Mel and Enid Zuckerman College of Public Health  
University of Arizona  

SYLLABUS  
EHS/PCOL 553 Toxicology and Chemical Exposure  
SPRING 2020  

Time: 1:00 – 2:15 p.m., Monday and Wednesday  

Location: Health Sciences Innovation Building, Room 320  

Instructor and Contact Information:  
Jefferey L. Burgess, MD, MS, MPH  
Office: Drachman Hall Room A317C  
Phone: (520) 626-4918  
Email: jburgess@u.arizona.edu  

Co-Instructor:  
Mark D. Van Ert, Ph.D., CIH  
Email: vanert@dakotacom.net  

Instructor Availability:  
Dr. Burgess: Office visits by appointment  
Dr. Van Ert: Phone meetings by appointment  

Teaching Assistant/T.A. Office Hours: N/A  

Catalog Description: Principles of toxicology related to industry and the environment; dose response; mechanisms of toxicity; hazard evaluation principles; toxicology of major classes of industrial and environmental compounds.  

Course Description: This course will cover the recognition and toxicology of specific chemical agents and chemical groups including hazard identification, hazard evaluation, mechanisms of toxicity, dose-response, use in industry and exposures from the environment.  

Course Prerequisites: None, although previous courses in chemistry and biology are strongly recommended.  

Course Objectives and Expected Learning Outcomes: During this course students will:  

1. Utilize various information sources to identify chemicals commonly employed in industry  
2. Appreciate the potential toxic effects of various families of chemical agents  
3. Understand the basic mechanisms of toxicity of selected chemical agents relative to exposure level  
4. Appreciate the significance of exposure levels relative to currently acceptable exposure limits  
5. Describe common chemical exposures by specific industry and environment
**Learning Outcomes (EOH Competencies Obtained):** Upon completion of this course students will be able to:

1. Recognize and classify the major types of chemical exposure agents capable of inducing disease in the public.
2. Describe the base mechanism of toxicity and potential health effects and diseases caused by various chemical agents.
3. Anticipate and recognize stressors, know toxic effects, correctly apply legal standards to the workplace, and recognize the need for life-long learning.
4. Identify control methods for reducing worker or public exposures to acceptable levels.

**MPH EOH-IH Concentration Competencies Covered**

1. Understand physiological and/or toxicological interactions of physical, chemical, biological, and ergonomic agents, factors, and/or stressors with the human body. [Midterm and final exam questions are used to assess student understanding of toxicological effects of chemical exposures.]
2. Assess qualitative and quantitative aspects of exposure assessment, dose-response, and risk characterization based on applicable pathways and modes of entry [Midterm and final exam questions are used to assess student understanding of dose-response effects of chemical exposures and differences by route of entry]

**Course Notes:** Lecture notes will be made available on a course website or handed out.

**Required Text/Readings:** None

The course will generally use on-line materials for reading assignments.

Recommended but not required texts include:
- Casarett and Doull’s *Toxicology: The Basic Science of Poisons*, 9th edition
- Luttrell et al., *Toxicology Principles for the Industrial Hygienist*

**Course Requirements:** Students will be required to complete quizzes, homework, article reviews, work-site visits, two midterm exams, and a final exam. In addition, development of a final project addressing an environmental or occupational health exposure and related health effects will be required with an associated presentation to the class. The topic must be pre-approved by the course instructor. You should expect to spend 3-4 hours on course work for each unit of credit. For a three credit class plan to spend approximately 8-11 hours per week outside of class.

**Grading Scale/Student Evaluation and Policies:**

Student performance and competencies will be assessed via a variety of homework assignments, participation activities, quizzes, exams and, for graduate students, a final, semester-long project and end of semester presentation.

The grading system for this course is based on the following items:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Due Date</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes/Participation/Homework</td>
<td>See course schedule</td>
<td>40 pts</td>
</tr>
<tr>
<td>Midterm Exam 1</td>
<td>See course schedule</td>
<td>100 pts</td>
</tr>
<tr>
<td>Midterm Exam 2</td>
<td>See course schedule</td>
<td>100 pts</td>
</tr>
<tr>
<td>Final Exam</td>
<td>See course schedule</td>
<td>100 pts</td>
</tr>
<tr>
<td>Final Project</td>
<td>See course schedule</td>
<td>60 pts</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>400 pts</strong></td>
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</table>
Up to nine graded quizzes are scheduled for the semester. You may drop the single lowest quiz grade (counting up to 8/9). Other assignments will be given for homework. It is recommended that you attempt to study the reading assignments for each class day as they will be the source of quiz information and are also essential preparation for exams.

