Chemical Engineering Kinetics

ECH 6506

Class Periods: Monday 11:45-1:40 PM (M: Periods 5-6), CHE 237
Wednesday 11:45 – 12:35 PM (W: Period 5), PSY 151

3 Credit Hours

Academic Term: Spring 2024

Instructor:
Jason Weaver
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CHE 331

Supervised teacher:
Conor Waldt
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Office Hours: Weaver, Monday 2:15 in CHE 124

Course Description (3 credits)
Fundamental aspects of chemical reaction kinetics, including macroscopic kinetics, collision theory, potential energy surfaces, molecular vibrations and transition state theory.

Textbooks and Software

- *Chemical Kinetics and Dynamics*, 2nd ed., J.I. Steinfeld, J.S. Francisco and W.L. Hase, Prentice-Hall, 1999. **ISBN** 10: 0137371233

  Course notes are not obtained from published resources.

Recommended Materials (Useful reading)

- *Chemical Kinetics*, K.J. Laidler, 3rd Ed., Harper Collins, 1987.
- *Chemical Kinetics*, R.W. Weston, Jr. and H.A. Schwarz, Englewood Cliffs, NJ, Prentice-Hall, 1972.

Attendance Policy, Class Expectations, and Make-Up Policy
Attendance is strongly suggested.

Please refrain from the use of cell phones and laptops.

Grading Policy
Homework problems will be assigned but not graded and solutions will be posted. Your final grade will be based on three exams taken during the semester. Final scores will be determined using the Table below.

Evaluation of Grades

Assignment	Percentage of Final Grade
Exam w/ Best Grade	36%
Exam	32%
Exam	32%

Course Topics

1. Macroscopic Kinetics
    - reaction rate and rate equations
    - elementary reactions
    - complex reactions
    - pseudo steady-state approximation
    - example mechanisms (e.g., chain reactions)
    - thermal rate coefficient
    - general definition of activation energy

2. Molecular Collisions and Microscopic Kinetics
    - Maxwell-Boltzmann distribution of molecular speed and energy
    - kinetic theory of collisions
    - reaction cross section
    - electronic potential energy
    - molecular vibrations (normal modes of vibration)
    - classical scattering theory
    - reaction dynamics

3. Statistical Theories of Reaction Rates
    - review of statistical mechanics
    - transition state theory
    - unimolecular reactions

Health and Wellness

If you are sick, stay home and self-quarantine. Please visit the UF Health Screen, Test & Protect website about next steps, retake the questionnaire and schedule your test for no sooner than 24 hours after your symptoms began. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 (or email covid@shcc.ufl.edu) to be evaluated for testing and to receive further instructions about returning to campus. UF Health Screen, Test & Protect offers guidance when you are sick, have been exposed to someone who has tested positive or have tested positive yourself. Visit the UF Health Screen, Test & Protect website for more information.

U Matter, We Care:
If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

Counseling and Wellness Center: http://www.counseling.ufl.edu/cwc, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS): Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or http://www.police.ufl.edu/.

Students Requiring Accommodations
Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, https://www.dso.ufl.edu/drc) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation
Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at https://evaluations.ufl.edu/evals. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results/.

University Honesty Policy
UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Student Privacy
There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see:

http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html