

# Environmental Science (B.S.) Environmental Molecular Sciences Specialization

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OHIO STATE

What's this major all about?



# Areas of Research in Environmental Molecular Sciences

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**Biogeochemistry** - biological, chemical and geological sciences, environmental change, Earth's biogeochemical cycles (C, N, O, P, S, Fe).

**Paleobiology & Astrobiology** - evolution of life on Earth and other planets, past climates, past ecosystems, extinction events.

**Environmental Microbiology** - interactions between microbes and minerals, bioremediation, evolution of life on Earth, geobiological reactions, extreme organisms (e.g., deep sea, high temperature, high salt, extreme cold).

**Nanotechnology** - synthesis and use of novel organic-inorganic biomaterials for electronics, medicine and biotechnology.

**Mineralogy** - crystal structure and chemistry of environmental minerals, remediation, mineral synthesis.

# What does it take to become a scientist and get a job in Environmental Molecular Sciences?

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Jobs in this field will require a strong education in biology, chemistry, geology and mathematics and laboratory experience in these areas.

After finishing your B.S. degree from OSU, you'll likely want to go on and earn a M.S. and/or Ph.D. degree. Good undergraduate grades & GRE score = full ride tuition scholarship + stipend for graduate school.

You'll likely become an expert of a particular instrument (e.g., atomic force microscope) or technique (pyrosequencing).

Most jobs are in academia (i.e., college, university) or government laboratories (e.g., U.S. DOE National Laboratory).

Ultimate goal likely will be for you to become a professor or lead government scientist (e.g., DOE Environmental Molecular Sciences Laboratory, National Institute of Environmental Health Sciences).

# Future Job Opportunities

Two excellent examples are shown below

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1. U.S. DOE Environmental Molecular Sciences Laboratory, Richland, Washington:

<http://www.emsl.pnl.gov/emslweb/>



2. U.S. NIH, National Institute of Environmental Health Sciences, Triangle Park, North Carolina:

<http://www.niehs.nih.gov>



Our major allows you to tailor your classes to meet your own individual interests:

- biochemistry
- ecosystems
- evolution
- genetics
- microbiology
- mineralogy
- molecular biology
- organic chemistry
- plant biology

<b>Environmental Molecular Sciences Specialization</b>		<b>Units</b>
<b>Biological Sciences</b>		<b>5-9</b>
<b>Required (select 1)</b>		<b>3-4</b>
MICRBIO 509 / 4000 Basic & Practical Microbiology		4
PLNTBIO 630 / MOLGEN 5630 Plant Physiology		3
<b>Electives (select 1)</b>		<b>2-5</b>
MICRBIO 520 & 521 / 4100 General Microbiology		5
MICRBIO 665 / 5155 Environmental Microbiology		3
MICRBIO H669 / 5169H Microbial Evolution		3
MICRBIO 610H / 5161H Bioinformatics & Molecular Microbiology		3
PLNTBIO 625 / MOLGEN 6625 Plant Metabolic Engineering		2
PLNTBIO 631 / MOLGEN 5630 Plant Physiology		3
PLNTPTH 401 / 3001 General Plant Pathology Lecture		3
PLNTPTH 600 / 5010 Phytobacteriology		2
PLNTPTH 602 / 8400 (GRAD) Molecular Bases of Plant Host-Microbe Interactions		3
PLNTPTH 660 / 5040 & 5041 Science of Fungi: Mycology Lecture & Lab		4
<b>Environmental Science (select 1)</b>		<b>5-6</b>
<b>Required (select 1)</b>		<b>3</b>
ENR 660 / 5262 Soil Chemical Processes & Environmental Quality		3
<b>Electives (select 1)</b>		<b>2-3</b>
ENR 665 / 5263 Biology of Soil Ecosystems		3
ENR 675 / 5273 Environmental Fate & Impact of Contaminants in Soil & Water		3
ENR 761 / 6610 Soil and Environmental Biochemistry		2
<b>Geochemistry &amp; Mineralogy</b>		<b>6-7</b>
<b>Required (select 1)</b>		<b>3</b>
EARTHSC 421 / 4421 Earth Materials		3
EARTHSC 621 / 5621 Introduction to Geochemistry		3
<b>Electives (select 1)</b>		<b>3-4</b>
EARTHSC 628 / 5628 Environmental Isotope Geochemistry		3
EARTHSC 636 / 5636 Advanced Topics in Mineralogy and Crystallography		3
EARTHSC 651 / 5651 Hydrogeology		4
EARTHSC 674 / 5676 Elemental Chemical Analysis using ICPOE and Mass Spectrometry		3
EARTHSC 680 / 5680 Deep Earth Geophysics		3
<b>Molecular Biology (select 2)</b>		<b>5-8</b>
<b>Required (select 1)</b>		<b>3-4</b>
BIOCHEM 511 / 4511 Introduction to Biological Chemistry		4
BIOCHEM 613 / 5613 Biochemistry & Molecular Biology I		3
MOLGEN 500 / 4500 General Genetics		3
PCMB 622 Plant Molecular Biology		3
<b>Electives (select 1)</b>		<b>2-4</b>
ENR 894 / 5240 Environmental Molecular Sciences		2
BIOCHEM 614 / 5614 Biochemistry & Molecular Biology II		3
MICROBIO 581.01 / 4130 Microbial Genetics		3
MICROBIO 581.02 / 4140 Molecular Microbiology Laboratory		3
MOLGEN 605 & 606 / 4606 Molecular Genetics		4
MOLGEN 607 / 5607 Cell Biology		3
MOLGEN 622 Plant Genetics & Molecular Biology		
PLNTBIO 623 / MOLGEN 5623 Genetics and Genomics		2
PCMB 648 Plant Cell Biology		
PCMB 650 Biological Microtechnique		
<b>Directed Electives</b>		<b>0-7</b>