The following scale will be a general guideline for the determination of course grades. If necessary, a revised copy may be passed out at a later date.

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Two Midterm Exams</td>
<td>25% each</td>
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<tr>
<td>Final Exam</td>
<td>25%</td>
</tr>
<tr>
<td>Final Project</td>
<td>15%</td>
</tr>
<tr>
<td>Assignments/Quizzes/Participation</td>
<td>10%</td>
</tr>
</tbody>
</table>

Final grades will be based on the following relative point system: A = 90-100%; B = 75-89%; C = 65-74%; D = 50-64%; E = < 50%.

Description of Each Assignment and Competencies Covered

The Quizzes/Participation/Homework will cover EOH Competencies 1-3.

The Midterm Exam 1 will cover EOH Competencies 1-4 and MPH EOH-IH Competencies 1 and 2.

The Midterm Exam 2 will cover EOH Competencies 1-3 and MPH EOH-IH Competencies 1 and 2.

The Final Exam will cover EOH Competencies 2-4 and MPH EOH-IH Competencies 1 and 2.

The Final Project will cover EOH Competency 2.

Homework Assignments submitted late will receive zero points unless a prior extension has been requested and approved by the instructor.

Missing Assignments submitted late will receive zero points. In the event of academic misconduct, the consequence for the first offense will be a zero for the assignment. A second offense will result in a failing grade for the course. Requests for incompletes (I) and withdrawal (W) must be made in accordance with University policies. University policy regarding grades and grading systems is available at: http://catalog.arizona.edu/policy-type/grade-policies

Required Extracurricular Activities: At least one day-long field trip will be planned for the course and attendance is required. If you are not able to participate, then you will need to arrange a suitable replacement or replacements with the course instructor.

Extra Credit: There will be no extra credit assignments.

Examinations: Students will be expected to demonstrate that they have met the course objectives through homework assignments, examinations, real time evaluations (i.e., quizzes, discussions). In class and final exams will consist of multiple choice, short answer, and essay questions. It is your responsibility to clear your calendar and take the exam at the scheduled time and place. Exams must be completed during the specified time. There are no make-up exams. Likewise, there are no make-up opportunities for quizzes and participation points. You will lose participation points if you fail to participate in discussions, turn in participation assignments or do not show up for graduate student presentations toward the end of the semester.

FINAL EXAM: Monday, May 7th, 2018, 1:00 – 3:00 p.m.

Final exam dates are set by the University so as not to conflict with other exam dates. No early or make-up final exam will be offered unless hardship can be demonstrated and the instructor can offer an alternate date.

Note: The University’s Final Exam regulations can be found here: http://www.registrar.arizona.edu/staff/courses/final-exams?audience=staff&cat1=10
Absence and Class Attendance/Participation: Students are expected to attend classroom sessions and participate in class discussions. If absolutely necessary, class make-ups can be arranged with instructor permission. Class participation will be included in the grading rubric as previously described.

The UA’s policy concerning class attendance, participation, and administrative drops is available at: http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable, http://policy.arizona.edu/human-resources/religious-accommodation-policy.

Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored, http://deanofstudents.arizona.edu/

Communications: You are responsible for reading emails sent to your UA account from your instructor(s) and the announcements or D2L content placed on the course web site. Information about readings, news events, your grades, assignments and other course related topics will be communicated to you with these electronic methods. The official policy can be found at: https://www.registrar.arizona.edu/personal-information/official-student-email-policy-use-email-official-correspondence-students

Participation in online discussion forums is encouraged for peer mentoring and learning. The best way to reach the instructor or TAs are to visit F2F during office hours by appointment. The TA will not be available via CATMail chat forums.

Important: check D2L regularly for a current communication of course progression.

Accessibility and Accommodations: At the University of Arizona, we strive to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability or pregnancy, you are welcome to let me know so that we can discuss options. You are also encouraged to contact Disability Resources (520-621-3268) to explore reasonable accommodation. If our class meets at a campus location: Please be aware that the accessible table and chairs in this room should remain available for students who find that standard classroom seating is not usable. For additional information on Disability Resources and reasonable accommodations, please visit http://drc.arizona.edu/students

Code of Academic Integrity: Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercise must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity, available through the office of the UA Dean Students: http://deanofstudents.arizona.edu/policies-and-codes/code-academic-integrity

Students are required to write all answers to assignments and exams independently. There is zero tolerance policy in this class for cheating. Cases of cheating, or of helping others to cheat, will be penalized to the maximum extent allowed at the University. If you are uncertain about the difference between collaboration and copying, come see me. You are encouraged to discuss assignments but your answer must be written individually and represent your own understanding. Posting answers to, or soliciting answers from, online course help sites is considered cheating.

