



Instructor:
Dr. Magdy S. Alabady

Intensive Lab: Molecular Biology Genomics Bioinformatics

Five integrated cores—Molecular Biology, Genomics, Bioinformatics, Evidence Evaluation, and a capstone Research Project—delivered through hands-on experimentation, HPC-enabled analysis, and real-world discovery.

Explore the Five Cores

See Research Projects

Download PDF Syllabus

Format

Wet-lab +
HPC training
+ reading and
presentating

Deliverable

Real research
project

Skills

Molecular
biology ·
Genomics ·
Bioinformatics

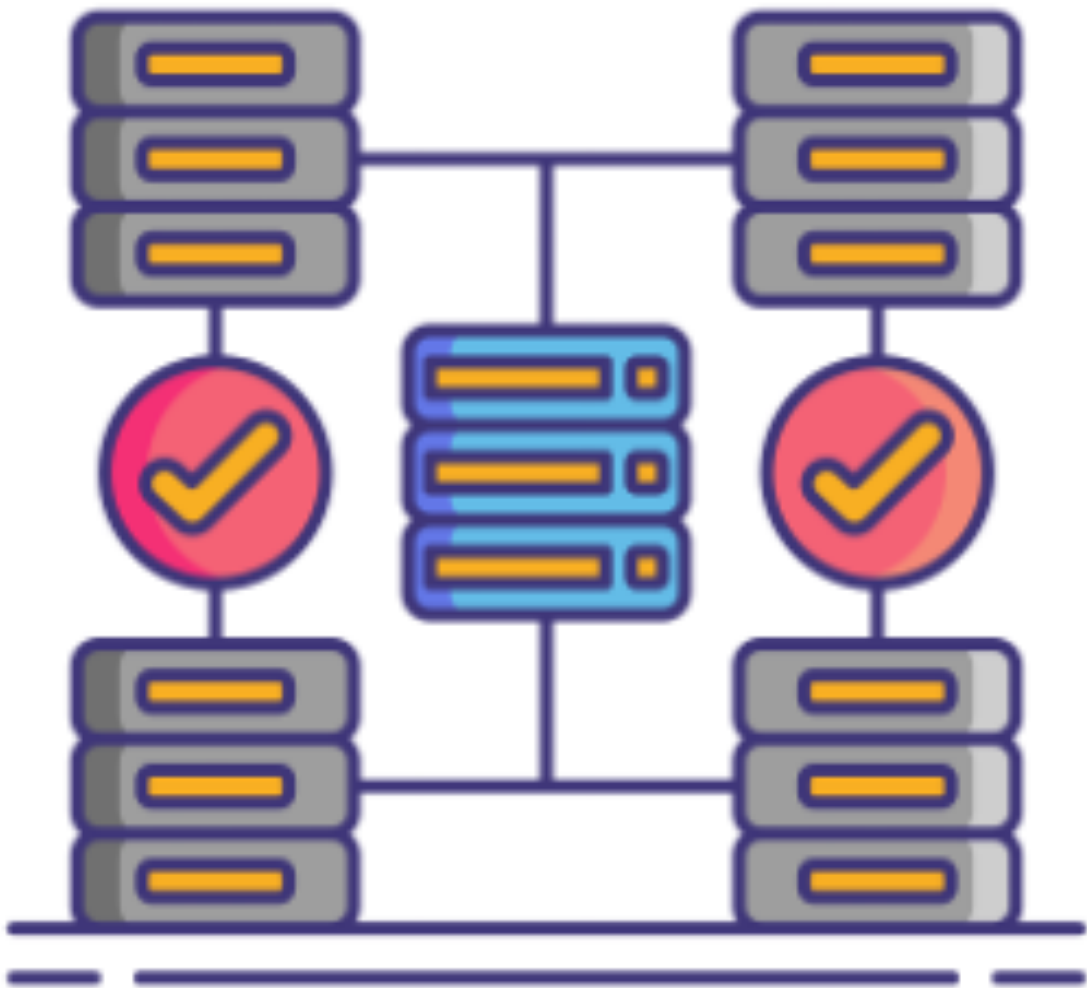
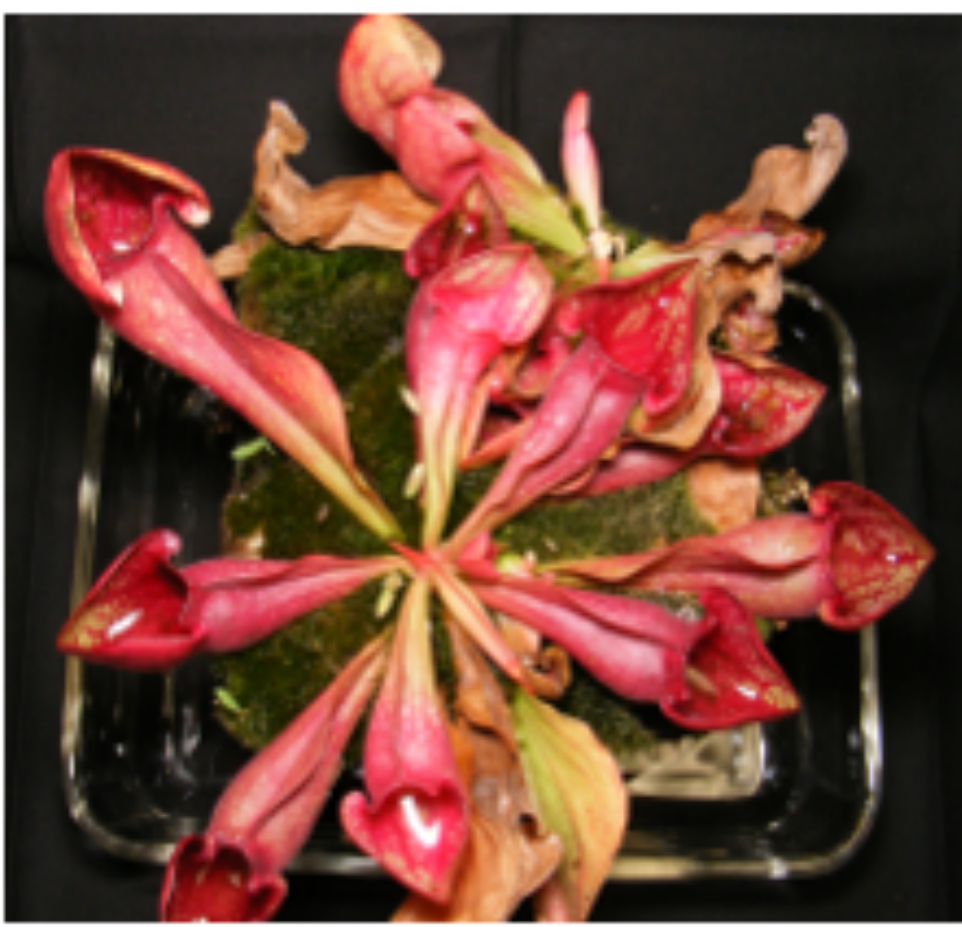
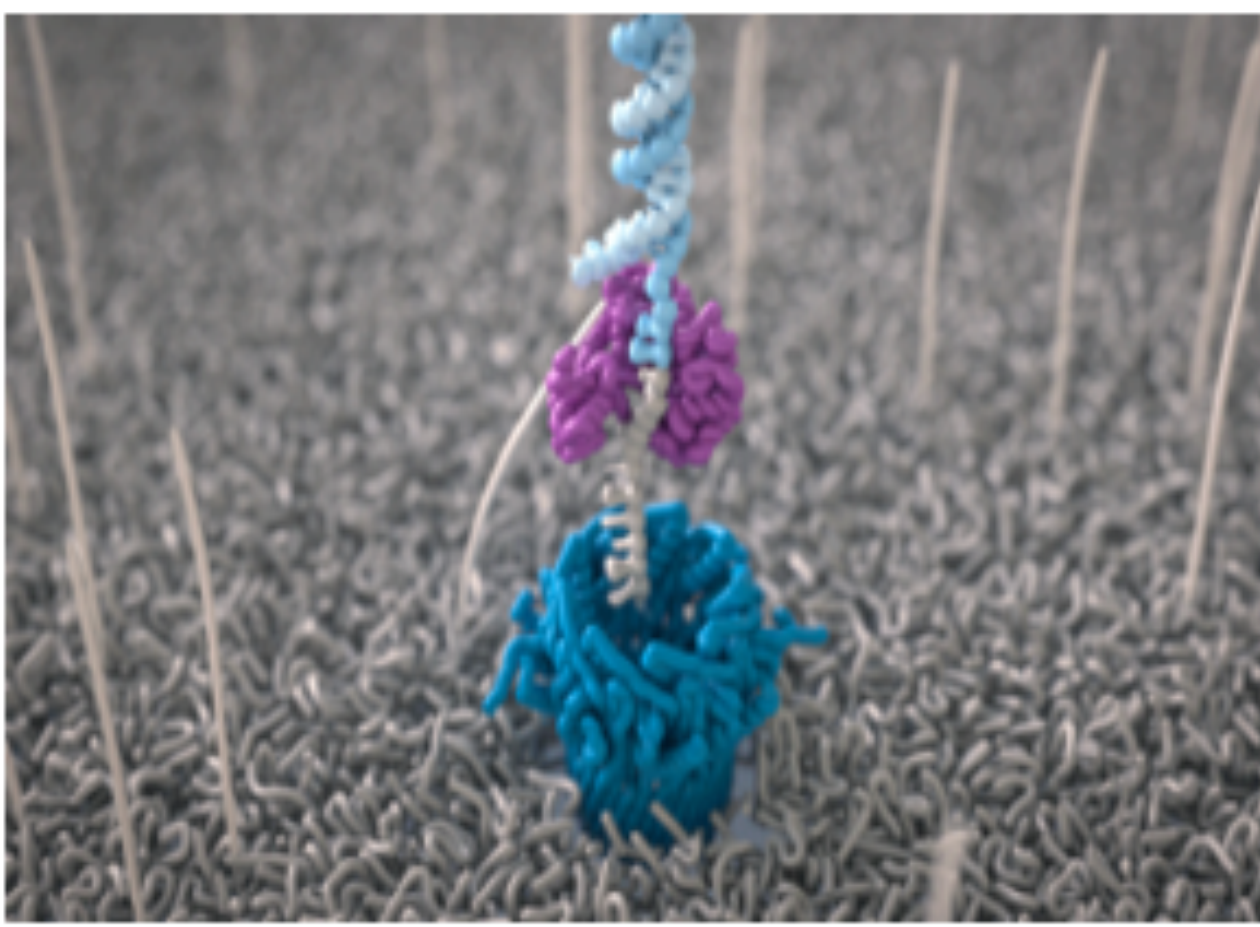
Outcomes

