

- Course Title:** *Environmental and Occupational Toxicology*
- Course Number:** *ENOH 0594-030*
- Course Location:** *Rutgers School of Public Health, Room 334*
- Course Website:** *canvas.rutgers.edu*
- Course Date & Time:** *6 to 8 PM, Tuesdays, January 17 to May 8, 2023*
- Course Instructor:** *Jun-Yan Hong, PhD, Professor, Rutgers (SPH-ENOH), Room 422, EOHSI Building, 848-445-6146, [hongju@sph.rutgers.edu](mailto:hongju@sph.rutgers.edu); <https://rutgers.webex.com/meet/hongju>*
- Office Hours:** *9 am to 5 pm. Students may schedule individual meetings by phone or WebEx- **Appointment is required.***
- Required Course Text:** *Curtis D. Klaassen and John Watkins III: Casarett & Doull's Essentials of Toxicology, 3<sup>rd</sup> Edition, 2015, McGraw-Hill Education, ISBN 978-0-07-184708-7*

**Additional/Supplemental Readings/Resources:** *Supplemental readings related to course topics and subtopics will be assigned during class.*

**Course Description:** *This course will introduce students to the basic language and principles of toxicology.*

**Selected Department Competencies Addressed:**

***For PhD students***

- Design a testable hypothesis and execute research activity to investigate the effects of a toxicant, or toxin, or hazard event in a community;
- Explain the importance of differences of susceptibility and vulnerability to environmental toxicant/toxins based upon age, gender, race, ethnicity, genetics and socioeconomic status in different populations;
- Provide an informed expert opinion to government and/or community leaders regarding the extent or level of risk associated with a particular environmental or occupational hazard or condition;
- Be able to teach a course in Environmental and Occupational Health;  
Obtain grant funding from private and/or governmental agencies to initiate an ENOH research program;
- Explain basic principles in environmental and occupational health sciences including toxicology, quantitative risk assessment, epidemiology, and exposure science; and
- Develop and/or apply novel and cutting-edge research methods in the laboratory and/or in the field.

**Selected Concentration Competencies Addressed:**

**A. For the MPH in Occupational and Environmental Medicine (OEM)**

1. Articulate occupational safety and health issues in the workplace and as applicable the related exposure risks to the general public as well as to vulnerable communities or susceptible sub-populations;
2. Explain basic mechanisms of toxicology and dose-response regarding occupational toxicants;
3. Apply federal and state regulatory standards which are related to worker (occupational) safety and health protection;
4. Evaluate the impact that environmental factors have on vulnerable populations

**B. For the MPH in Occupational Safety and Health (OSH)**

1. Identify occupational safety and health issues in the workplace and as applicable the related exposure risks to the general public as well as to vulnerable communities or susceptible sub-populations
2. Explain basic mechanisms of toxicology and dose-response regarding occupational toxicants
3. Apply federal and state regulatory standards which are related to worker (occupational) safety and health protection

**C. For the MPH in Environmental Health Sciences (EHS)**

1. Describe the major environmental health problems facing the general public as well as among specific communities or susceptible, vulnerable sub-populations
2. Explain the basic mechanism of toxicology and dose-response as applied to environmental toxicants
3. Describe the federal and state regulatory programs that relate to environmental (community) protection

Please visit the concentration webpages on the school of Public Health's website at [sph.rutgers.edu](http://sph.rutgers.edu) for additional competencies addressed by this course for other degrees and concentrations. Please visit the Department webpages on the School of Public Health's website at <http://sph.rutgers.edu/> for additional competencies addressed by this course for other degrees and departments.

