CAL POLY POMONA

Name:
Plan: **Biotechnology, B.S.**
SubPlan/Option:
Min. Units Required: **120 units**

2018-2019 University Catalog
Degree Curriculum Sheet

Major Required Core — 77 units

BIO1210 - Foundations of Biology: Energy, Matter, and Information (3) (B2)
BIO1210L - Foundations of Biology: Energy, Matter, and Information Laboratory (1) (B3)
BIO1220 - Foundations of Biology: Evolution, Ecology, and Biodiversity (3)
BIO1220L - Foundations of Biology: Evolution, Ecology, and Biodiversity Laboratory (1)
BIO2060 - Basic Microbiology (3)
BIO2060L - Basic Microbiology Laboratory (1)
BIO2300 - Horizons in Biotechnology (1)
BIO2400 - Genetics (3)

BIO3000 - Genetics and Human Issues (3) (B5) or
BIO3010 - Human Sexuality (3) (B5) or
BIO3030 - Sexually Transmitted Diseases and Safer Sex (3) (B5) or
BIO3040 - Environment and Society (3) (B5) or
BIO3070 - Biology of Human Pregnancy (3) (B5) or
BIO3090 - Biology of the Brain (3) (B5) or
BIO3120 - Biodiversity Conservation (3) (B5) or
BIO3130 - Marine Biology (3) (B5)

BIO3220 - Cell and Molecular Biology (3)
BIO4300 - Concepts of Molecular Biology (3)

BIO4320 - Molecular Biology Techniques (3) and
BIO4320L - Molecular Biology Techniques Laboratory (1)
OR
BIO4360 - Recombinant DNA and Protein Technology (3) and
BIO4360L - Recombinant DNA and Protein Technology Laboratory (1)

BIO4410 - Internship in Biology (1-2) (1-unit required) or
BIO4610 - Undergraduate Research (1)

CHM1210 - General Chemistry I (3) (B1)
CHM1210L - General Chemistry Laboratory I (1) (B3)
CHM1220 - General Chemistry II (3) (B1)
CHM1220L - General Chemistry Laboratory II (1) (B3)
CHM2210 - Quantitative Analysis (2)
CHM2210L - Quantitative Analysis Laboratory (2)
CHM3140 - Organic Chemistry I (4)
CHM3140L - Organic Chemistry Laboratory I (1)
CHM3150 - Organic Chemistry II (3)
CHM3270 - Biochemistry I (3)
CHM3270L - Biochemistry Laboratory I (1)

ENG1101 - Stretch Composition II (3) (A2) or
ENG1103 - First Year Composition (3) (A2)

ENG2105 - Written Reasoning (3) (A3)
MAT1200 - Calculus for Life Sciences (3) (B4)

NTR2030 - Health, Nutrition and the Integrated Being (3) (E)
OR
PSY2201 - Introduction to Psychology (3) (E)
OR
SCI1010 - Science and Mathematics: Freshman Experience I (1) (E) and
SCI1010A - Science and Mathematics: Freshman Experience I Activity (1) (E) and
SCI1020A - Science and Mathematics: Freshman Experience II Activity (1) (E)

PHY1210 - Physics of Motion, Fluids, and Heat (3) (B1)
PHY1210L - Physics of Motion, Fluids, and Heat Laboratory (1) (B3)
PHY1220 - Physics of Electromagnetism, Circuits, and Light (3)
PHY1220L - Electromagnetism, Circuits, and Light Laboratory (1)
STA1300 - Biostatistics (3) (B4)

Major Electives — 16 units

Any combination of courses from the FIVE emphases of electives would satisfy this requirement. In addition, up to 2 units of BIO 4410 and/or BIO 4610 and one unit of BIO 4620 may count towards major electives.

