CHM346: Physical Chemistry II
21:160:346
Spring 2023

Lecture Time/Location
Monday/Wednesday 10:00 AM – 11:20 AM
Smith Hall, Room 240

Instructor
Prof. Colin Kinz-Thompson
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Olson Hall, Room 206
Office Hours: Monday/Wednesday 11:30 AM – 12:30 PM

Textbook
Required: Quantum Chemistry, 2nd edition, Donald A. McQuarrie
Suggested: Mathematics for Physical Chemistry - Opening Doors, Donald A. McQuarrie

Prerequisites
21:750:204 General Physics II or 21:640:235 Calculus III
21:160:313 Inorganic Chemistry I

Grading
This course will have three midterms and a cumulative final exam. Midterms will be given during class periods. There will not be any make-up midterms. Instead, your lowest midterm grade, or half of your final, will be dropped when calculating your final grade.

(20%) Midterm 1 – February 8
(20%) Midterm 2 – March 8
(20%) Midterm 3 – April 10
(40%) Final Exam – May 8

Course Description
This course will focus on the theory of quantum mechanics and its implications for understanding atomic and molecular structure and spectroscopies. The course will start by introducing and exploring the tools of quantum mechanics, including the Schrödinger equation, operators and wavefunctions. We will first apply these quantum mechanical concepts to simple systems and then, in the latter part of the course, to atoms and molecules. Additionally, we will cover various spectroscopy methods as the primary tools used in physical chemistry for observing the effect of energy quantization.

Course Goals
- Master fundamental concepts of quantum mechanics including the understanding and use of Schrödinger equation, operators and wavefunctions
- Be able to apply quantum mechanical concepts to:
  o Simple systems such as particle in a box, harmonic oscillator, and rigid rotor
  o One and multi-electron atoms, to derive atomic orbitals
Molecules, to derive molecular orbitals
- Master the fundamental concepts of spectroscopy and the use of different spectroscopy methods for probing the quantized rotational, vibrational, and electronic energy in molecules

Academic Integrity
As an academic community dedicated to the creation, dissemination, and application of knowledge, Rutgers University is committed to fostering an intellectual and ethical environment based on the principles of academic integrity. Academic integrity is essential to the success of the University’s educational and research missions, and violations of academic integrity constitute serious offenses against the entire academic community. The entire Academic Integrity Policy can be found here: http://academicintegrity.rutgers.edu/academic-integrity-policy/

Your health and well-being matter, and Rutgers has put in place a number of resources that are intended to help students through the challenges that might emerge during these times. Information on many of these resources appears below. Please let us know immediately if you are experiencing circumstances that are negatively impacting your academic performance. We also strongly encourage you to contact your academic advisor.

Accommodation and Support
Rutgers University Newark (RU-N) is committed to the creation of an inclusive and safe learning environment for all students. RU-N has identified the following resources to further the mission of access and support:

Absences: All students are responsible for timely notification of their instructor regarding any expected absences. The Division of Student Affairs can provide assistant for absences related to religious observance, emergency or unavoidable conflict (illness, personal or family emergency, etc.) Students should refer to the University’s Course Attendance policy (10.2.7), for complete expectations and responsibilities. The office can be contacted at: (973) 353-5063 or deanofstudents@newark.rutgers.edu.

Disabilities: 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) will be provided. The LOA must be given to each course instructor by the student and follow up with a discussion. This should be completed as early in the semester as possible as accommodations are not retroactive. More information can be found at ods.rutgers.edu. Contact ODS: (973) 353-5375 or ods@newark.rutgers.edu.

Temporary Conditions/Injuries: The Division of Student Affairs can assist students who are experiencing a temporary condition of injury (broken or sprained limbs, concussions, or recovery from surgery). Students experiencing a temporary condition or injury should submit a request for assistance at: https://temporaryconditions.rutgers.edu.
Pregnancy: The Office of Title IX and ADA Compliance is available to assist students with any concerns or potential accommodations related to pregnancy. Students may contact the office at (973) 353-1906 or TitleIX@newark.rutgers.edu.

Gender or Sex-Based Discrimination or Harassment: The Office of Title IX and ADA Compliance can assist students experiencing any form of gender or sex-based discrimination or harassment, including sexual assault, sexual harassment, relationship violence, or stalking. Students can report an incident to the office at: (973) 353-1906 or TitleIX@newark.rutgers.edu. Incidents may also be reported by using the following link: tinyurl.com/RUNReportingForm. For more information, students should refer to the University’s Student Policy Prohibiting Sexual Harassment, Sexual Violence, Relationship Violence, Stalking and Related Misconduct located at: http://compliance.rutgers.edu/title-ix/about-title-ix/title-ix-policies/.

Interpersonal Violence: The Office for Violence Prevention and Victim Assistance can provide any student with confidential support. The office is a confidential resource and does not have a reporting obligation to report information to the University’s Title IX Coordinator. Students can contact the office at: (973) 353-1918 or run.vpva@rutgers.edu. There is also a confidential, text-based line students can text for support: (973) 339-0734.

Crisis and Concerns: The Campus Awareness Response and Education (CARE) Team works with students in crisis to develop a support plan to address personal situations that might impact academic performance. Students may contact the CARE Team at: http://tinyurl.com/RUNCARE or careteam@rutgers.edu.

Stress, Worry, or Concerns about Well-Being: The Counseling Center has confidential therapists available to support students. To schedule an appointment: counseling@newark.rutgers.edu or (973) 353-5805. If a student is not quite ready to make an appointment with a therapist but is interested in self-help, check out TAO at Rutgers-Newark for an easy, web-based approach to self-care and support: https://tinyurl.com/RUN-TAO.

Emergencies: Call 911 or contact Rutgers University Police Department (RUPD) at (973) 353-5111.

Learning Resources
Rutgers Learning Center (tutoring services)
(973) 353-5608
https://sasn.rutgers.edu/student-support/tutoring-academic-support/learning-center

Writing Center (tutoring and writing workshops)
(973) 353-5847
nwc@rutgers.edu
https://sasn.rutgers.edu/student-support/tutoring-academic-support/writing-center