

CHEMICAL KINETICS (16:160:534/434) FALL 2023

Welcome to chemical kinetics! Chemical kinetics is the study of how and why chemical reactions occur at different rates, exploring the factors that influence the speed of reactions and reaction pathways that occur. This course is designed to provide you with the framework to understand and study chemical reaction rates and mechanisms in any context, both experimental and theoretical, from complex biological systems to solid-state materials chemistry.

In this course, we will delve into the fundamental principles that govern the kinetics of chemical reactions, focusing on topics such as reaction orders, rate laws, reaction mechanisms, and the influence of temperature and catalysts on reaction rates. By studying chemical kinetics, you will gain the tools necessary to analyze reaction data, predict reaction outcomes, and uncover the underlying factors that shape the progress of chemical transformations.

Class Time

Lecture: Monday/Thursday 8:30-9:50 AM
Allison Road Classroom Building (ARC) 206

Instructor

Prof. Christopher E. Shuck CCB-4202 Christopher.E.Shuck@rutgers.edu
Office hours By appointment

Topics that will be covered:

1. Kinetic Theory of Gases and General Theories of Chemical Reactions
2. Chemical Reaction Rates and Associated Reaction Mechanisms
3. Effect of Transport Properties on Chemical Reactions
4. Reactions in Liquid Solutions and on Solid-Surfaces
5. Homogeneous and Heterogeneous Catalysis
6. Introduction to Photochemistry, Biological Kinetics, and Solid-State Kinetics

Textbook

Chemical Kinetics and Reaction Dynamics by Paul Houston, Dover Books, 2006.

Grading Scheme

Quiz I (Tentatively October 12, 2023)	20%
Quiz II (Tentatively November 9, 2023)	20%
Final Exam (December 18, 2023; 8-11 AM)	30%
Homework	30%

Homework Policy:

Homework assignments will be announced at the end of class, and consequently uploaded to the Canvas (<https://canvas.rutgers.edu/>) webpage for the course. All homework must be turned in at the beginning of class one week from the date of assignment. For example, if homework is assigned on Monday after class, homework is due on the subsequent Monday at the beginning of class. Homework will not be accepted electronically or after the beginning of class.

Homework grades will be assigned based on completeness and correctness. For each problem in your homework assignments, it is mandatory to present all the steps you take to arrive at your final answer. Simply providing the answer without showing the process will not be sufficient for full credit.

Academic Integrity: Rutgers University takes academic dishonesty very seriously. By enrolling in this course, you assume responsibility for familiarizing yourself with the Academic Integrity Policy and the possible penalties (including suspension and expulsion) for violating the policy. As per the policy, all suspected violations will be reported to the Office of Student Conduct. Academic dishonesty includes (but is not limited to):

- Cheating
- Plagiarism
- Aiding others in committing a violation
- Allowing others to use your work
- Failure to cite sources correctly
- Fabrication
- Using another person's ideas or words without attribution
- Re-using a previous assignment
- Unauthorized collaboration
- Sabotaging another student's work

If in doubt or unfamiliar with anything on this list, please consult the instructor. Please review the Academic Integrity Policy at: <https://nbacademicintegrity.rutgers.edu/>

Student Wellness:

Bias Incidents: If you experience or witness an act of bias or hate, report it to someone in authority. You may file a report online and you will be contacted within 24 hours. Bias is defined by the university as an act, verbal, written, physical, psychological, that threatens, or harms a person or group on the basis of race, religion, color, sex, age, sexual orientation, gender identity or expression, national origin, ancestry, disability, marital status, civil union status, domestic partnership status, atypical heredity or cellular blood trait, military service or veteran status. <https://studentaffairs.rutgers.edu/resources/bias-prevention-reporting#tab=panel-2> Counseling, ADAP & Psychiatric Services (CAPS): CAPS is a university mental health support service that includes counseling, alcohol and other drug assistance, and psychiatric services staffed by a team of professionals within Rutgers Health services to support students' efforts to succeed at Rutgers University. CAPS offers a variety of services that include individual therapy, group therapy and workshops, crisis intervention, referral to specialists in the community, and consultation and collaboration with campus partners. CAPS can be reached by phone at (848) 932-7884, and is located at 17 Senior Street, New Brunswick, NJ 08901. <http://health.rutgers.edu/medical-counseling-services/counseling/>

Violence Prevention & Victim Assistance (VPVA): The Office for Violence Prevention and Victim Assistance provides confidential crisis intervention, counseling, and advocacy for victims of sexual and relationship violence and stalking to students, staff, and faculty. To reach staff during office hours when the university is open or to reach an advocate after hours, call 848-932- 1181. VPVA can be reached by phone at (848) 932-1181, and is located at 3 Bartlett Street, New Brunswick, NJ 08901. www.vpva.rutgers.edu/

Disability Services: Rutgers University is committed to the creation of an inclusive and safe learning environment for all students and welcomes students with disabilities into all the university's educational programs. The Office of Disability Services (ODS) is responsible for the determination of appropriate accommodations for students who encounter barriers due to disability. Once a student has completed the ODS process (registration, initial appointment, and submitted documentation) and reasonable accommodations are determined to be necessary and appropriate, a Letter of Accommodation (LOA) can be requested and will be sent to the student and instructor. This should be done as early in the semester as possible as accommodations are not retroactive, and a discussion should occur about how the accommodations will be implemented. More information can be found at www.ods.rutgers.edu. You can contact ODS at (848)445-6800 or via email at dsoffice@echo.rutgers.edu .