**Course Objectives:** By the completion of this course, students will be able to:

- a) Understand the basic concept of toxicology (e.g., dose response, thresholds);
- b) Understand the major dynamic processes (e.g., absorption, metabolism, excretion);
- c) Understand the mechanisms by which xenobiotics damage living systems at the molecular, cellular, tissue and organ levels;
- d) Understand the major categories of toxicological damage on an organ-system basis and
- e) Understand the major classes of toxic substances and the manner in which they produce damage

**A. For the MPH in Occupational and Environmental Medicine (OEM)**

OEM Competency	Course Objectives(s)	Lessons	Assessment(s)
1	a, d, e	1, 5, 6, 8, 9, 10, 11	classroom discussions; two examinations; presentations, final paper
2	b, c, d, e	2, 3, 4, 5, 6, 8, 9, 10, 11	same as above
3	d, e	1, 12, 14, 15	same as above
4	b, c, d, e	1,2, 3, 14, 15	same as above

**B. For the MPH in Occupational Safety and Health (OSH)**

OSH Competency	Course Objectives(s)	Lessons	Assessment(s)
1	a, d, e	1, 5, 6, 8, 9, 10, 11	classroom discussions; two examinations; presentations, final paper
2	b, c, d, e	2, 3, 4, 5, 6, 8, 9, 10, 11	same as above
3	d, e	1, 12, 14, 15	same as above

**C. For the MPH in Environmental Health Sciences (EHS)**

EHS Competency	Course Objectives(s)	Lessons	Assessment(s)
1	a, d, e	1, 5, 6, 8, 9, 10, 11	classroom discussions; two examinations; presentations, final paper
2	b, c, d, e	2, 3, 4, 5, 6, 8, 9, 10, 11	same as above
3	d, e	1, 12, 14, 15	same as above

**Course Requirements and Grading:**

- In addition to attending the lectures and taking two examinations, each student is required to present a literature review on a specific environmental health/occupational medicine issue. The topic will be assigned after the first examination. It will be a 20-min oral presentation. For PhD students, submission of an additional 5-page report with original references at the end of course is required.*

**Grading**

- |  |                 |
|--|-----------------|
| 1. Examination #1 (Midterm)              | 35 pts.         |
| 2. Examination #2 (Final)                | 35 pts.         |
| 3. Project Presentation                  | 20 pts          |
| 4. Participation in classroom discussion | 10 pts          |
| <b>Total:</b>                            | <b>100 pts.</b> |

- Grading Policy:** 94 – 100 A
- 90 – <94 A-
- 87 – <90 B+
- 84 – <87 B
- 80 – <84 B-
- 77 – <80 C+
- 70 – <77 C

- <70 F

**Course Schedule:** *Includes week-by-week listing of each class session (dates to be determined based on academic calendar)*

**Course Topics (including linked competencies and assessment)**

**Introduction to Principles of Toxicology (class 1)**

***Linked competency:***

- Describe the major environmental health problems to the general public as well as specific communities within that population;
- Explain the importance of differences of susceptibility and vulnerability to environmental toxicant/toxins based upon age, gender, race, ethnicity, genetics and socioeconomic status in different populations;

***Assessment:*** Classroom discussion and midterm exam

**Mechanism of Toxicity (class 2)**

***Linked competency:***

- Explain the basic mechanism of toxicology and dose-response regarding environmental toxicants;
- Explain the importance of differences of susceptibility and vulnerability to environmental toxicant/toxins based upon age, gender, race, ethnicity, genetics and socioeconomic status in different populations;

***Assessment:*** Classroom discussion and midterm exam

**Metabolism and Toxicokinetics (class 3)**

***Linked competency:***

- Explain the basic mechanism of toxicology and dose-response regarding environmental toxicants;
- Explain the importance of differences of susceptibility and vulnerability to environmental toxicant/toxins based upon age, gender, race, ethnicity, genetics and socioeconomic status in different populations;

***Assessment:*** Classroom discussion and midterm exam

**Carcinogenesis/Genetic Toxicity (class 4)**

***Linked competency:***

- Explain the basic mechanism of toxicology and dose-response regarding environmental toxicants;
- Describe the major environmental health problems to the general public as well as specific communities within that population;

***Assessment:*** Classroom discussion and midterm exam

**Toxic Response of the Liver and Kidney (class 5)**

***Linked competency:***

- Explain the basic mechanism of toxicology and dose-response regarding environmental toxicants;

- Describe the major environmental health problems to the general public as well as specific communities within that population;

