

**Environmental Health**  
**MSBS 5050S (3 Credits)**  
**Master of Biomedical Science Program**

**Fall 2024**

**Course Syllabus**

Course Director: Dr. Michael Shakarjian, Ph.D.

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Office Hours: By appointment via telephone or ZOOM

[Personal Meeting Link](#) (Meeting ID: 346 033 2477 Passcode: 674116)

**Meeting Time** **Monday & Wednesday 10:00 - 11:15 (Location TBD)**

**Instructional Materials**

Nadakavukaren, Anne and Caravanos, Jack "[Our Global Environment: A Health Perspective.](#)" 8<sup>th</sup> ed., 2020, Waveland Press, New York. ISBN 978-1478637714

Optional Supplemental Materials:

Howard Frumkin (ed.) Environmental Health: From Global to Local, 3rd Edition, 2016

Moore, Gary S., "Living With The Earth: Concepts in Environmental Health Science." 3<sup>rd</sup> ed., 2007.

**Course Description:**

This course is designed to provide an introduction to the broad field of environmental health. In this course we will discover and explore how the environments that we inhabit and encounter in our daily lives can have profound impacts on health and well-being. We will examine how ecosystems provide goods and services that support life and health, and how natural events and human activity can lead to harm from biological, chemical, physical, and radiological agents in air, water, soil, food, homes, and workplaces. We will apply multidisciplinary concepts and analysis from ecology, toxicology, epidemiology, and behavioral sciences. We will review policies intended to improve health by enhancing or maintaining the environments that we live in.

**Learning Objectives:**

Criteria	Percent of total grade
<b>A. Class attendance</b>	<b>6%</b>
<b>B. Class discussion</b>	<b>6%</b>
<b>C. Paper or report w/Discussion</b>	<b>15%</b>
<b>E. Quizzes</b>	<b>28%</b>
<b>F. Final Examination</b>	<b>25%</b>
<b>G. Pamphlet w/Discussion</b>	<b>20%</b>

**Homework:**

Students are allowed and are encouraged to discuss the assignments outside of class, but the actual homework must be the work of the individual student.

**Examinations:**

There will one final take-home examination consisting of short answer/short essay questions based on class materials and extraneous resources.

**Students with Disabilities:** Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: <https://ods.rutgers.edu/students/documentation-guidelines>. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: <https://ods.rutgers.edu/students/getting-registered>

**Student Conduct**

All students are expected to understand and follow the Rutgers University codes of conduct and academic integrity. See: <http://studentconduct.rutgers.edu/>

**VII. Lecture Schedule**

**32:832:531 Environmental Health**

**Fall 2024: Format TBD**

<b>Date</b>	<b>Day</b>	<b>Lecture Topics and Reading Assignments</b>	<b>Lecturer</b>
9/4/2024	W	Course Introduction: Scope and Nature of Environmental Health 1. Course overview 2. Grading 3. Aspects of global ecology Reading Assignment: Chapter 1	Shakarjian  <b>Informational Pamphlet assignment distributed Discussion #1 Assigned</b>
9/9/2024	M	Population 1. Fertility rates and global population growth 2. Urbanization, affluence and technology 3. Carrying capacity of an ecosystem 4. Limiting population growth and resources use 6. Globalization of industry and infrastructure development Reading Assignment: Chapter 2	Shakarjian
9/11/2024	W	Emerging Infectious Diseases	Shakarjian  <b>Quiz I on Lectures 1 – 3 Due 9/15</b>

