Class dates: August 24, 2020- December 9, 2020

Instruction mode: Hybrid (Flex In-Person)
Mondays: Online, self-paced, asynchronous
Wednesdays: 9:00 am-10:15 am (Flex In-Person, live on Zoom or option to watch recorded session on Zoom)

Join Zoom Meeting
https://arizona.zoom.us/j/92860345613
Password: RISK

***Important – In-Person meetings will not begin until after September 8th***

This class will not have physical meetings until at least September 8th. The class in-person meeting days (Wednesdays) and times will be held in a Live Online format until physical class meetings are allowed on campus. After September 8th, you have the option to schedule attending in a flex, in-person format or to view the in-person Wednesday sessions on Zoom, as they will be recorded live and available typically within 24 h of class time. Please review the class meeting pattern details and class format descriptions below.

**Important Information Fall 2020 – Flex In Person**

This class will be structured to allow students to participate via a mix of in-person and online modes. The exact mix of in-person and online components will be determined by the instructor. Students should check the D2L course site for guidance from the instructor prior to attending the class in-person. Students should be available during all scheduled class meetings and follow all health and safety guidelines. Some components of this class will be offered in a classroom setting, modified for physical distancing and enhanced disinfectant routines. Students will be required to wear face coverings at all times when in the classroom. Students who are unable to come to class due to illness or a need to self-isolate for a period during the semester will be able to stay current with class work via remote or online methods.

- During our class meetings, we will respect CDC guidelines, including limited seating to increase physical distancing and appropriately-worn face coverings. See below for the University’s policy on wearing face coverings in University buildings. [Official language: https://president.arizona.edu/news/2020/07/administrative-directive-use-face-coverings]
  - The Disability Resource Center is available to explore face coverings and accessible considerations if you believe that your disability or medical condition precludes you from utilizing any face covering or mask option. DRC will explore the range of potential options as well as remote course offerings. Should DRC determine an accommodation to this directive is reasonable, DRC will communicate this accommodation with your instructor.
If you feel sick:
  ○ Stay home. Except for seeking medical care, avoid contact with others and do not travel.
  ○ Notify your instructors if you will be missing an in person or online course.
  ○ Campus Health is testing for COVID-19 - please call (520) 621-9202 before you come in.
    ■ Campus Health is testing individuals who are concerned that they are infected with or have been exposed to COVID-19.
    ■ They continue to test only students, staff, and faculty of the University at this time.
    ■ Campus Health providers will evaluate patients and order testing if appropriate.
    ■ Visit the Campus Health website for more information.
  ○ Visit the UArizona COVID-19 page for regular updates

If you are experiencing unexpected barriers to your success in your courses, please note the Dean of Students Office is a central support resource for all students and may be helpful. The Dean of Students Office can be reached at 520-621-2057 or DOS-deanofstudents@email.arizona.edu.

If pandemic conditions warrant, the University may require that we move to remote operations. If that is the case, we will notify you by D2L Announcement and email that we are moving to remote operations.

After the Thanksgiving holiday, we are scheduled to move to remote teaching. That means that we will meet via Zoom during the Wednesday live lectures.

Class Recordings:
  ○ Flex In-person classes will be recorded and available to all students currently enrolled in the course and accessed through D2L only.
  ○ Take care not to share personal or contact information as you participate in virtual learning activities.
  ○ Students may not modify content or re-use content for any purpose other than personal educational reasons. Students accessing unauthorized recordings or using them in a manner inconsistent with UArizona values and educational policies are subject to suspension. All recordings are the property of the faculty member.

COVID-19 Best Practices Training Videos:

Do Your Part (general health and Safety) = https://arizona.wistia.com/medias/vknkojv06d
Classroom expectations = https://arizona.wistia.com/medias/0kswgarbmc

Location: Drachman Hall, A118, Wednesday only, in-person attendance will be scheduled and announced by instructor prior to September 8th.

Instructor(s) and Contact Information:
  Kelly A. Reynolds, MSPH, PhD
  Office: Drachman Hall, A235
  Phone: (520) 626-8230
  Email: Reynolds@email.arizona.edu

Instructor Availability*:
  Dr. Reynolds: By appointment, via Zoom

*The best way to get in touch with me is via email. Please allow 1 business day for a response. If you do not hear from me within the expected time, please resend your email.

Catalog Description: The purpose of this course is to enhance students’ knowledge and skills related to environmental risk assessment, including hazard assessment, exposure assessment, toxicity assessment, and risk characterization.

