

Any of the following courses:

CHE 450 Biochemistry I (4)
 CHE 451 Biochemistry I Lab (1)
 CHE 452 Biochemistry II (4)
 CHE 453 Biochemistry II Lab (2)

Students doing research in ecology can also take the following courses:

GEO 408 Remote Sensing and Image Processing (3)
GEO 415 Geographic Information Systems (3)

Students might also take 400 or 500-level courses from other departments if approved by the research mentor and the Biology Graduate Program Coordinator.

Students must take all courses within five years of the date of graduation from the Master's degree. If approved by the Graduate Committee and the Graduate Dean, a student may revalidate a limited number of courses. However, under no circumstances can a course taken more than seven years before graduation be revalidated and counted in the program.

Grades

To graduate, students must maintain an overall "B" (GPA: 3.0), and they must pass courses with a grade of "B-" or above.

C. Thesis

Each student should select a major advisor to guide them in their program. The student and the major advisor will select two or more faculty to serve as the student's graduate committee. At least two of the committee, including the chair, must be faculty from the CSUDH biology department. When additional expertise is required, the third member may be a faculty member from another department, or other academic institution.

The thesis is appropriate for all students and a necessity for those who plan a career in research and plan to continue a doctoral program. The student and his or her major advisor will prepare a one or two page hypothesis-based proposal of the thesis research along with the time line of no more than two years to completion. This proposal is also to be approved by the two other members of the student's thesis committee and submitted to the Biology Graduate Committee for review and approval.

Upon the completion and acceptance of the thesis, the student and his or her advisor will arrange for an oral defense of the thesis. This ordinarily takes the form of a seminar to which the faculty, students, and public are invited to attend.

D. Continuing Student Status

Students should maintain continuous enrollment throughout their time in the graduate program. Students who have completed their course work and are working on their thesis may enroll in BIO 600: Graduate Continuation Course (0 units) to maintain continuous attendance. Eligible students may request a Planned Graduate Student Leave. Students must be enrolled the semester they graduate.

E. Biology Graduate Program Policy on Revalidation of Outdated Course Work

The Biology Department requires that all course work taken in the master's degree program be completed within five years immediately preceding the date of graduation.

Revalidation of outdated course work may be requested from the University Graduate Studies Office through the Biology Graduate Coordinator. Outdated course work means courses that were completed earlier than five years, and no more than seven years, immediately preceding the date of graduation. The request must be accompanied by a petition from the Biology Graduate Committee that verifies that the student has done one of the following:

- repeated the course and passed it with a grade of "B" or better;
- taken the exams and completed the assignments of the course as it is currently offered and earned a grade of "B" or better;

The choice of the revalidation method is at the discretion of the Biology Graduate Committee,

F. Classified Standing

If a student has been admitted as conditionally classified, they must fulfill the conditions for classified standing by the end of the first year after admission. The student must submit an application for classified standing to the Dean of Graduate Studies, who will forward the request to the Biology Graduate Coordinator. To receive classified standing, the student must have completed all prerequisite courses and requirements, a grade point average of 3.0 or better in all courses taken at CSUDH, and received a grade of "B-" or better in all courses,

G. Advancement to Candidacy

An application for advancement to candidacy is submitted when the student has completed most of the course work and is completing the thesis. Application is made through the Biology Graduate Coordinator and must be done before the student can complete the thesis. This application will list the student's program of courses and other requirements which must be completed for the degree.

The student should have:

- classified standing;
- completed all required courses;
- maintained a minimum grade point average of 3.0 and received a grade of "B-" or better in all courses taken in the graduate program;
- approval of their thesis proposal by their committee and the Biology Graduate Committee.

H. Master's Requirements

In addition to the program requirements, students must meet all university requirements for the master's degree. Students should consult the section of the catalog entitled "Requirements for the Master's Degree."