PRINCIPLES OF TOXICOLOGY I
Fall 2019

COURSE & CONTACT INFORMATION

Credits: 2
Meeting Day(s): M
Meeting Time: 6:00-7:40
Meeting Place: Mayo 1155

Instructor: William A. Toscano
Email: tosca001@umn.edu
Office Phone: 612-859-2120
Fax: 612-626-4837
Office Hours: By Appointment
Office Location: Mayo 1165

COURSE DESCRIPTION

This is the first of two courses that covers fundamental principles of exposure, uptake and metabolism. This course focuses on identifying the mechanisms and effects of chemical, biological, and physical agents on human health. Discussions will focus on the action of environmental agents and how they interact with humans to cause disease. Emphasis is on understanding the principles of toxicology as they apply to understanding toxicant-human interactions.

COURSE PREREQUISITES:

Working knowledge of Biochemistry, Organic chemistry, Physiology, or consent of the instructor.

COURSE GOALS & OBJECTIVES:

Identify potential toxic chemicals
determine dose dependence of chemicals to toxicity
apply structure-activity relations to identify toxic chemicals
define describe and explain uptake and distribution of toxic chemicals
describe mechanisms of activation of toxic chemicals
describe mechanisms of enzymatic deactivation of toxic chemicals
calculate basic enzyme kinetics

METHODS OF INSTRUCTION AND WORK EXPECTATIONS

Course Workload Expectations [Note: you can customize this to your course or replace with your own language]

Principles of Toxicology I is a 2 credit course. The University expects that for each credit, you will spend a minimum of three hours per week attending class or comparable online activity, reading, studying, and completing assignments. over the course of a 15-week term. Thus, this course requires approximately [6 x 45 = 270] hours of effort spread over the course of the term in order to earn an average grade. Method of Instruction is Lecture/Discussion;
Homework problems, Mid-Term and Final Exams

Learning Community [Note: you can customize this to your course or delete]
School of Public Health courses ask students to discuss frameworks, theory, policy, and more, often in the context of past and current events and policy debates. Many of our courses also ask students to work in teams or discussion groups. We do not come to our courses with identical backgrounds and experiences and building on what we already know about collaborating, listening, and engaging is critical to successful professional, academic, and scientific engagement with topics.
In this course, students are expected to engage with each other in respectful and thoughtful ways.

In group work, this can mean:
- Setting expectations with your groups about communication and response time during the first week of the semester (or as soon as groups are assigned) and contacting the TA or instructor if scheduling problems cannot be overcome.
- Setting clear deadlines and holding yourself and each other accountable.
- Determining the roles group members need to fulfill to successfully complete the project on time.
- Developing a rapport prior to beginning the project (what prior experience are you bringing to the project, what are your strengths as they apply to the project, what do you like to work on?)

In group discussion, this can mean:
- Respecting the identities and experiences of your classmates.
- Avoid broad statements and generalizations. Group discussions are another form of academic communication and responses to instructor questions in a group discussion are evaluated. Apply the same rigor to crafting discussion posts as you would for a paper.
- Consider your tone and language, especially when communicating in text format, as the lack of other cues can lead to misinterpretation.

Like other work in the course, all student to student communication is covered by the Student Conduct Code (https://z.umn.edu/studentconduct).

**COURSE TEXT & READINGS**

**Reference Texts:** There is no required textbook, however you are referred to:

For background reading before class sessions

This course uses journal articles, which are available via the University Libraries’ E-Reserves and will be linked from the course site. It is good practice to use a citation manager to keep track of your readings. More information about citation managers is available at https://www.lib.umn.edu/pim/citation.

Or review articles will be placed on the Canvas website
<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Readings&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Activities/Assignments</th>
</tr>
</thead>
</table>
| September 9, 2019 | • Introduction – Exposome, physical chemical properties, basic definitions | C & D 1, 2 M 2, 3 S & B 1 | • Lecture  
• Discussion of Reading |
| September 16, 2019| • Dose Response, Structure-Activity                     | 4 4 1                 | • Lecture  
• Discussion of Reading |
| September 23, 2019| • Toxicokinetics: Absorption/Transporters               | 5 5 2                 | • Lecture  
• Discussion of Reading |
| September 30, 2019| • Toxicodynamics: Distribution and Excretion            | 7 5 2,4               | • Lecture  
• Discussion of Reading |
| October 7, 2019   | • Toxicokinetics: Models                               | 7 5 2,4              | • Lecture  
• Discussion of Reading |
| October 14, 2019  |                                          |                      | • Exam I                                      |
| October 21, 2019  | • Enzyme induction; Kinetics                           | 6 7 3                | • Lecture  
• Discussion of Reading |
| October 28, 2019  | Electron Transport Chains; Phase I Enzymes CYP Super Family | 6 7 3                | • Lecture  
• Discussion of Reading |
| November 4, 2019  | • Phase I Metabolism Oxidases                          | 6 7 3                | • Lecture  
• Discussion of Reading |
| November 11, 2019 | • Phase II Metabolism: Amino acids, sugars, Hydratases, Methylation, Acetylation | 6 7 3               | • Lecture  
• Discussion of Reading |
| November 18, 2019 | • Phase II Metabolism Glutathione S-Transferases       | 6 7 3                | • Lecture  
• Discussion of Reading |
| November 25, 2019 | • Factors that Affect Metabolism                       | 6 7 3                | • Lecture  
• Discussion of Reading |
| December 2, 2019  | • Systems Toxicology                                   |  • Handout            | • Lecture  
• Discussion of Reading |
December 9, 2019
• Receptor Signaling Pathways