Poster/co-
authorship
opportunities

About the Course

New Semester, New Research: Complementary Projects Building Toward Publication.

PBIO 3660L provides an immersive, research-centered experience that integrates molecular biology, genomics, and bioinformatics training within a real-world genomics project. Through firsthand experimentation, computational analysis, and collaborative inquiry, students engage in authentic research practices that cultivate five key Institutional Competencies: *Critical Thinking, Analytical Thinking, Communication, Creativity & Innovation, and Leadership & Collaboration.*



PBIO 3660L — Integrating Molecular Biology, Genomics, and Environmental Systems

The Five Cores

Molecular Biology

From DNA extraction to amplification; contamination control; assay design.

Genomics

Explore genomes and sequence diversity; metagenomics and targeted panels.

Bioinformatics

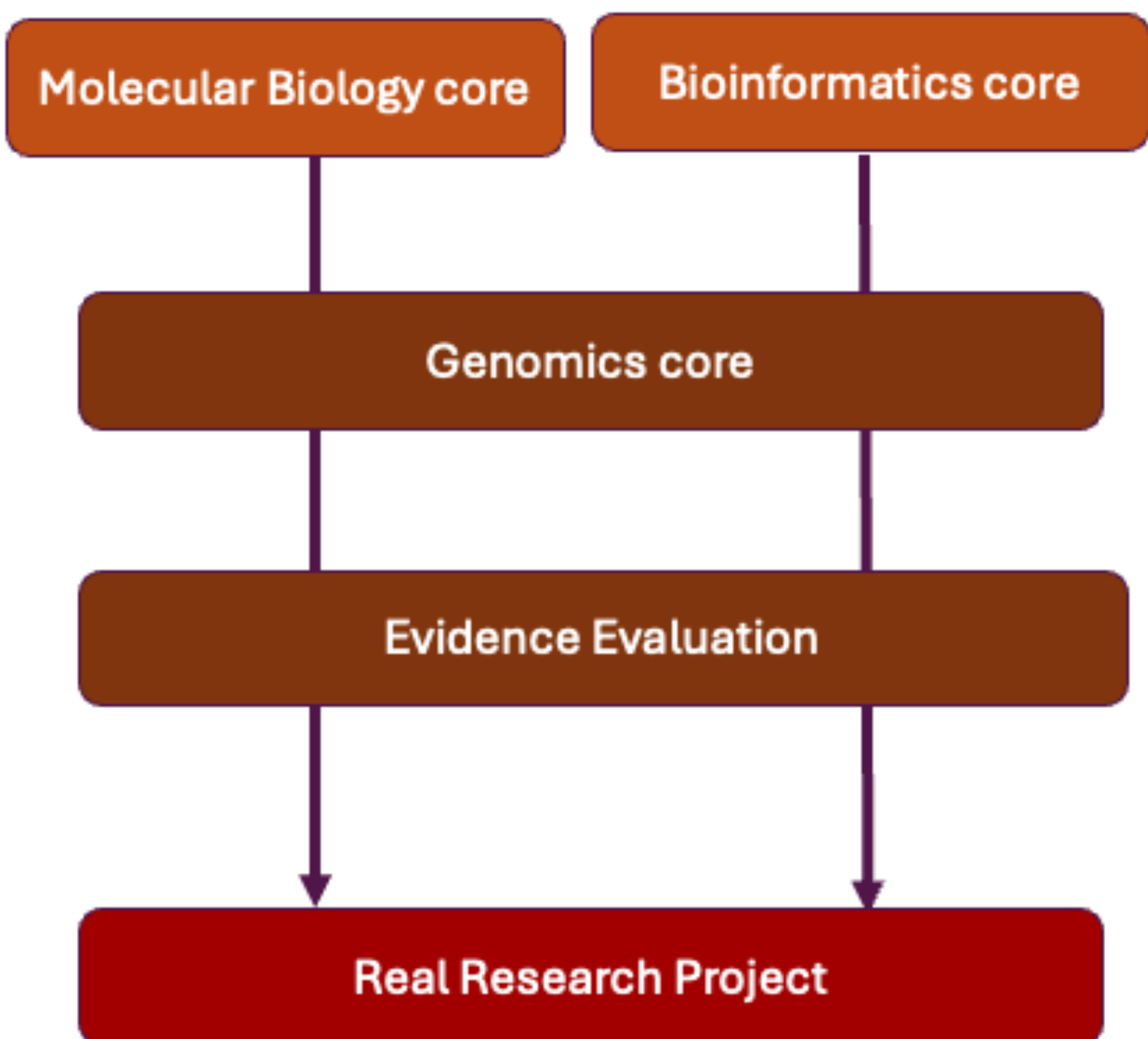
Analyze real datasets using HPC tools; reproducible workflows and QC.

Evidence Evaluation

Assess, interpret, and communicate results; uncertainty & validation.

Research Project

Drive discovery in a real-world system; team science and communication.



The Five Cores: From Molecular Biology to a Real Research Project

Course Highlights

Hands-On & Real Data

- Hands-on molecular biology and sequencing workflows
- Real dataset analysis using bioinformatics and HPC tools
- Team-based collaboration and communication

Scholarly Impact

- Real-world research project each semester
- Opportunities for poster presentations
- Potential co-authorship on manuscripts

Research Projects

- Microbiomes of Carnivorous Plants
- Endophytic Microbiomes' role in Plant Carnivory
- Human mtDNA in Environmental DNA
- Transcriptome & Organelle Genomes of *Acetabularia*

Mini-Syllabus Snapshot

Module 1

Foundations

- DNA extraction, quality & contamination control
- Project overview & sampling plans

Module 2

Genomics

- Library strategies; metagenomics vs. targeted capture
- Sequencing concepts; reading QC reports

Module 3

Bioinformatics

- HPC basics; pipelines; taxonomy & alignment
- Reproducible notebooks; parameter logs

Module 4

Evidence Evaluation

- Uncertainty, controls, and validation
- Visualization and narrative building

Module 5

Research Project

- Team analyses & interpretation
- Poster & manuscript-ready figures

Ready to join?

Enroll via the registrar when the course opens. Questions about seats, accommodations, or aligning the project with your interests? Email the instructor.

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