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<b>Date</b>	<b>Day</b>	<b>Lecture Topics and Reading Assignments</b>	<b>Lecturer</b>
9/16/2024	M	<p>Genetics and Environmental Health</p> <ol style="list-style-type: none"> <li>1. Disease characteristics</li> <li>2. Familial clustering</li> <li>3. Genetic of environment, that is the question</li> <li>4. Gene Expression Analysis</li> <li>5. SNPs and Expression Studies</li> <li>6. Epigenetics</li> </ol> <p>Reading Assignment: Chapter 5</p>	Shakarjian
9/18/2024	W	<p>Environmental Toxicology</p> <ol style="list-style-type: none"> <li>1. What is Toxicology?</li> <li>2. The role of toxicology in environmental health</li> <li>3. Examples of toxins and health endpoints</li> </ol> <p>Reading Assignment: Chapter 6</p>	Shakarjian
9/23/2024	M	<p>Environmental Epidemiology</p> <ol style="list-style-type: none"> <li>1. Exposure Science/Toxicology/Epidemiology</li> <li>2. Role of epidemiology in risk assessment</li> <li>3. Traditional risk assessment</li> <li>4. Evaluating epidemiological literature for causality</li> </ol> <p>Reading Assignment: Frumkin Chapter 3</p>	<p>Malinowski</p> <p><b>Discussion #2 Assigned</b></p>
9/25/2024	W	<p>Exposure Measurement and Assessment</p> <ol style="list-style-type: none"> <li>1. Role of contact in exposure</li> <li>2. Routes of exposure</li> <li>3. Measurement of exposure</li> <li>4. Exposure modeling</li> </ol> <p>Reading Assignment: Frumkin Chapter 8</p>	<p>Shakarjian</p> <p><b>Quiz II on Lectures 4-7 Due on 9/29</b></p>
9/30/2024	M	<p>Environmental Psychology</p> <ol style="list-style-type: none"> <li>1. Considering health in sociophysical context</li> <li>2. Promotion of good health</li> <li>3. Perceptions of the environment</li> <li>4. Interaction of objective and subjective factors</li> </ol> <p>Reading Assignment: Frumkin Chapter 9</p>	Ehrlich
10/2/2024	W	<p>Environmental Justice</p> <ol style="list-style-type: none"> <li>1. Environmental Ethics</li> <li>2. Convergence of civil and environmental rights</li> <li>3. Disproportionate impacts of pollutions</li> <li>4. Working with community groups</li> </ol> <p>Reading Assignment: Frumkin Chapter 11</p>	Shakarjian
10/7/2024	M	<p>Air Pollution and Indoor Air</p> <ol style="list-style-type: none"> <li>1. Sources of pollution</li> <li>2. Criteria pollutants and air toxics</li> <li>3. Health effects</li> <li>4. Pollution control</li> <li>5. Indoor vs outdoor levels</li> <li>6. Indoor Sources and chemistry</li> </ol>	Shakarjian

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<b>Date</b>	<b>Day</b>	<b>Lecture Topics and Reading Assignments</b>	<b>Lecturer</b>
		Reading Assignment: Chapter 11	
10/9/2024	W	<p>Energy Production</p> <ol style="list-style-type: none"> <li>1. Sources of energy</li> <li>2. Use with level of socioeconomic development</li> <li>3. Health impacts from energy use, global policy</li> <li>4. Life cycle analysis &amp; changing patterns</li> </ol> <p>Reading Assignment Chapter 10</p>	<p>Shakarjian</p> <p><b>Quiz III on Lectures 8-11 Due on 10/13</b></p> <p><b>Pamphlet Assignment Due</b></p>
10/14/2024	M	<p>Radiation and Public Health</p> <ol style="list-style-type: none"> <li>1. Ionizing radiation in the environment</li> <li>2. Cosmic radiation</li> <li>3. Radioactive minerals</li> <li>4. Nuclear power industry</li> </ol> <p>Reading Assignment Chapter 9</p>	Shakarjian
10/16/2024	W	<p>Climate Change</p> <ol style="list-style-type: none"> <li>1. Man-made or not it's happening</li> <li>2. Ambient temperature and health hazards</li> <li>3. Global warming and coastal hazards</li> <li>4. Water, water everywhere but can we drink it?</li> </ol> <p>Reading Assignment Chapter 10</p>	<p>Shakarjian</p> <p><b>Toxicant Paper Assigned</b></p>
10/21/2024	M	<p>Pest Control and Pesticides</p> <ol style="list-style-type: none"> <li>1. Role of pesticides in pest control</li> <li>2. Organochlorines</li> <li>3. Organophosphates</li> <li>4. Pyrethroids</li> <li>5. Health hazards posed by pesticide use</li> </ol> <p>Reading Assignment: Chapter 7</p>	<p>Shakarjian</p> <p><b>Discussion #3 Assigned</b></p>
10/23/2024	W	<p>Healthy Communities and Healthy Buildings</p> <ol style="list-style-type: none"> <li>1. Design of neighborhoods, towns, cities and health</li> <li>2. Urban planning and land use policy</li> <li>3. Building conditions impact on health</li> <li>4. Building-related hazards</li> <li>5. Green buildings</li> </ol> <p>Reading Assignment: Frumkin Chapters 15, 20</p>	<p>Shakarjian</p> <p><b>Quiz 1V on Lectures 12-15 due on 10/27</b></p>
10/28/2024	M	<p>Water Quality Health Effects of Water Pollution</p> <ol style="list-style-type: none"> <li>1. Water cycle</li> <li>2. Water usage</li> </ol> <p>Reading Assignment: Chapter 13</p>	Shakarjian
10/30/2024	W	<p>Water Pollution</p>	Shakarjian

