Cendara University

Department of Biology

Course Catalog 2024–2025

Undergraduate Courses (B.Sc. in Biology)

BIOL 101 — Principles of Biology

- **Description:**
  An introduction to the fundamental concepts of biology, including cell structure, genetics, evolution, and ecology. Emphasis on the scientific method, laboratory research, and data analysis.
- **Prerequisites:**
  None
- **Credit Hours:**
  4

BIOL 115 — Marine Diversity and Ecology

- **Description:**
  A comprehensive exploration of marine ecosystems, focusing on organismal diversity, ecological interactions, and adaptation. Includes fieldwork in coastal environments and laboratory identification.
- **Prerequisites:**
  BIOL 101
- **Credit Hours:**
  3

BIOL 121 — Introduction to Molecular Biology

- **Description:**
  Covers the structure and function of biomolecules, DNA replication, gene expression, and genetic technologies. Laboratory work includes DNA extraction and electrophoresis.
- **Prerequisites:**
  BIOL 101
- **Credit Hours:**
  4

BIOL 201 — Botany: Plant Life and Processes

- **Description:**
  Examination of plant anatomy, physiology, and evolution. Study of plant responses to the environment, photosynthesis, and biodiversity in terrestrial ecosystems.

- **Prerequisites:**
  BIOL 101

- **Credit Hours:**
  3

BIOL 221 — Genetics

- **Description:**
  Fundamental principles of heredity, gene function, and genetic analysis in prokaryotes and eukaryotes. Focus on Mendelian genetics, chromosomal theory, and modern genomics.
- **Prerequisites:**
  BIOL 121

- **Credit Hours:**
  4

BIOL 235 — Ecology

- **Description:**
  Concepts in population, community, and ecosystem ecology. Topics include biodiversity, energy flow, nutrient cycling, and human impacts on biological systems. Includes field data collection and statistical analysis.
- **Prerequisites:**
  BIOL 101

- **Credit Hours:**
  3

BIOL 243 — Research Methods in Biology

- **Description:**
  An introduction to experimental design, scientific writing, and quantitative analysis in biological research. Students develop skills in critical reading, hypothesis testing, and use of laboratory and field techniques.
- **Prerequisites:**
  BIOL 101
  MATH 150 (or concurrent enrollment)
- **Credit Hours:**
  3

BIOL 311 — Cell Biology

- **Description:**
  Structure and function of eukaryotic cells, including membranes, organelles, and cytoskeleton. Explores cell communication, cycle regulation, and apoptosis with hands-on microscope work.
- **Prerequisites:**
  BIOL 121
  CHEM 110

- **Credit Hours:**
  4

BIOL 318 — Marine Biology Field Studies

- **Description:**
  An immersive field-based course covering marine organisms, habitats, and ecological monitoring techniques. Includes a week-long research trip to the Gulf of Cendara.
- **Prerequisites:**
  BIOL 115
  BIOL 235

- **Credit Hours:**
  3

BIOL 350 — Evolutionary Biology

- **Description:**
  Explores the mechanisms of evolution, natural selection, population ge-

netics, and speciation. Integrates case studies and evolutionary analysis across major taxa.

- **Prerequisites:**
  BIOL 221
  BIOL 235

- **Credit Hours:**
  3

BIOL 390 — Conservation Biology

- **Description:**
  Principles and practice of conserving biodiversity. Topics include species extinction, habitat loss, and ecological restoration. Includes group projects with local conservation agencies.
- **Prerequisites:**
  BIOL 235

- **Credit Hours:**
  3

BIOL 410 — Senior Thesis

- **Description:**
  Culminating research project under faculty supervision. Students design and execute original research, culminating in a written thesis and public defense.
- **Prerequisites:**
  Senior standing in Biology
  BIOL 243

- **Credit Hours:**
  6

Graduate Courses (M.Sc./Ph.D. in Biology)

BIOL 501 — Advanced Molecular Genetics

- **Description:**
  In-depth analysis of genetic mechanisms at the molecular level. Topics include gene regulation, epigenetics, genomics, and CRISPR technologies. Lab includes genome editing techniques.

- **Prerequisites:**
  Undergraduate degree in Biology or consent of instructor

- **Credit Hours:**
  4

BIOL 512 — Cell Structure and Function

- **Description:**
  Advanced study of cellular architecture, signal transduction, and microscopy methods. Investigates cell dynamics using live-cell imaging and flow cytometry.
- **Prerequisites:**
  BIOL 311 or equivalent

- **Credit Hours:**
  4

BIOL 523 — Population and Quantitative Genetics

- **Description:**
  Explores genetic variation within populations, heritability, genetic mapping, and genome-wide association studies. Includes hands-on analysis with bioinformatics tools.
- **Prerequisites:**
  BIOL 221 or consent of instructor

- **Credit Hours:**
  3

BIOL 540 — Conservation and Restoration Ecology

- **Description:**
  Evaluation of theoretical and practical approaches to ecosystem restoration and conservation. Emphasizes adaptive management, population viability analysis, and conservation policy.
- **Prerequisites:**
  BIOL 235 or graduate standing

- **Credit Hours:**
  3

BIOL 558 — Current Topics in Marine Biology

- **Description:**
  Seminar-style course focused on emerging research in marine biology, including climate change impacts, ocean acidification, and molecular tools in marine research.

- **Prerequisites:**
  Graduate standing

- **Credit Hours:**
  2

BIOL 601 — Research Methods and Data Analysis

- **Description:**
  Training in experimental design, advanced statistics, and grant writing for biological research. Includes workshops on R and statistical modeling.
- **Prerequisites:**
  Graduate standing

- **Credit Hours:**
  3

BIOL 621 — Genomics and Proteomics

- **Description:**
  Analysis of whole-genome data and protein expression profiles. Emphasis on next-generation sequencing, bioinformatics, and mass spectrometry.
- **Prerequisites:**
  BIOL 501 or instructor consent

- **Credit Hours:**
  3

BIOL 698 — Graduate Seminar

- **Description:**
  Weekly seminar series featuring guest speakers, student research presentations, and discussions of current literature in genetics, conservation, and cell biology.

- **Prerequisites:**
  Graduate standing

- **Credit Hours:**
  1

BIOL 699 — Doctoral Thesis Research

- **Description:**
  Independent, original research conducted under faculty supervision, culminating in a written dissertation and oral defense.
- **Prerequisites:**
  Admission to Ph.D. candidacy

- **Credit Hours:**
  Variable (1–12 per term)

Concentration and Specialization Tracks

Molecular Biology (B.Sc. & Graduate)

- Emphasizes advanced coursework in BIOL 121, BIOL 311, BIOL 501, BIOL 621

Ecology (B.Sc.)

- Focused on BIOL 235, BIOL 350, and BIOL 390

Marine Biology (B.Sc./Graduate)

- Central courses: BIOL 115, BIOL 318, BIOL 558

Genetics (Graduate)

- Recommended: BIOL 501, BIOL 523, BIOL 621

Conservation Biology (Graduate)

- Core: BIOL 540, BIOL 390

Cell Biology (Graduate)

- Key courses: BIOL 512, BIOL 621

For full program requirements and course schedules, consult the Department of Biology website or contact the departmental advisor (Dr. Nadia Lam, nadia.lam@cendara.edu).