**Assessment:** Classroom discussion and midterm exam

## **Toxic Response of the Immune System and Lung (class 6)**

### ***Linked competency:***

- Explain the basic mechanism of toxicology and dose-response regarding environmental toxicants;
- Describe the major environmental health problems to the general public as well as specific communities within that population;

**Assessment:** Classroom discussion and midterm exam

## **Exam I (Midterm) (class 7)**

## **Toxic Response of the Nervous System (class 8)**

### ***Linked competency:***

- Explain the basic mechanism of toxicology and dose-response regarding environmental toxicants;
- Describe the major environmental health problems to the general public as well as specific communities within that population;

**Assessment:** Classroom discussion and final exam

## **Toxic Response of the Skin (class 9)**

### ***Linked competency:***

- Explain the basic mechanism of toxicology and dose-response regarding environmental toxicants;
- Describe the major environmental health problems to the general public as well as specific communities within that population;

**Assessment:** Classroom discussion and final exam

## **Developmental Toxicology (class 10)**

### ***Linked competency:***

- Describe the major environmental health problems to the general public as well as specific communities within that population;
- Explain the importance of differences of susceptibility and vulnerability to environmental toxicant/toxins based upon age, gender, race, ethnicity, genetics and socioeconomic status in different populations;
- Explain the basic mechanism of toxicology and dose-response regarding environmental toxicants;

**Assessment:** Classroom discussion and final exam

## **Toxic Effects of Metals and Solvents (class 11)**

### ***Linked competency:***

- Explain the basic mechanism of toxicology and dose-response regarding environmental toxicants;
- Describe the major environmental health problems to the general public as well as specific communities within that population;

**Assessment:** Classroom discussion and final exam

### **Regulatory Toxicology and Risk Assessment (class 12)**

**Linked competency:**

- Describe the federal and state regulatory programs that relate to environmental (community) and worker (occupational) protection;
- Specify current environmental risk assessment approaches and methods for a particular hazard or risk in a community.

**Assessment:** Classroom discussion and final exam

### **Exam II (Final) (class 13)**

### **Emerging Environmental Health Issues (Student Project Presentation I) (class 14)**

**Linked competency:**

- Describe the major environmental health problems to the general public as well as specific communities within that population;
- **Explain the models** of environmental exposures (one or more agents) and adverse health outcomes (causing injury, disability, other measure of morbidity or mortality);
- Explain the basic mechanism of toxicology and dose-response regarding environmental toxicants;
- Design a testable hypothesis and execute research activity to investigate the effects of a toxicant, or toxin, or hazard event in a community;
- Be able to teach a course in Environmental and Occupational Health; Obtain grant funding from private and/or governmental agencies to initiate an EHS and OEM research programs;
- Provide an informed expert opinion to government and/or community leaders regarding the extent or level of risk associated with a particular environmental or occupational hazard or condition;
- Explain basic principles in environmental and occupational health sciences including toxicology, quantitative risk assessment, epidemiology, and exposure science;
- Develop and/or apply novel and cutting-edge research methods in the laboratory and/or in the field.

**Assessment:** PPT presentation and evaluation, classroom discussion, and paper (PhD students only).

### **Emerging Environmental Health Issues (Student Presentation II) (class 15)**

**Linked competency:**

- Describe the major environmental health problems to the general public as well as specific communities within that population;
- **Explain the models** of environmental exposures (one or more agents) and adverse health outcomes (causing injury, disability, other measure of morbidity or mortality);
- Explain the basic mechanism of toxicology and dose-response regarding environmental toxicants;
- Design a testable hypothesis and execute research activity to investigate the effects of a toxicant, or toxin, or hazard event in a community;
- Be able to teach a course in Environmental and Occupational Health; Obtain grant funding from private and/or governmental agencies to initiate an EHS and OEM research programs;

- Provide an informed expert opinion to government and/or community leaders regarding the extent or level of risk associated with a particular environmental or occupational hazard or condition;
  - Explain basic principles in environmental and occupational health sciences including toxicology, quantitative risk assessment, epidemiology, and exposure science;
  - Develop and/or apply novel and cutting-edge research methods in the laboratory and/or in the field.
- Assessment:** PPT presentation and evaluation, classroom discussion, and paper (PhD students only).