Upper Division Course Emphases

Emphasis 1: Cellular, Molecular, and Microbial Biology

BIO3620 - Applied Microbiology (2)
BIO3620L - Applied Microbiology Laboratory (1)
BIO3640 - Food Microbiology (2)
BIO3640L - Food Microbiology Laboratory (1)
BIO4030 - Human Genetics (3)
BIO4040 - Advanced Genetics (3)
BIO4320 - Molecular Biology Techniques (3)
BIO4320L - Molecular Biology Techniques Laboratory (1)
BIO4360 - Recombinant DNA and Protein Technology (3)
BIO4360L - Recombinant DNA and Protein Technology Laboratory (1)
BIO4380 - Bioinformatics (2)
BIO4380L - Bioinformatics Laboratory (2)
BIO4390 - Cancer Cell Biology (3)
BIO4400 - Stem Cell Biology (3)
BIO4400L - Stem Cell Biology Laboratory (1)
BIO4540 - Plant Genetics (3)
BIO4560 - Plant Development and Differentiation (3)
BIO4635 - Medical Microbiology (3)
BIO4635L - Medical Microbiology Laboratory (1)
BIO4640 - Medical Virology (1)
BIO4650 - Immunology (3)
BIO4650L - Immunology Laboratory (1)
BIO4660 - Microbial Physiology (3)
BIO4660L - Microbial Physiology Laboratory (1)
BIO4670 - General Virology (3)
BIO4670L - General Virology Laboratory (1)
BIO4690 - Plant-microbe Interactions (2)
BIO4690L - Plant-microbe Interactions Laboratory (1)
BIO4700 - Hematology (3)
BIO4700L - Hematology Laboratory (1)

Emphasis 2: Physiology

BIO3240 - Principles of Evolution (3)
BIO4020 - Developmental Biology (3)
BIO4020L - Developmental Biology Laboratory (1)
BIO4100 - Biophysics (3)
BIO4190 - Neuroscience I: Cell and Molecular Processes (3)
BIO4190L - Neuroscience I: Cell and Molecular Processes Laboratory (1)
BIO4259 - Neuroscience II: Neural Systems (3)
BIO4259L - Neuroscience II: Systems Neuroscience Laboratory (1)
BIO4220 - Neural Circuits of Behavior (3)
BIO4220L - Neural Circuits of Behavior Laboratory (1)
BIO4240 - Neuromuscular Physiology (3)
BIO4450 - Physiology I: Cells (3)
BIO4450L - Physiology I: Cells Laboratory (1)
BIO4460 - Physiology II: Systems (3)
BIO4460L - Physiology II: Systems Laboratory (1)
BIO4660 - Microbial Physiology (3)
BIO4660L - Microbial Physiology Laboratory (1)
BIO4810 - Histology (2)
BIO4810L - Histology Laboratory (2)

Emphasis 3: Biochemistry and Molecular Seperation Techniques

CHM3010 - Modeling the Fundamentals of Physical Chemistry (3) (B5)
CHM3040 - Elements of Physical Chemistry I (3)
CHM3050 - Elements of Physical Chemistry II (3)
CHM3150L - Organic Chemistry Laboratory II (1)
CHM3280 - Biochemistry II (3)
CHM3280L - Biochemistry Laboratory II (1)
CHM3310 - Clinical Chemistry (2)
CHM3310L - Clinical Chemistry Laboratory (1)
CHM3400 - The Chemist in Industry (3)
CHM3420 - Spectroscopic Methods (1)
CHM3420L - Spectroscopic Methods Laboratory (1)
CHM3430 - Separation Methods (1)
CHM3430L - Separation Methods Laboratory (1)
CHM3440 - Electroanalytical Methods (1)
CHM3440L - Electroanalytical Methods Laboratory (1)
CHM3520L - Physical Chemistry Laboratory (2)

General Education Requirements — 48 Units

Students should consult the Academic Programs website

https://www.cpp.edu/~academic-programs/general-education-course-listings.shtml

for current information regarding this requirement. Unless specific courses are required, please refer to the list of approved courses under General Education Requirements, Areas A through E.

Area A. English Language Communication and Critical Thinking (9 units)
1. Oral Communication
2. Written Communication
3. Critical Thinking

Area B. Scientific Inquiry and Quantitative Reasoning (12 units)
1. Physical Sciences
2. Life Sciences
3. Laboratory Activity
4. Mathematics/Quantitative Reasoning
5. Science and Technology Synthesis

Area C. Arts and Humanities (12 units)
1. Visual and Performing Arts
2a. Philosophy and Civilization
2b. Literature and Language Other than English
3. Arts and Humanities Synthesis

Area D. Social Sciences (12 units)
1. U.S. History and American Ideals
2. U.S. Constitution and California Government
3. Social Sciences: Principles, Methodologies, Value Systems, and Ethics
4. Social Science Synthesis

Area E. Lifelong Learning and Self-Development (3 units)

Interdisciplinary General Education — 21 Units

An alternate pattern for partial fulfillment of GE Areas A, C, and D available for students is the Interdisciplinary General Education (IGE) program. Students should see an advisor for specific GE coursework required by their major. Please refer to the University Catalog General Education Program section for additional information.