December 16, 2019
• Final Exam

*Reference Texts: There is no required textbook, however you are referred to:
M = Mercurio, S., *Understanding Toxicology*, Jones and Bartlett Learning, Burlington, MA, 952 pp. (2017);

The numbers in the rows above refer to chapters in these three text books. Reading is expected to be completed before class sessions

**SPH AND UNIVERSITY POLICIES & RESOURCES**

The School of Public Health maintains up-to-date information about resources available to students, as well as formal course policies, on our website at [www.sph.umn.edu/student-policies/](http://www.sph.umn.edu/student-policies/). Students are expected to read and understand all policy information available at this link and are encouraged to make use of the resources available.

The University of Minnesota has official policies, including but not limited to the following:
- Grade definitions
- Scholastic dishonesty
- Makeup work for legitimate absences
- Student conduct code
- Sexual harassment, sexual assault, stalking and relationship violence
- Equity, diversity, equal employment opportunity, and affirmative action
- Disability services
- Academic freedom and responsibility

Resources available for students include:
- Confidential mental health services
- Disability accommodations
- Housing and financial instability resources
- Technology help
- Academic support

**EVALUATION & GRADING**

Attendance is required. There are no make-up exams. Your grade will depend on your performance on the two exams (90%) and your active participation in class discussions. See university grading policies Resource at [https://z.umn.edu/gradingpolicy](https://z.umn.edu/gradingpolicy)

Grading Scale
The University uses plus and minus grading on a 4.000 cumulative grade point scale in accordance with the following, and you can expect the grade lines to be drawn as follows:
<table>
<thead>
<tr>
<th>% In Class</th>
<th>Grade</th>
<th>GPA</th>
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<tbody>
<tr>
<td>93 - 100%</td>
<td>A</td>
<td>4.000</td>
</tr>
<tr>
<td>90 - 92%</td>
<td>A-</td>
<td>3.667</td>
</tr>
<tr>
<td>87 - 89%</td>
<td>B+</td>
<td>3.333</td>
</tr>
<tr>
<td>83 - 86%</td>
<td>B</td>
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</tr>
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<tr>
<td>77 - 79%</td>
<td>C+</td>
<td>2.333</td>
</tr>
<tr>
<td>73 - 76%</td>
<td>C</td>
<td>2.000</td>
</tr>
<tr>
<td>70 - 72%</td>
<td>C-</td>
<td>1.667</td>
</tr>
<tr>
<td>67 - 69%</td>
<td>D+</td>
<td>1.333</td>
</tr>
<tr>
<td>63 - 66%</td>
<td>D</td>
<td>1.000</td>
</tr>
<tr>
<td>&lt; 62%</td>
<td>F</td>
<td>-</td>
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</tbody>
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- A = achievement that is outstanding relative to the level necessary to meet course requirements.
- B = achievement that is significantly above the level necessary to meet course requirements.
- C = achievement that meets the course requirements in every respect.
- D = achievement that is worthy of credit even though it fails to meet fully the course requirements.
- F = failure because work was either (1) completed but at a level of achievement that is not worthy of credit or (2) was not completed and there was no agreement between the instructor and the student that the student would be awarded an I (Incomplete).
- S = achievement that is satisfactory, which is equivalent to a C- or better
- N = achievement that is not satisfactory and signifies that the work was either 1) completed but at a level that is not worthy of credit, or 2) not completed and there was no agreement between the instructor and student that the student would receive an I (Incomplete).
Scholastic Dishonesty, Plagiarism, Cheating, etc.

You are expected to do your own academic work and cite sources as necessary. Failing to do so is scholastic dishonesty. Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis (As defined in the Student Conduct Code). For additional information, please see https://z.umn.edu/dishonesty.

The Office for Student Conduct and Academic Integrity has compiled a useful list of Frequently Asked Questions pertaining to scholastic dishonesty: https://z.umn.edu/integrity.

If you have additional questions, please clarify with your instructor. Your instructor can respond to your specific questions regarding what would constitute scholastic dishonesty in the context of a particular class—e.g., whether collaboration on assignments is permitted, requirements and methods for citing sources, if electronic aids are permitted or prohibited during an exam.

Indiana University offers a clear description of plagiarism and an online quiz to check your understanding (http://z.umn.edu/iuplagiarism).

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<tr>
<td>Attendance Requirements</td>
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<tr>
<td>Extra Credit</td>
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CEPH COMPETENCIES

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<table>
<thead>
<tr>
<th>Competency</th>
<th>Learning Objectives</th>
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<td>Resources for filling out the CEPH competencies grid are available on isph: <a href="http://www.isph.umn.edu/sph/instructor-resources/">http://www.isph.umn.edu/sph/instructor-resources/</a></td>
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