Rev. August 23, 2020
Course Description: Evaluation of environmental hazards and assessment of chemical and microbial exposures in various populations and the probability of associated health effects on the human population or the environment. This course is a hybrid, flex in-person format. A portion of the course will be taught online (Monday sessions, self-paced). Wednesday sessions include either live online or in-person lectures and discussion forums. We will not meet F2F or live online on Mondays, rather content will be posted online the prior Friday by 5 pm. Graduate students are further required to meet with the instructor at additional scheduled times throughout the semester.

Course Prerequisites: Undergraduates-advanced standing, Graduate Students-none (a background in science, engineering or math is recommended). Students should have mastered advanced topics in algebra.

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

1. Describe common, regulated, and emerging environmental contaminants and specific characteristics of each.
2. List the various health effects/toxic endpoints associated with hazard exposures in healthy and sensitive populations.
3. Identify primary and multiple exposure/transmission routes of environmental hazards.
4. Understand the steps involved in, and be able to perform, a qualitative and quantitative risk assessment.
5. Describe various approaches to risk analysis.
6. Differentiate the pros and cons of epidemiological vs. risk assessment studies.
7. Critique current research relative to methodological and statistical limitations and other assumptions or uncertainties.
8. Perform simulation modeling exercises in Excel or other software program.
9. Integrate computer modeling tools into public health risk assessments.
10. Evaluate the use of risk assessment for regulatory development or other mitigations.
11. Graduate students only: Complete a formal risk assessment and present semester-long project results to the class.

Undergraduate Learning Domains
The foundations of scientific knowledge, including the biological and life sciences and the concepts of health and disease.

Undergraduate Foundational Domains
The basic concepts, methods and tools of public health data collection, use and analysis and why evidence-based approaches are an essential part of public health practice.

The concepts of population health, and the basic processes, approaches and interventions that identify and address the major health-related needs and concerns of populations.

The underlying science of human health and disease, including opportunities for promoting and protecting health across the life course.

Undergraduate Foundational Competencies
The ability to locate, use, evaluate, and synthesize public health information.

Undergraduate Cross-Cutting Concepts and Experiences
Critical thinking and creativity
Research methods
Systems thinking

In addition, graduate student Learning Outcomes (Competencies Obtained) include:

- Analyzing quantitative and qualitative data using biostatistics, informatics, computer-based
programming and software, as appropriate (MPH foundational competency 3).

- Interpret results of data analysis for public health research, policy or practice (MPH foundational competency 4).
- Applying systems thinking tools to a public health issue (MPH foundational competency 17).
- Demonstrating fundamental knowledge of the principles of environmental health sciences and be able to apply them. (MS-EHS competency 1)
- Utilizing risk assessments and models. (MS-EHS competency 4)
- Demonstrating knowledge of local, federal and state regulatory programs. (MS-EHS competency 5)
- Developing effective written and oral communication skills. (MS-EHS competency 8)

Course Notes: You are expected to take your own notes in class. Students are responsible for collecting the material in class and for downloading information from the D2L website. If you are absent, you are expected to obtain notes and other information from a fellow classmate or from recorded lectures.

Readings, lecture slides, videos, homework assignments and other information relative to the course will be posted at The University of Arizona D2L (desire to learn) site, D2L.arizona.edu. Be sure to check the site regularly for updated information. New content will be posted every Friday before 5 pm.

Wednesday F2F or live online discussions are recorded in Zoom and usually accessible within 24 hours. Students who do not attend the live Zoom sessions and watch the recorded lectures may be required to provide feedback through mandatory discussions, quizzes, or essays on the material covered to receive credit the attendance and participation.

Required Texts or Readings: There are no required textbooks. Readings or links to readings will be provided on the course D2L site.

Required or Special Materials: You will need a scientific calculator and/or computer for homework assignments and exams. Several homework assignments will require the use of a computer suitable to run Excel and other downloaded software add-ins to Excel.

Course Requirements:

You are expected to be an active learner and should come to the Wednesday classes prepared, having already viewed all of the videos, readings, and presentation materials posted in D2L. You should come to class with your homework and writing assignments completed to the best of your ability. We will spend some of the Wednesday class engaged in discussions, working on group activities and analyzing current risk model applications in order to reinforce lessons from the assigned materials. You should be prepared to respond to questions in class and participate in class/online discussions and engage in real-time assessments throughout the semester.

You should plan to submit homework assignments on time, be prepared to discuss case studies or work through calculations in class, take exams on the specified dates, and participate in additional online surveys. The best way to prepare for the live sessions is to complete the readings, watch posted lectures or videos and complete the homework assignment before class.

