Syllabus
Chem 5305: Chemical Kinetics
Spring 2020

Instructor: Dr. Katherine (Kallie) Willets. Please call me Kallie.
Office: BE 340
Office hours: Tuesdays 2 – 3:30 PM or by appointment
Email: kwillets@temple.edu

Lecture: Wednesday, 5:30-8 PM, Beury 415

Course objectives: This class is designed to introduce you to the fundamental principles of chemical kinetics, thinking about chemical processes both experimentally and theoretically. We will discuss kinetic studies across a variety of reaction types, from the gas phase to the condensed phase, combining theoretical derivations and models with scientific applications. Because kinetics crosses multiple disciplines (as reflected in the enrollee composition), we will focus on a variety of application spaces.

Reading:

Primary text: Chemical Kinetics and Reaction Dynamics. Paul L. Houston. This text is available through the library as a free electronic textbook and can also be purchased in softcover for ~$25.

Additional resources:


Chemical Kinetics and Dynamics. Steinfeld, Francisco, and Hase.

Course website:

I will be using Canvas for all class communication, including posting problem sets, lecture notes, handouts, etc.

Attendance and participation (10% of course grade):

Due to the limited number of classes, you are expected to attend every session. If you miss a class without a valid excuse (illness with doctor’s note, PI sanctioned travel), you will be docked 20% of your final attendance/participation score for each unexcused absence.

You are expected to participate in discussions and think critically about the material. Failure to do so will be reflected in your final grade. That said, you should also avoid being a distraction to your classmates. Dominating discussion or being disrespectful to your peers will impact this grade.
Eating in class:

I understand this class is inconveniently scheduled over dinner time. Please be courteous if you choose to eat a snack during class. Strong odors, crinkly wrappers, and extremely crunchy foods should be avoided.

Assignments:

Problem sets (25% of course grade). Multiple problem sets will be assigned over the course of the semester. They will be due by the start of the following class in which they are assigned. Exact dates will be determined based on progress through in-class material and make-up class dates.

Students are encouraged to work in groups to complete the problem sets; however, all work that is turned in should be each student’s own.

Problems will be graded as (weighted) values on a scale of 0 – 3, where 0 = incorrect, 1 = significant errors, 2 = minor errors, and 3 = correct. Thus, a problem worth 6 points will be weighted by a factor of 2 and possible point values would be 0, 2, 4 or 6. Failure to show sufficient work (even with a correct answer) will not receive full credit, with scoring at the discretion of the instructor.

Late problem sets will lose 20% per day. A problem set is considered late if it is not turned in at the start of the class in which it is due.

Problem sets should be completed on a separate sheet of paper, with questions clearly labeled and answered in the order in which they appear on the problem set. Please write legibly. Points will be deducted if I cannot read answers.

Literature assignments (25% of course grade). We will use the primary literature in a variety of ways to help us understand applications in kinetics. Details to be announced for specific assignments.

Midterm exam (20% of course grade). The midterm will cover material covered in (roughly) the first half of the semester.

Final exam (20% of course grade). The final exam will be cumulative for the entire course.

Academic dishonesty:

I strongly encourage working in groups on problem sets, but the work you submit should be your own. Do NOT copy answers/text directly from internet/other sources in your answers/writing (even if properly cited, this is not acceptable as it shows no indication of independent thought or synthesis of ideas).
A first incidence of academic dishonesty will result in a zero for the relevant assignment and a report of the incident to the department chair and your research advisor. A second incident will result in automatic failure of the course.

Disability disclosure statement:

Any student who has a need for accommodation based on the impact of a documented disability, including special accommodations for access to technology resources and electronic instructional materials required for the course, should contact me privately to discuss the specific situation by the end of the second week of classes or as soon as practical. If you have not done so already, please contact Disability Resources and Services (DRS) at 215-204-1280 in 100 Ritter Annex to learn more about the resources available to you. I will work with DRS to coordinate reasonable accommodations for all students with documented disabilities.

Statement of Student and Faculty Academic Rights and Responsibilities:

Freedom to teach and freedom to learn are inseparable facets of academic freedom. The University has a policy on Student and Faculty and Academic Rights and Responsibilities (Policy #03.70.02) which can be accessed through the following link:

Grades:

As this is a graduate course, it is expected that students will perform at the A/B level. If your grade is above the class average, you are guaranteed to receive at least an A-.

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<thead>
<tr>
<th>Assignment</th>
<th>Course weight (%)</th>
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<tbody>
<tr>
<td>Problem sets</td>
<td>25</td>
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<tr>
<td>Literature</td>
<td>25</td>
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<tr>
<td>Midterm Exam</td>
<td>20</td>
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<tr>
<td>Final Exam</td>
<td>20</td>
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<tr>
<td>Attendance and participation</td>
<td>10</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
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Topics:

Below is a (rough and tentative) course schedule for the semester.

Basics of kinetics
- reaction rates
- integrated rate laws and half lives
- elementary and composite reactions
- approximations
- techniques

Temperature dependence on reaction rates

Rate theories
- Kinetic theory of collisions
- Transition state theory

Reaction classes
- Gas phase reactions
- Solution phase reactions
- Reactions on surfaces
- Enzyme kinetics
- Catalytic reactions
- Photochemical reactions

Midterm exam (in-class): Wednesday, February 26

Final exam: Wednesday May 6. 5:45 – 7:45 PM.