How to Navigate through Biology Emphases
Flowcharts are for guidance; all courses are elective/optional

• Emphases are listed to provide guidance for helping students to choose courses that best fit your career goals, but **there is no requirement to choose a specific emphasis.**

• Any combination of listed courses below will satisfy the required **21-31 units**, except that **at least 12 units must be at 4000-level or above.**
  • Non-Emphasis Electives (0-8 units): Any 2000-4000 level science units + extra GE B5 (BIO only)

• Up to **4 units** combined from research supervisory, service learning, and internship courses can also count as emphasis electives. These courses include BIO 2000 or BIO 4000, BIO 4410, BIO 4590S / BIO 4590AS, BIO 4610, BIO 4620, and BIO 4910S / BIO 4910AS.

• All special topics courses listed as BIO 2990 / BIO 2990A / BIO 2990L or BIO 4990 / BIO 4990A / BIO 4990L can count as emphasis electives.

(Descriptions from Biology Curriculum Sheet)
(1) Integrative Biology Emphasis Course Options

Study integration at all levels of organization from molecules to the biosphere, and in all branches of the tree of life: plants, animals, and microbes

Choose 2 of 3 courses:
(All offered Fall & Spring)

- BIO 2050/L Form/Function in Plants
- BIO 2060/L Basic Microbiology
- BIO 2070/L Animal Biology

Consider courses from emphasis 2 to 6 for “Other Electives”. (Refer to other flowcharts for specific emphasis.)

- Emphasis 2 Botany
- Emphasis 3 Genetics & Molecular Cell Biology
- Emphasis 4 Microbiology
- Emphasis 5 Neuroscience & Physiology
- Emphasis 6 Zoology

Light blue box – core; dark blue box – “Recommended Electives”; green box – “Other Electives”.
(2) Botany Emphasis Course Options

Study of plant physiology, structure, genetics, ecology, classification, and distribution

**Core Courses**

- **BIO 1210/L & BIO 1220/L**
  - Foundations of Biology
- **BIO 2060/L**
  - Basic Microbiology
- **BIO 3500/L**
  - California Flora
- **BIO 4540**
  - Plant Genetics
- **BIO 4550/(A)/(L)**
  - Field Biology
- **BIO 2050/L**
  - Form and Function in Plants
- **BIO 3250**
  - Principles of Ecology
- **BIO 2110L**
  - Biostatistics Laboratory
- **BIO 2070/L**
  - Animal Biology
- **CHM 1210/L**
  - General Chemistry I

**Recommended Electives**

- **BIO 4480/L**
  - Plant Physiology
- **BIO 4490/L**
  - Marine Botany
- **BIO 4520/L**
  - Evolution of Plants
- **BIO 4530/L**
  - Plant Anatomy
- **BIO 4560**
  - Plant Development and Differentiation
- **BIO 4570/L**
  - Plants & the Environment
- **BIO 4580**
  - Ecology and Conservation of Hawaiian Ecosystems
- **BIO 4800/L**
  - Entomology

**Other Electives**

- **PLT 2310/L**
  - Basic Soil Science

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- **a** Bio 2110L has the prerequisite STA 1300.
- **b** BIO 4520/L also has the prerequisite BIO 3240.
- **c** BIO 2400 is recommended as a prerequisite.

*Light blue box – core; dark blue box – “Recommended Electives”; green box – “Other Electives”. F – Fall; S – Spring*
(3) Genetics & Molecular Cell Biology Emphasis Course Options
Study the structure and function of genes and molecules within a cell system

- BIO 1210/L & BIO 1220/L Foundations of Biology
- BIO 2400 Genetics
- BIO 4490/L Cancer Cell Biology
- BIO 4040 Advanced Genetics
- BIO 4380/L Bioinformatics
- BIO 4540/L Plant Physiology
- BIO 2050/L Form and Function in Plants
- BIO 2060/L Basic Microbiology
- BIO 4020/L Developmental Biology
- BIO 4060 Regulatory Affairs and Safety Assessment
- BIO 4030 Human Genetics
- BIO 4300 Concepts of Molecular Biology
- BIO 4320/L Molecular Biology Techniques
- BIO 4360/L Recomb. DNA and Protein Technology
- BIO 4390 Cancer Cell Biology
- BIO 4400/L Stem Cell Biology
- BIO 4450/L Physiology I: Cells
- BIO 4480/L Plant Physiology
- BIO 4660/L Microbial Physiology

(L) Lecture can be taken without the laboratory; offering term is indicated as Fall (F) and Spring (S).

a BIO 4660/L also requires CHM 2010/L or CHM 3140/L Organic Chemistry

Light blue box – core; green box – “Electives”; purple box – pre-requisite course(s). Gray are not currently offered; F – Fall; S – Spring
Microbiology Emphasis Course Options

Study the world of microbes and their roles in diseases, health, and environment.