You should expect to spend 3-4 hours on course work for each unit of credit. Thus, for a 3-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:

Rev. August 23, 2020
Homework assignments (6/7) &nbsp;&nbsp; 180 pts
Participation exercises &nbsp;&nbsp; 100 pts
Exam 1 &nbsp;&nbsp; 100 pts
Exam 2 &nbsp;&nbsp; 100 pts
Final Exam (optional) &nbsp;&nbsp; (100 pts)

Total &nbsp;&nbsp; 480 (580) pts
Grad student final project/presentation &nbsp;&nbsp; 100 pts
Course maximum total &nbsp;&nbsp; 580 pts (undergraduate); 680 pts (graduate)

A total of 7 graded homework assignments are scheduled for the semester. You may drop the single lowest homework grade (counting 6/7). Other assignments will be given for homework and graded as participation points if completed. It is recommended that you attempt to complete all homework assignments as they are essential preparation for exams.

The final is optional. If you opt to take the final, the grade will be averaged with the total points earned over the semester, including all three exams (i.e., the final is not a substitution for any other exam.)

Final grades will be based on the following system:

- A = 90-100%
- B = 80-89%
- C = 70-79%
- D = 60-69%
- E = < 60

**400/500 Co-Convened Courses:** Students enrolled in 518 will be expected to be more analytical in their assignments and to think more critically about the questions, beyond what has been presented in class. Graduate students are expected to exercise a higher level of critical by moving beyond memorization and toward deeper understanding, application and further into analysis, evaluation and creative expression (based on Blooms taxonomy). As such, graduate students will have a greater involvement/expectation in class and discussion forums, requiring increased depth of response and will also be required to meet more frequently as a team and with the instructor and complete a project assignment that will be presented to the entire class. Graduate students are further expected to independently seek out new thought concepts related to risk assessment and bring ideas/discussion to class via an in depth investigation of the literature beyond concepts introduced in class. Finally, 518 students will complete a semester long review of literature around an assigned topic in risk assessment, share information throughout the semester with the class on their progress and present a final risk characterization to the class at the end of the semester.

**Homework assignments** are due by 5 pm on designated Fridays unless otherwise instructed. Regularly check D2L content and new or events schedule for detailed due dates. **Late homework assignments will be deducted 10% for every day late, including weekends.**

**Missing assignments** or assignments more than 10 days late will be assigned a zero. 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](http://catalog.arizona.edu/policy-type/grade-policies)

**Required Extracurricular Activities:** none

**Extra Credit:** There will be no extra credit assignments.

Rev. August 23, 2020
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, calculations (bring your calculator) and essay questions. Some exams may include self-evaluations or take-home 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 (optional): Thursday, December 17, 2020, 10:30 am – 12:30 pm, Drachman Hall A118

The final is optional. If you opt to take the final, the grade will be averaged with the total points earned over the semester, including all three exams (i.e., the final is not a substitution for any other exam). 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.

Note: The University’s Final Exam regulations can be found here: http://www.registrar.arizona.edu/staff/courses/final-exams?audience=staff&cat1=10

Competencies will be assessed by:

- Completion of homework assignments where students discover primary EHS toxicants and microbes and their health effects through use of the EPA IRIS and CAMRA Wiki websites and other common EHS contaminant resources. Students will select priority environmental contaminants and create Hazard ID summaries. (MS-EHS competency 1).
- A homework exercise where students learn to develop and utilize dose response curves to predict health outcomes. Students will conduct their own curve fitting exercise and evaluate published dose response curves. Another homework exercise requires students to search the literature for information on chemical exposure potentials and exposure assessment data to characterize chemical intake risks. Students will construct and implement their own exposure intake calculations and compare with current or proposed regulatory maximums. A third homework exercise provides hands on practice for students to program and apply Monte Carlo simulation software to characterize human exposure potentials (MPH foundational competency 3; MS-EHS competency 4; PhD-EHS competency 5).
- Exam 2 evaluation questions requiring students to describe knowledge of risk management approaches and acceptability based on risk perceptions and within regulatory standards and guidelines (MS-EHS competency 5)
- The final project and presentation involving a full risk assessment paradigm application (hazard identification, exposure assessment, dose response, and risk characterization). Students select a priority contaminant and systematically perform a written risk characterization which is then presented orally to the class. (MPH foundational competency 17; MS-EHS competency 8; PhD-EHS competency 3).

Absence and Class Attendance/Participation: Participation points will be evaluated based on student engagement during F2F and/or online discussions, reflections, other in class engagement, quizzes and additional homework assignments. If you do not attend the Wednesday F2F lectures, you are not eligible to receive in class participation points. There are no make-up opportunities for these points. It is your responsibility to watch the lecture recordings and complete any assigned activities.

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.

