WELCOME TO THE

Sophomore Open House
The Molecular Biology Department

We are a diverse group of undergraduate and graduate students, postdoctoral fellows, and faculty who are united in our desire to understand the biology of life at the level of molecules, cells, tissues, and animals.

Each year ~55 sophomores sign into the Molecular Biology department.

Lewis Thomas Lab

Schultz Lab

Moffett Lab

Carl Icahn Lab
Newly Renovated Moffett Lab
Our interests are broad

- Biochemistry
- Biophysics
- Cancer
- Cell Biology
- Structural Biology
- Computation & Modeling
- Development
- Evolution
- Genetics
- Genomics
- Global Health
- Immunology
- Microbiology
- Virology
Information about the undergraduate program

http://molbio.princeton.edu/
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http://molbio.princeton.edu/
Specific information about the major

Molecular Biology Major

Current Concentrators (Classes of '21 and '22)
Visit this page for important updates related to COVID-19.

Prospective Concentrators (Classes of '23 and '24)
Freshmen and Sophomores should visit this page for additional information about signing into Molecular Biology.

The Molecular Biology major is one of the larger concentrations at Princeton, with 50-60 sophomores joining the department each spring. Our introductory Cell and Molecular Biology course, together with courses in chemistry, physics, and statistics, prepare students for three upper level core courses covering fundamentals of modern experimental biology - genetics, biochemistry, and cell and developmental biology - and an intensive project lab course. A diverse set of elective courses allow students to delve into more specialized topics like immunology, cancer biology, genomics, and drug discovery. Students with interdisciplinary interests can combine the Molecular Biology major with certificates such as biophysics, neuroscience, global health and health policy, and quantitative and computational biology.

From classes you will learn how science is applied in research and medical advancements. In the junior and senior independent work you will solidify your skills and apply them first hand by performing your own original research. During the junior year, you will learn to critically analyze the research literature and formulate a detailed research plan in preparation for embarking on your senior thesis. Many students choose a hands-on laboratory experience for their senior thesis research, although non-laboratory projects are also possible. A unique program for rising seniors to conduct laboratory thesis research during the summer maximizes the educational experience of our majors.

- Major Requirements
- Departments
- Courses
- Certificate programs
- Study abroad
- Junior Independent Work
- Senior Thesis

Undergraduate Students

Undergraduate Community
Career Resources
Important Dates and Deadlines
Class Day
Current Lab Assignments
MOL Curriculum

Prerequisites

- MOL 214 *Introduction to Cellular and Molecular Biology* (must be taken at Princeton and completed with a grade of C or better)

- CHM 201/207 and CHM 202 *General Chemistry/Advanced General Chemistry* or 1 unit AP credit + CHM 202 or 1 unit AP credit + CHM 215 *Advanced General Chemistry: Honors Course* or 2 units AP credit

- ISC 231-234 (a full-year, double-credit course) taken in the first year offers an alternative to the combination of MOL 214, CHM 201 & 202, COS 126, and PHY 103 & 104/108.

General requirements

- *Organic Chemistry*: CHM 301 & 304 or CHM 337 - Must be taken before junior year

- *Quantitative*: SML 201 (recommended), or MOL 290 or ORF 245 and either COS 126 (recommended), or MAT 103 (without AP credit), or a higher level math course (with AP credit)

- *Physics*: PHY 108 (recommended), or PHY 103 & 104, or PHY 101 & 102

All prerequisite, required or departmental courses must be taken for a letter grade (no P/D/F).
Departmental core courses

The following core courses are required and except under very special circumstances, must be taken before senior year:

- MOL 342 Genetics
- MOL 345 Biochemistry (fall or spring)
- MOL 348 Cell & Developmental Biology (recommended sophomore year)
- MOL 320/350 Laboratory in Molecular Biology

Sample schedules: http://molbio.princeton.edu/undergraduate/major/typical-paths
At least eight departmentals are required.

In addition to the four departmental core courses (MOL 342, 345, 348, 320/350), students must take at least one 300, 400, or 500-level course with MOL as the primary listing.

The remaining three departmental courses can be chosen from among all 300-or-higher-level MOL, MOL-crosslisted, or other approved courses. Only Princeton courses count as departmentals; there are no exceptions to this rule.