## ***Spring 2023***

### **Subject**

Introduction to Principles of Toxicology	1/17
Mechanism of Toxicity	1/24
Metabolism and Toxicokinetics	1/31
Carcinogenesis/Genetic Toxicity	2/07

<p><b>Learning Management System (Canvas)</b> will be used extensively throughout the semester for course syllabus, assignments, announcements, communication and/or other course-related activities. It is the student's responsibility to familiarize themselves with Canvas and check it regularly. If you have difficulties accessing Canvas, please inform the instructor and Canvas Support (<a href="mailto:help@canvas.rutgers.edu">help@canvas.rutgers.edu</a>). Canvas is accessible at <a href="https://canvas.rutgers.edu">canvas.rutgers.edu</a>.</p>	2/14
<p><b>Toxic Response of the Immune System and Lung</b></p>	2/21
<p><b>Exam I (Midterm)</b></p>	2/28
<p><b>School of Public Health Honor Code:</b> The School of Public Health Honor Code is found in the School Catalog (<a href="https://sph.rutgers.edu/academics/catalog.html">sph.rutgers.edu/academics/catalog.html</a>). Each student bears a fundamental responsibility for maintaining academic integrity and intellectual honesty in his or her graduate work. For example, all students are expected to observe the generally accepted principles of scholarly work, to submit their own rather than another's work, to refrain from falsifying data, and to refrain from receiving and/or giving aid on examinations or other assigned work requiring independent effort. In submitting written material, the writer takes full responsibility for the work as a whole and implies that, except as properly noted by use of quotation marks, footnotes, etc., both the ideas and the works used are his or her own. In addition to maintaining personal academic integrity, each student is expected to contribute to the academic integrity of the School community by not facilitating inappropriate use of her/his own work by others and by reporting acts of academic dishonesty by others to an appropriate school authority. It should be clearly understood that plagiarism, cheating, or other forms of academic dishonesty will not be tolerated and can lead to sanctions up to and including separation from the Rutgers School of Public Health.</p>	3/07
<p><b>Students with Disabilities:</b> Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student must Apply for Services by first completing a Registration Form with the Rutgers Office of Disability Services (ODS) at <a href="https://ods.rutgers.edu">ods.rutgers.edu</a>. The student will also be required to participate in an ODS intake interview and provide documentation. If reasonable accommodations are granted, ODS will provide you with a Letter of Accommodations which should be shared with your instructors as early in your courses as possible.</p>	3/21
<p><b>Graduate Student Computer Policy:</b> Students are required to possess a personal laptop, no older than approximately two years, that must meet minimum requirements which may be found online at: <a href="https://sph.rutgers.edu/student-life/computer-support.html">sph.rutgers.edu/student-life/computer-support.html</a>.</p>	3/28
<p><b>Policy Concerning Use of Recording Devices and Other Electronic Communications Systems:</b> When personally owned communication/recording devices are used by students to record lectures and/or classroom lessons, such use must be authorized by the faculty member or instructor who must give either oral or written permission prior to the start of the semester and identify restrictions, if any, on the use of mobile communications or recording devices.</p>	4/04
<p><b>Policy Concerning Use of Turnitin:</b> Students agree that by taking this course all required papers may be subject to submission for textual similarity review to Turnitin.com (directly or via learning management system, i.e. Canvas) for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the Usage Policy posted on the Turnitin.com site. Students who do not agree should contact the course instructor immediately.</p>	4/11
<p><b>Withdrawal/Refund Schedule:</b> Students who stop attending their course(s) without submitting a completed <a href="#">Add/Drop Course</a> form will receive a failing grade. Furthermore, students dropping to zero credits for the semester are considered withdrawn and must submit a completed <a href="#">Leave of Absence</a> form from the School of Public Health's Office of Student Affairs. The School of Public Health refunds tuition only. Administrative and technology fees are non-refundable. You may find the Withdrawal/Refund Schedule on the School of Public Health website at: <a href="https://sph.rutgers.edu/academics/school-calendar.html">sph.rutgers.edu/academics/school-calendar.html</a></p>	4/18
<p><b>Withdrawal/Refund Schedule:</b> Students who stop attending their course(s) without submitting a completed <a href="#">Add/Drop Course</a> form will receive a failing grade. Furthermore, students dropping to zero credits for the semester are considered withdrawn and must submit a completed <a href="#">Leave of Absence</a> form from the School of Public Health's Office of Student Affairs. The School of Public Health refunds tuition only. Administrative and technology fees are non-refundable. You may find the Withdrawal/Refund Schedule on the School of Public Health website at: <a href="https://sph.rutgers.edu/academics/school-calendar.html">sph.rutgers.edu/academics/school-calendar.html</a></p>	4/25
<p><b>Withdrawal/Refund Schedule:</b> Students who stop attending their course(s) without submitting a completed <a href="#">Add/Drop Course</a> form will receive a failing grade. Furthermore, students dropping to zero credits for the semester are considered withdrawn and must submit a completed <a href="#">Leave of Absence</a> form from the School of Public Health's Office of Student Affairs. The School of Public Health refunds tuition only. Administrative and technology fees are non-refundable. You may find the Withdrawal/Refund Schedule on the School of Public Health website at: <a href="https://sph.rutgers.edu/academics/school-calendar.html">sph.rutgers.edu/academics/school-calendar.html</a></p>	5/02



