

Physical Chemistry Laboratory
Fall 2022 (21:160:427)

Classes

Lecture:

Wednesday, 1:00 – 2:20 PM, Hill Hall 106

Lab:

Tuesday and Friday, 1:00-5:15 PM, LSC-II 128

Instructors

Professor Piotr Piotrowiak

Office: Life Science Center 201D

Email: piotr@newark.rutgers.edu

Professor Colin Kinz-Thompson

Office: Olson Hall 206

Email: colin.kinzthompson@rutgers.edu

Office Hours

By appointment

Course Website

Canvas: <https://rutgers.instructure.com/> or <https://canvas.rutgers.edu>

Course Materials

- Computer with internet access
- Software – **Do not** buy these programs by yourself; you will be provided access
 - Origin Pro
 - Windows: <https://software.rutgers.edu/product/3644>
 - Others: use school computer lab or the “virtual computer lab” <https://it.rutgers.edu/virtual-computer-labs/>
 - Microsoft Word and Microsoft Excel
 - Windows/Mac: <https://it.rutgers.edu/microsoft-office/microsoft-office-for-students/>
 - Any other word processing and spreadsheet software alternative is generally fine
 - Arduino IDE
 - Windows/Mac: <https://www.arduino.cc/en/Main/Software>

Prerequisites

Physical Chemistry I (345) and II (346) are pre- or co-requisites.

Course Description

In physical chemistry laboratory, students perform experiments spanning their knowledge of physical chemistry topics ranging from molecular spectroscopy to computational chemistry. This class will be taught via in person instruction during the Fall 2022 semester. The experiments will utilize instrumentation and software available through the University and will involve data analysis and interpretation. As a result, students learn how to perform experimental physical chemistry research, and to effectively communicate their science in writing through written laboratory reports.

Course Goals

- Master the measurement of selected thermodynamic and spectroscopic properties
- Be able to apply in practice the principles of thermodynamics and quantum mechanics acquired in the lecture courses Physical Chemistry 345 and 346
- Be proficient in performing quantitative analyses of experimental data
- Be able to interpret the results of experiments in a logical, scientifically sound manner
- Be able to write laboratory reports in clear and concise professional English

Course Management and Policies

The course will be administered primarily through Canvas. Lecture attendance and participation is considered mandatory. Office hour attendance is not mandatory. Provide a timely notice and/or request in the event of an absence. Lab reports are due two week after the corresponding lecture and will be turned in electronically as Word Documents (.doc,.docx) or in Portable Document Format (.pdf) via Canvas

Grading

20% Final exam

80% 8 Lab grades (includes attendance, participation, and reports)

(Late lab report policy: 20% off per week)

Lab Experiments

Lab 1: Determination of Planck's Constant

Lab 2: Confirmation of the Beer-Lambert Law

Lab 3: Electronic spectrum of I₂ in gas phase

Lab 4: Rotational-vibrational spectra of HCl and DCl

Lab 5: Exploring keto/enol tautomerism: combined computational and NMR Spectroscopy experiment

Lab 6: Quinine fluorescence quenching

Lab 7: Circular dichroism spectroscopic investigation of protein (un)folding

Lab 8: Phase Diagram *via* solution scattering

Lab schedule:

You will be working with a lab partner on each experiment, and these partners will rotate throughout the semester. Due to instrumentation constraints, not every group of lab partners may be performing the experiment on the same day. The exact schedule is posted as a PDF on Canvas.

Lab report due dates:

Reports are due one week after you perform the experiment. See experiment schedule for exact details.

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 assistance 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 TitleX@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 reports an incident to the office at: (973) 353-1906 or TitleX@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>