CHM 301 & 304 can count toward the total.
Upper level courses cover a wide variety of topics and research areas:

MOL 340 Molecular and Cellular Immunology
MOL 380 Modern Microbiology
MOL 423 Molecular Basis of Cancer
MOL 415 Modern Biophysics and Systems Biology
MOL 431 Regulatory Mechanisms in Development
MOL 433 Biotechnology
MOL 459 Viruses: Strategy and Tactics
MOL 460 Diseases in Children: Causes, Costs, Choice
MOL 475 Light Microscopy and Biological Imaging

CBE 411/MOL 411 Antiobiotics: From Cradle to Grave
CBE 440/MOL 440 The Physical Basis of Human Disease
EEB 327/MOL 327 Immune Systems: Molecules to Populations
ISC 326/MOL 326 Human Genomics: The Past, Present and Future of the Human Genome
QCB 455/MOL 455 Genomics and Computational Molecular Biology
NEU 408/MOL 408 Cellular and Systems Neuroscience

Many upper-level math and science courses in other departments are approved as departmentals:
http://molbio.princeton.edu/undergraduate/major/departmentals
Certificate Programs

Molecular Biology majors can combine different but related disciplines in course work and in at least part of the independent work.

**Biophysics:** http://www.princeton.edu/ua/departmentsprograms/bph/

**Engineering Biology:** http://www.princeton.edu/engbio/

**Global Health and Public Policy:** http://www.princeton.edu/ghp/

**Neuroscience:** https://www-dept-edit.princeton.edu/neuroscience/education/undergraduate-education/

**Quantitative and Computational Biology:** http://www.princeton.edu/integratedscience/certificate/
Study Abroad

We are committed to working with students to help ensure that those who wish to study abroad are able to do so without compromising the quality of their molecular biology education.

**Fall semester** of junior year is the best time for MOL concentrators

Juniors wish to study abroad must fulfill chemistry requirements prior to travel

Study Abroad programs that entail intensive lab research can, with advance permission, substitute for MOL 350.

**Study Abroad Advisor**

Dr. Fred Hughson  
215 Schultz Lab, 8-4982  
hughson@princeton.edu
Research and Independent Work: Junior Year

Fall semester:

Students participate in small group tutorials with postdoctoral instructors, read original research papers, and prepare two short papers on assigned topics.

Spring semester:

Students carry out independent research with a faculty advisor with whom they will do their senior thesis. This may include experimental work. A written grant proposal on the senior thesis topic constitutes the JP.
Research and Independent Work: Senior Thesis

Students perform original research and write a formal thesis in either of two settings:

Experimental (laboratory) thesis research

Student works independently but under supervision to plan and conduct experiments to advance scientific knowledge. Students learn to analyze and interpret critically the results of experiments, to use their results to guide subsequent experiments, and to integrate knowledge from various sources.

Non-laboratory thesis research

Similarly, hypotheses are examined by original research. Original research does not merely consist of a literature review. Rather, students are expected to analyse new or existing data in order to test their hypotheses. Sources of data could include (but are not limited to): online databases chosen in consultation with the thesis adviser, existing experimental data perhaps from the adviser's lab, or new student-initiated surveys or ethnographic studies.
Learn about faculty research programs

MOL Faculty
http://molbio.princeton.edu/faculty/molbio-faculty

Also see individual faculty websites

MOL Associated Faculty
http://molbio.princeton.edu/faculty/associated-faculty

Note that Associated Faculty may not have space for MOL students

Also: LSI fellows

Other Princeton Faculty
With permission of DUS

and many more......
Senior Thesis Titles

Exploring DNA Methylation as a Mediator Between Exposure to Airborne Neurotoxicants and Cognitive Impairment in Children

We Work Hard but Our Bacteria Work Harder: An Investigation into Fludarabine Metabolism by the Gut Microbiome

Investigating the Mechanisms of Surface-induced Virulence in *Pseudomonas aeruginosa*

The Effects of Cytokine Signaling and Memory Differentiation on Mammalian T-helper Cell Effector Phenotype Plasticity

Investigating the Relationship Between Cell Fate and Collective Cell Migration in Hair Follicle Morphogenesis