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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 and 
the announcements that are 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

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

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 campuses and in its vehicles. The official policy can 
be found at: http://policy.arizona.edu/ethics-and-conduct/smoking-and-tobacco-policy

University Course Policies: (please see the following URL):
https://academicaffairs.arizona.edu/syllabus-policies

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.

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.
<table>
<thead>
<tr>
<th>Date</th>
<th>Day</th>
<th>Location</th>
<th>General Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>August 24</td>
<td>M</td>
<td>See D2L content</td>
<td>Review syllabus; watch COVID-19 Best Practices Training videos (2); review posted D2L content</td>
</tr>
<tr>
<td>26 W</td>
<td></td>
<td>Zoom live</td>
<td>Course Intro/Syllabus Review/Risk Paradigm</td>
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<tr>
<td>31 M</td>
<td></td>
<td>See D2L content</td>
<td>Risk Assessment</td>
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<tr>
<td>September 2</td>
<td>W</td>
<td>Zoom live</td>
<td>Dose Response/Toxicology</td>
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<tr>
<td>7 M</td>
<td></td>
<td>Labor Day- See D2L content</td>
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<tr>
<td>9 W</td>
<td></td>
<td>Zoom live or F2F A118</td>
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<tr>
<td>14 M</td>
<td></td>
<td>See D2L content</td>
<td>Toxicology/Data Analysis/Models</td>
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<tr>
<td>16 W</td>
<td></td>
<td>Zoom live or F2F A118</td>
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<tr>
<td>21 M</td>
<td></td>
<td>See D2L content</td>
<td>Microbial Risk Assessment</td>
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<tr>
<td>23 W</td>
<td></td>
<td>Zoom live or F2F A118</td>
<td>Grad student topic presentation</td>
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<tr>
<td>28 M</td>
<td></td>
<td>See D2L content</td>
<td>Microbial Hazard ID</td>
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<td>October 30</td>
<td>W</td>
<td>Zoom live or F2F A118</td>
<td>CAMRA-QMRA</td>
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<td>5 M</td>
<td></td>
<td>See D2L content</td>
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<tr>
<td>7 W</td>
<td></td>
<td>Zoom live or F2F A118</td>
<td>Exam 1</td>
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<tr>
<td>12 M</td>
<td></td>
<td>See D2L content</td>
<td>Chemical Hazard ID</td>
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<tr>
<td>14 W</td>
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<td>Zoom live or F2F A118</td>
<td>Exposure Assessment- Chemicals</td>
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<tr>
<td>19 M</td>
<td></td>
<td>See D2L content</td>
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<tr>
<td>21 W</td>
<td></td>
<td>Zoom live or F2F A118</td>
<td>Exposure Assessment- Activity/ Applied Models</td>
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<tr>
<td>26 M</td>
<td></td>
<td>See D2L content</td>
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<tr>
<td>November 28</td>
<td>W</td>
<td>Zoom live or F2F A118</td>
<td>Risk characterization/Monte Carlo Simulations</td>
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<tr>
<td>2 M</td>
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<td>See D2L content</td>
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<tr>
<td>4 W</td>
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<td>Zoom live or F2F A118</td>
<td>Modeling tools/software</td>
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<tr>
<td>9 M</td>
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<td>Veteran’s Day- See D2L content</td>
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<tr>
<td>11 W</td>
<td></td>
<td>Veterans Day- Zoom live or F2F A118</td>
<td>Applied Models</td>
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<tr>
<td>16 M</td>
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<td>See D2L content</td>
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<tr>
<td>18 W</td>
<td></td>
<td>Zoom live or F2F A118</td>
<td>Graduate Student Presentations</td>
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<tr>
<td>23 M</td>
<td></td>
<td>Zoom live</td>
<td>Risk Management/Risk Perception/Regulatory Controls</td>
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<tr>
<td>25 W</td>
<td></td>
<td>Zoom live</td>
<td>Graduate Student Presentations</td>
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<tr>
<td>30 M</td>
<td></td>
<td>See D2L content</td>
<td>Risk communication/ Cost-benefit analysis/Course Review</td>
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<tr>
<td>December 2</td>
<td>W</td>
<td>Zoom live</td>
<td>Exam 2</td>
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<tr>
<td>7 M</td>
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<td>See D2L content</td>
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<tr>
<td>9 W</td>
<td></td>
<td>Zoom live</td>
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</tbody>
</table>
Final Exam (optional) 10:30 am- 12:30 pm, A118

*Assignments posted in D2L by 5 pm the previous Friday, Mondays are self-paced sessions, Wednesdays are live online Zoom or F2F in Drachman A118.