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Date	Day	Lecture Topics and Reading Assignments	Lecturer
		<ol style="list-style-type: none"> <li>1. Water treatment</li> <li>2. Microorganisms of concern</li> <li>3. Chemical contamination</li> <li>4. Mitigation and standards</li> </ol> <p>Reading Assignment: Chapter 14</p>	
11/4/2024	M	<p>Impacts of Growth</p> <p>Reading Assignment: Chapter 4</p>	
11/6/2024	W	<p>Solid and Hazardous Wastes</p> <ol style="list-style-type: none"> <li>1. Sources of wastes</li> <li>2. Impact on the environment</li> <li>3. Treatment and control</li> </ol> <p>Reading Assignment: Chapter 15</p>	<p>Lee</p> <p><b>Quiz V on Lectures 16-19 due on 11/10</b></p>
11/11/2024	M	<p>Children and Reproductive Health</p> <ol style="list-style-type: none"> <li>1. Adverse (adverse pregnancy outcomes (miscarriages, stillbirth, low birth weight, congenital malformations))</li> <li>2. Measurement error in pregnancy</li> <li>3. Exposure to environmental agents in reproductive health</li> <li>4. Diagnostic challenges</li> </ol> <p>Reading Assignment: Frumkin Chapter 28</p>	<p>Shakarjian</p> <p><b>Discussion #4 Assigned</b></p>
11/13/2024	W	<p>Disasters and Response</p> <ol style="list-style-type: none"> <li>1. Environmental disasters: exposure, vulnerability, coping</li> <li>2. Natural or technological premises</li> <li>3. Planning for a disaster and recovery</li> <li>4. Disaster risk management and sustainable development</li> </ol> <p>Reading Assignment for next class: Moore Chapter 14</p>	<p>Shakarjian</p>
11/18/2024	M	<p>Food Systems and Public Health</p> <ol style="list-style-type: none"> <li>1. Food Consumption and Malnutrition</li> <li>2. Microbial and Chemical Contamination and Disease</li> <li>3. Global issues of food</li> <li>4. Food Safety</li> </ol> <p>Reading Assignment: Chapters 3 and 8</p>	<p>Shakarjian</p> <p><b>Toxicant Paper Due</b></p>
11/20/2024	W	<p>Prevention in Environmental Health</p> <ol style="list-style-type: none"> <li>1. Control of hazards and environmental health promotion</li> <li>2. Prevention hierarchy: removal, administrative, behavioral</li> <li><b>3. Precautionary principle</b></li> </ol> <p>Reading Assignment: Chapter 26</p>	<p>Shakarjian</p> <p><b>Quiz VI on lectures 20-23 due on 11/24</b></p>
11/25/2024	M	<p>Geographic Information Systems</p> <ol style="list-style-type: none"> <li>1. Geographic data relevant to environmental health</li> </ol>	<p>Quispe/Tulloch</p>

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Date	Day	Lecture Topics and Reading Assignments	Lecturer
		2. GIS Mapping of data 3. Operations: layering, buffering, spatial queries 4. Data quality and availability and methodological issues  Reading Assignment: Chapter 28	
11/27/2024	W	Occupational Health  1. The history and role of occupational health 2. Mining and dusty trades 3. Chemical exposures in the workplace 4. Accident prevention  Reading Assignment: Chapters 20 & 27	Lee  <b>Final Exam Posted</b>
12/2/2024	M	Risk Assessment and Management  1. Scientific components of risk assessment 2. Toxicology versus Epidemiology 3. Policy making for risk management  Reading Assignment: Chapter 29	Shakarjian Or TBA
12/4/2024	W	Risk Communication  1. Two-way exchange of information 2. Inform public, provide warnings, help resolve conflicts 3. Determinants of risk perception and addressing needs of communities  Reading Assignment: Chapter 31	Shakarjian
12/9/2024	M	Current Issue in Environmental Health  Topic chosen by class from current events Class discussion format	Shakarjian  <b>Quiz VII on Lectures 24-28 due on Dec 15.</b>