- **BIO 1210/L & BIO 1220/L** Foundations of Biology
- **BIO 2060** Basic Microbiology
- **BIO 4635/L Medical Microbiology**
- **BIO 4660/(L) Microbial Physiology**
- **BIO 4680/(L) Microbial Ecology**
- **BIO 3620 Applied Microbiology**
- **BIO 3640/(L) Food Microbiology**
- **BIO 4660/(L) Microbial Physiology**
- **BIO 4670/(L) General Microbiology**
- **BIO 4060 Regulatory Affairs**
- **BIO 4080 Water Pollution Biology**
- **BIO 4080 General Epidemiology**
- **BIO 4700/(L) Hematology**
- **BIO 4640 Medical Microbiology**
- **BIO 4670/(L) General Microbiology**
- **BIO 4690/L Plant-Microbe Interactions**

**F, S** **F, S** **F** **F** **S** **S** **F** **F**

- **(L) Lecture can be taken without the laboratory; Spring (S) courses only; Fall (F) courses only; (F, S) courses offered both Fall and Spring.**
- **a Bio 4660/L also requires CHM 2010/L or CHM 3140/L Organic Chemistry.**
- **b Requirements for admission to Clinical laboratory Scientist (CLS) programs; please consult the CLS programs for additional requirements.**

Light blue box – core; dark blue box – “Recommended Electives”; green box – “Other Electives”. Gray are currently not offered; F – Fall; S – Spring.
(5) Neuroscience & Physiology Emphasis Course Options

Study the bodily and neural functions of complex organisms

- **BIO 1210/L & 1220/L Foundations of Biology**
- **BIO 2070/L Animal Biology**
- **BIO 2340/L Human Anatomy**
- **BIO 2350/L Human Physiology**
- **BIO 2380/L Intro vertebrate zoology**
- **BIO 2400 Genetics**
- **BIO 2400/L Cell & Molecular Bio**
- **BIO 2380/L Bioinformatics**
- **BIO 2380/L Bioinformatics**
- **BIO 3220 Cell & Molecular Bio**
- **BIO 4020/(L) Developmental Biology**
- **BIO 4020/(L) Developmental Biology**
- **BIO 4190/L Neuroscience I**
- **BIO 4200/L Histology**
- **BIO 4220/L Neural Circuits of Behavior**
- **BIO 4240 Neuromuscular Physiology**
- **BIO 4220/L Recomb DNA & Protein Technology**
- **BIO 4240/L Stem Cell Biology**
- **BIO 4360/(L) Recomb DNA & Protein Technology**
- **BIO 4380/L Bioinformatics**
- **BIO 4400/(L) Stem Cell Biology**
- **BIO 4450/L Physiology I: Cells**
- **BIO 4460/L Physiology II: Systems**
- **BIO 4810/L Histology**
- **BIO 4900/L Histology**
- **PHY 1210/L & 1220/L Physics**
- **PHY 4100 Biophysics**

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*(L) Lecture can be taken without the laboratory; Spring (S) courses only, Fall (F) courses only, (F, S) courses offered both Fall and Spring

*a* BIO 4380/L also requires Pre-requisite CHM 3280 Biochemistry II if you have not taken BIO 2400.

*b* Recommended to take BIO 2340/L before enrolling in BIO 2350/L

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Zoology Emphasis Course Options

Study of the behavior, structure, physiology, classification, and distribution of animals

BIO 1210/L & BIO 1220/L
Foundations of Biology

BIO 3250L
Ecology Laboratory

BIO 4450/L
Physiology I: Cells

BIO 4460/L
Physiology II: Systems

BIO 2370/L
Intro to Invert Zoology

BIO 2380/L
Intro to Vert Zoology

BIO 3200
Cell & Molecular Bio

BIO 4140
Biology of Species Invasions

BIO 3250 (F) & 3250L (S)
Ecology & Ecology Lab

BIO 2050/L
Form/Function in Plants

PHY 1210/L & PHY 1220/L
Physics

BIO 4550/(A)/(L)
Field Biology

BIO 4580
Ecology & Conservation of Hawaiian Ecosystems

BIO 3500/L
California Flora

BIO 3220
F, S
Cell & Molecular Bio

BIO 4180/L
Marine Ecology

BIO 4020/(L)
Developmental Biology

BIO 4190/L
Neuroscience I: Cell & Molecular Processes

BIO 4200/L
Neuroscience II: Neural Systems

BIO 4180/L
Marine Ecology

BIO 4190/L
Neuroscience I: Cell & Molecular Processes

BIO 4200/L
Neuroscience II: Neural Systems

BIO 4800/L Entomology

BIO 4810/L Histology

BIO 4840/L Herpetology

BIO 4820/L Bio of Fishes

(L) Lecture can be taken without the laboratory
a Offered every other year in Spring

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