How IGE fulfills General Education Requirements:

Year	*Completion of IGE Courses*	*Satisfies GE Requirements*
Freshman	*IGE 1100, IGE 1200*	*A2 and C2b*
Sophomore	*IGE 2100, IGE 2200*	*C1 and C2a*
Junior	*IGE 2300, IGE 2400*	*D1 and D3*
Senior	*IGE 3100*	*C3 or D4*

American Institutions — 6 Units

Courses that satisfy this requirement may also satisfy GE Area D1 and D2.

American Cultural Perspectives Requirement — 3 Units

Refer to the University Catalog General Education Program section for a list of courses that satisfy this requirement. Course may also satisfy major, minor, GE, or unrestricted elective requirements.

Graduation Writing Test

All persons who receive undergraduate degrees from Cal Poly Pomona must pass the Graduation Writing Test (GWT). The test must be taken by the semester following completion of 60 units for undergraduates.

CHM4090 - Polymer Chemistry (2)
CHM4160 - Macromolecular Modeling (3)
CHM4220 - Organic Synthesis (2)
CHM4220L - Organic Synthesis Laboratory (2)
CHM4240 - Organic Analysis (2)
CHM4240L - Organic Analysis Laboratory (2)
CHM4480 - Modern Mass Spectrometry and FT-NMR (3)
CHM4500 - Bioanalytical Chemistry (3)
CHM4500L - Bioanalytical Chemistry Laboratory (1)
CHM4510 - Enzymology (3)
CHM4510L - Enzymology Laboratory (1)
CHM4520 - Advanced Biomolecular Structure (3)
CHM4540 - Advanced Metabolism (3)
CHM4590 - Green Chemistry (3)
ECE4735 - Biomedical Signals, Instrumentation and Measurements (3)

Emphasis 4: Food, Agriculture, and Environment

AHS3305 - Parasitology and Animal Diseases (3)
AHS3305L - Parasitology and Animal Diseases Laboratory (1)
AVS4430 - Biotechnology Applications in Animal Science (3)
AVS4430L - Biotechnology Applications in Animal Science Laboratory (1)
BIO4480 - Plant Physiology (3)
BIO4480L - Plant Physiology Laboratory (1)
BIO4530 - Plant Anatomy (2)
BIO4530L - Plant Anatomy Laboratory (2)
BIO4680 - Microbial Ecology (2)
BIO4680L - Microbial Ecology Laboratory (1)
BIO4690 - Plant-microbe Interactions (2)
BIO4690L - Plant-microbe Interactions Laboratory (1)
BIO4800 - Entomology (2)
BIO4800L - Entomology Laboratory (2)
CHM4490 - Environmental Analysis (2)
CHM4490L - Environmental Analysis Laboratory (1)

Note: Students will only need one 2000 level NTR course to start the following series
NTR3930 - Advanced Nutrient Metabolism I (3)
NTR3940 - Advanced Nutrient Metabolism II (3)

NTR4370 - Nutritional Genomics (3)
PLT4040 - Plant Breeding (2)
PLT4040L - Plant Breeding Laboratory (1)
PLT4110 - Environmental Toxicology (3)
PLT4190 - Plant Pathology (2)
PLT4190L - Plant Pathology Laboratory (1)
PLT4210 - Production Mycology (2)
PLT4210L - Production Mycology Laboratory (1)
PLT4220 - Specialized Plant Propagation (2)
PLT4220L - Specialized Plant Propagation Laboratory (1)
PLT4310 - Soil Chemistry (2)
PLT4310L - Soil Chemistry Laboratory (1)

Emphasis 5: Policy and Business

BIO4060 - Regulatory Affairs and Safety Assessment (3)
BIO5760 - Regulatory Affairs for the Biotechnology Industry (2)
CIS3100 - Management Information Systems (3)
FST3250 - Food Safety and Current Issues (3)
GEO4130 - Environmental Law (3)
IBM3012 - Principles of Marketing Management (3)
MHR3020 - Organizational Behavior (3)
MHR4220 - Training and Development (3)
PLT3030 - Pesticide Laws and Regulations (2)
TOM3010 - Operations Management (3)