Establishing a Computational Model of the CO2-Concentrating Mechanism in *Chlamydomonas reinhardtii*

Analysis of SM-SNARE Interactions in Golgi-to-ER Retrograde Vesicular Transport

Developing Tools to Identify Novel Protein Components of Drosophila Germ Granules Using BioID

Elucidating the Role of YTHDF1 in Mammary Gland Development and Breast Tumorigenesis
MOL/QCB Summer Undergraduate Research Program
For seniors doing lab-based thesis research

9-week summer program that includes:
• Research
• Faculty seminars
• Discussion groups

The program culminates in a poster session where students present their research to faculty and other students.

Students receive a stipend for living expenses.
Examples of what recent grads have done in science and beyond:

**Corporate Employment**
- Staff scientist – Novartis
- Consulting Analyst – Accenture
- Strategy Analyst – Clearview Healthcare Partners
- Manager of Corporate Business Operations – Loxo Oncology

**1-2 Year Post-Grad Options**
- Research Assistant – Yale University
- Research Assistant – Columbia University Medical Center
- Research Assistant (Project 55) – Sinai Community Institute
- Clinical Researcher (Project 55) – University of California, San Francisco
- Medical Assistant Intern – Hospital for Special Surgery

**Graduate and Professional School**
- M.S. (Fulbright) – National Taiwan University
- M.S., Violin Performance – Rice University
- M.Phil., Genomic Medicine – University of Cambridge
- M.D. – University of Pennsylvania
- M.D. – Harvard Medical School
- Ph.D., Immunology – Stanford University
- Ph.D., Biology – M.I.T.
Process for declaring the Molecular Biology concentration

Two steps - can be done in either order:

1) Declare Molecular Biology as your concentration in Tigerhub

2) Fill out online form using link posted on the Molecular Biology Undergraduate website:

https://molbio.princeton.edu/undergraduate/major/declaring-a-major

After you submit the form, you will receive an email from Katie Pyott assigning you to a MOL Academic Adviser.

This person will be your academic adviser until you graduate. You will meet with them in advance of each semester for course selection and as needed for other course-related issues.
Make an appointment with your assigned Academic Adviser

Dr. Jodi Schottenfeld-Roames
204 Lewis Thomas Lab, 8-6224
jschotte@princeton.edu

Dr. Fred Hughson
215 Schultz Lab, 8-4982
hughson@princeton.edu

Dr. Tom Silhavy
310 Lewis Thomas Lab, 8-5899
tsilhavy@princeton.edu

Dr. Jared Toettcher
140 Lewis Thomas Lab, 8-8466
toettcher@princeton.edu

Use WASE to make appointment
Bring worksheets, course summaries…
Additional contact information

Administration
Ms. Katie Pyott
Undergraduate Program Administrator
119 Lewis Thomas Lab, 8-2803
kpyott@princeton.edu

Director of Undergraduate Studies
Dr. Liz Gavis
416 Schultz Lab, 8-3857
gavis@princeton.edu

Department Chair
Dr. Bonnie Bassler
329 Lewis Thomas Lab, 8-2857
bbassler@princeton.edu

Health Professions Advising
Ms. Kate Fukawa-Connelly
36 University Place, 8-3144
katef@princeton.edu

Study Abroad Advisor
Dr. Fred Hughson
215 Schultz Lab, 8-4982
hughson@princeton.edu

Advisor for Fall Junior Independent Work & Graduate School Advisor
Dr. Tom Silhavy
310 Lewis Thomas Lab, 8-5899
tsilhavy@princeton.edu

Medical Career Advisor
Dr. Dan Notterman
205 Lewis Thomas Lab, 8-2933
dan1@princeton.edu
The Undergraduate Student Committee

• Liaison between MOL majors and the faculty

• Meets ~2x/semester with the Director of Undergraduate Studies to discuss student concerns regarding courses, professors, TAs, workloads, etc.

• Assists with the Academic Expo, Princeton Preview, and other events

Seniors

Jesse Brewer  Sam Frank  Chris Jun  Neerav Kumar

Juniors

Bboomika Chowdhary  Aaron Cohen  Maryam Kamel  Dev Patel