**Special Circumstances During COVID-19 (For Fall 2020) Please follow up the updated RU and SPH policy**

The School of Public Health recognizes that students may experience challenges or be negatively impacted due to the COVID-19 pandemic, mental and emotional health toll from systemic racism, altered personal and professional obligations, and other crises existing at the moment in our local, national, and global communities. Students are encouraged to discuss these challenges and circumstances with their instructor, if they feel they may need additional support or temporary accommodations at the beginning or during this course. The course instructor may consider making reasonable temporary adjustments depending on the student's situation. If additional support is needed, students may reach out to the [Office of Student Affairs](#) ([studentaffairs@sph.rutgers.edu](mailto:studentaffairs@sph.rutgers.edu)) or any of the appropriate referral resources listed on the [Student Connect Canvas page](#).

**Remote Learning Policies**

As you know, we are engaged in this course under extraordinary circumstances. Not only are we now conducting the class remotely, but we are all working under the repercussions of the COVID-19 pandemic. The following are class policies for our class sessions with Zoom. Please read carefully; these policies apply to the Fall 2020 semester. All students are expected to adhere to the policies.

General: Log into Zoom using your Rutgers NetID and sign-in with your full first name and last name as listed on the class roster. (If you use a different name than what is listed on the class roster, please email the instructor in advance of the class or send a private Chat message.) Using your full name allows the instructor to know who is in attendance and to quickly sort students into their groups when needed. Users who do not log into Zoom using their Rutgers NetID may have trouble accessing the Zoom classroom.

Video: Please turn on your video when possible. We recognize that this isn't always easy but this will help to build our class community. Seeing the faces of your classmates more closely duplicates the typical in-person learning experience and may shift your mindset into more focus and attention. Seeing each other can also provide each of us with positive social interactions.

- If you're unable to find an environment without a lot of visual distractions or prefer to not show your living space as a background, feel free to use a virtual background (several virtual background images created by the School of Public Health are available in the [Student Connect Canvas page](#)).
- To save bandwidth, there may be times during class when the instructor asks students to turn off videos.
- Add a photo to your Zoom profile. (Then in times when videos are off, we'll see photos of everyone rather than an empty box.)
- If you have limited internet bandwidth or other issues impacting your video use, please inform the instructor.

Audio: Mute your microphone when you are not talking. This helps eliminate background noise.

- Use a headset, if possible. If you own headphones with a microphone, please use them. This improves audio quality.
- Be in a quiet place, if possible. Turn off any music, videos, etc. in the background.

Chat: Stay on topic and be respectful. Use the chat window for questions and comments that are relevant to class.

NOTE: Class meetings on Zoom will be recorded and made available for students in the course on Canvas only.



**Acknowledge (Print name)**

**Signature and Date**