Consequences for any type of academic misconduct may result in a grade of zero for assignment, or a failing grade for the course.

Pay special attention to the sections on plagiarism.

Plagiarism: What counts as plagiarism?
• Copying answers from another student or “recycling” work you have previously utilized and submitting as a new piece of work.
• Copying and pasting information from a web site or another source, and then revising it so that it sounds like your original idea.
• Doing an assignment/essay/take home test with a friend and then handing in separate assignments that contain the same ideas, language, phrases, etc.
• Quoting a passage without quotation marks or citations, so that it looks like your own.
• Paraphrasing a passage without citing it, so that it looks like your own.
• Hiring another person to do your work for you, or purchasing a paper through any of the on- or off-line sources.

Classroom Behavior: (Statement of expected behavior and respectful exchange of ideas: Present policies to foster a positive learning environment, including use of cell phones, mobile devices, etc.). Students are expected to be familiar with the UA Policy on Disruptive Student Behavior in an Instructional Setting found at: http://policy.arizona.edu/education-and-student-affairs/disruptive-behavior-instructional-setting

You may use your computer in class for accessing content related to this course only. Other uses of the computer during class are distracting to fellow students and lecturers and will not be permitted. Likewise, cell phones should be set to silent or vibrate in order to not disrupt the class and disturb your fellow students and professor. Texting is not allowed during class.

Threatening Behavior Policy: The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to one’s self, http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students

Nondiscrimination and Anti-Harassment Policy: The University of Arizona is committed to creating and maintaining an environment free of discrimination, http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy

UA Smoking and Tobacco Policy: The purpose of this Policy is to establish the University of Arizona’s (University) commitment to protect the health of University faculty, staff, students, and visitors on its campuses and in its vehicles, http://policy.arizona.edu/ethics-and-conduct/smoking-and-tobacco-policy

Syllabus Changes: Information contained in the course syllabus, other than the grade and absence policies, may be subject to change with reasonable advance notice, as deemed appropriate by the instructor.

Course Schedule:

<table>
<thead>
<tr>
<th>Month</th>
<th>Date</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>15</td>
<td>Introduction/ Respirator fit-testing questionnaire/ Hazardous Materials Incidents</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>MARTIN LUTHER KING JR. DAY – NO CLASS</td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>Hazard Evaluation Principles (Van Ert)</td>
</tr>
<tr>
<td></td>
<td>27</td>
<td>Hazardous Materials Incidents (continued)</td>
</tr>
<tr>
<td></td>
<td>29</td>
<td>Principles of Toxicology</td>
</tr>
<tr>
<td>February</td>
<td>3</td>
<td>Asphyxiants / Acids / Bases</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Poison Control Centers (Shirazi)</td>
</tr>
</tbody>
</table>
10  Respirator fit-testing (Littau)
12  Metals I – Arsenic / Arsine / Stibine / Lead / Mercury / Manganese
17  Metals II – Beryllium / Zinc / Cadmium / Chromium
19  Mining/smelting hazards (Cole)
21  **Friday Field Trip I – Miami-Globe smelter**  
meet at 6:10 AM on the East side of Drachman Hall
24  MIDTERM 1/ TLV documentation and Final project outlines due
26  Presentations of TLV documentation

**March**

2  Respiratory Toxicology
4  Dermal, Cardiovascular, Renal and Sensory Toxicology
9  **NO CLASS- UA SPRING BREAK**
11  **NO CLASS- UA SPRING BREAK**
16  Aliphatic Hydrocarbons (Van Ert)
18  Aromatic and Chlorinated Hydrocarbons (Van Ert)
23  Neurotoxicology / Hepatic Toxicology
25  Immunotoxicology / Reproductive and Genetic Toxicology
30  Carcinogenesis / Teratogenesis

**April**

1  Ketones and Aldehydes (Van Ert)
6  **MIDTERM EXAM 2**
8  Pesticides I
13  Pesticides II and Alcohols
15  Firefighting hazards
20  Methamphetamine laboratories and **Final Project Draft Due**
22  No class - comp time from field trip
27  Indoor Air Quality investigations
29  No class - comp time from field trip

**May**

4  Class Presentations
6  Class Presentations and **Final Project Due**
11  **FINAL EXAM 1:00 – 3:00 p.m.**