

Molecular Toxicology Major Snapshot

Department of Nutritional Science and Toxicology
College of Natural Resources, University of California Berkeley

The Department Nutritional Science and Toxicology in the College of Natural Resources at UC Berkeley offers an undergraduate major in **Molecular Toxicology**. This major combines a strong foundation in the biological and chemical sciences with specialized advanced course work focusing on the hazardous and beneficial effects of natural and human-made toxic agents. From industrially produced environmental contaminants and designer drugs to naturally occurring herbs and food products, this field of study applies molecular and computational methods to better understand how these agents interact with living organisms and what should be done to ensure human health and safety.

Career Opportunities • Medical School • Health Professions

The Molecular Toxicology major prepares students for careers in many applications of biological or computer sciences, including environmental protection, public health, pharmacology, forensic sciences, biotechnology, the food industry, and related businesses.

The Molecular Toxicology major is also ideal preparation for medical school and other professional health programs (e.g. pharmacy, dentistry, optometry, etc). Many of the required pre-med courses are part of our curriculum (including one semester of math, general chemistry, physics, biology, biochemistry as well as two semesters of organic chemistry). Additional pre-med courses (such a second semester of math, physics and biology) can be easily added to your academic plan.

Research Opportunities

Students can earn credit for laboratory work by enrolling in a Supervised Independent Study Research (NST 99 or NST 199). See the DNST advisor for more information.

- Characterizing the mode of action of naturally occurring cancer protective agents in food.
- Foodborne illness and the microbiological safety of our food and water supply.
- Environmental and cellular toxins and DNA damage.
- Identifying the antimicrobial activity of natural products.
- Iron and copper metabolism and the role of these minerals in human health and disease states.

The Curriculum

Lower Division Requirements:

Humanities and Social Science (22 units)

- English R1A & English R1B (or equivalent Reading and Composition course)
- 14 additional units of course work in American Cultures, Arts & Literature, Historical Studies, International Studies, Philosophy & Values, Social & Behavioral Sciences, or Foreign Language.

Biological and Natural Resource Science (11-13 units)

- NST 11 Introduction to Toxicology
- Bio 1A 1AL General Biology
- MCB 32 and MCB 32L Human Physiology Lecture and Lab
(or IB 132 & IB 132L Summer Session)

*Students pursuing the Molecular Toxicology are required to take a lab course in physiology OR microbiology (e.g. MCB 32L or PMB C112L). You may opt to take the accompanying lab course with MCB 32 as a lower division student or choose to take an accompanying lab with your choice for microbiology as an upper division student.

Physical Sciences and Mathematics (21 units)

- Chem 1A 1AL General Chemistry
- Chem 3A 3AL Organic Chemistry
- Chem 3B 3BL Organic Chemistry
- Math 16A or 1A Calculus
- Physics 8A Introductory Physics

Upper Division Requirements (40 units):

Upper Division Required Courses

- MCB 102 Biochemistry & Molecular Biology
- MCB 104 Genetics or IB 141 (Summer Session only)
- PMB/MCB C112 General Microbiology OR PH 162A Public Health Microbiology
- Microbiology Lab (PMB/MCB C112L OR PH 162L) **
- NST 110 Toxicology
- NST 120 Molecular Toxicology
- NST 121 Computational Toxicology
- NST 171 Nutrition and Toxicology Laboratory
- NST 193 Introduction to Research in Toxicology
- Stat 131A Statistical Inferences for Social & Life Scientists or PH 141 (Summer Session Only)

Additional Upper Division Unit Requirements

Students are required to earn a total of 40 upper division biological units (this includes the classes noted above), 15 of these 40 upper division units must be taken in the College of Natural Resources. At least 6 of the remaining units must be selected from Restricted Electives noted below. The balance of units can be satisfied by selecting additional courses from Restricted and/or Suggested Electives to add up to 40 upper division biological units.

Restricted Electives

- ESPM 100 Environmental Problem Solving
- ESPM 162 Bioethics
- NST C114/ESPM C148 Pesticide Chemistry & Toxicology
- NST C115 Principles of Drug Action
- NST C119/PH C170B Advanced Toxicology
- NST H196 Honors Research
- NST 199 Independent Study Research

Suggested Electives

- Chem 130, 130B Biophysical Chemistry
- Civ Eng 114 Environmental Microbiology
- Civ Eng 115 Water Chemistry
- ESPM 119 Chemical Ecology
- ESPM 126 Environmental Soil Chemistry
- ESPM C180 Air Pollution
- IB 117 Medical Ethnobotany
- IB 152 Environmental Toxicology
- NST 103 Nutrient Function and Metabolism
- NST 150 Mechanisms of Metabolic Regulation
- NST 160 Human Nutrition: Normal Physiology
- PH 150A Introduction to Epidemiology & Human Disease
- PH 150B Introduction to Environmental Health

Free Electives (as many units necessary to reach the required 120 overall)

All courses must be taken for a letter grade with the exception of free electives or courses that are only offered on a pass/no pass basis.

There is a maximum limit of 4 units of independent study research per semester and only 16 units of independent student research may count towards graduation.

You must receive at least a C- in all courses required for the major