

## **ANALYTICAL ENVIRONMENTAL CHEMISTRY LABORATORY**

11:375:310 sections 01-03, Spring 2024

In-Person Lecture (all sections): Tuesday 8:30 – 9:50 am, HCK-119

Section 1 Lab: Tuesday 10:20 am – 1:20 pm, ENR Room 205

Section 2 Lab: Wednesday 10:20 am – 1:20 pm, ENR Room 205

Section 3 Lab: Thursday 10:20 am – 1:20 pm, ENR Room 205

### **CONTACT INFORMATION:**

Instructor(s): Dr. Jeffra Schaefer

Office Location: Room 356, Environmental & Natural Resource Sciences Building

Phone: 848-932-5779; Email: [jschaefer@envsci.rutgers.edu](mailto:jschaefer@envsci.rutgers.edu)

Office Hours: by appointment

### ***Teaching Assistants:***

Tues & Wed: TBD

Tues & Thurs: TBD

TA Office Hours: by appointment

### **COURSE DESCRIPTION:**

A chemistry laboratory course covering basic chemical lab techniques for the analysis of environmental samples and on written presentation of analytical results.

### **COURSE MATERIALS:**

1. Binder for lab manual (Provided in class and on Canvas)
2. Lab notebook (spiral-bound or composition book; no loose pages)
3. Safety glasses or goggles (required)
4. Canvas course website
5. Laptop computer (recommended). Laptops also available in the classroom.

### **LEARNING GOALS:**

#### ***General Education Requirements:***

#### **Writing and Communication requirement WCD (writing in the disciplines).**

- t. Communicate effectively in modes appropriate to a discipline or area of inquiry; evaluate and critically assess sources and use the conventions of attribution and citation correctly; and analyze and synthesize information and ideas from multiple sources to generate new insights. [WCD]

#### **Information Technology and Research ITR.**

- y. Employ current technologies to access and evaluate information, to conduct research, and to communicate findings. [ITR]

#### ***Environmental Science Majors:***

This class will contribute toward students' ability to:

1. apply knowledge, skills and techniques from the sciences and mathematics to identify, characterize and provide solutions to environmental problems
2. design and conduct experiments, analyze and interpret data to draw informed conclusions
3. communicate technical information effectively (orally, in writing, and through electronic media)
4. function effectively on teams to accomplish collaborative tasks

### **ASSIGNMENTS & ASSESSMENTS:**

- Three short lab write-ups: 30%
- Two formal lab reports: 40%
- Prelab quizzes: 12%
- Technical Assessments: 12%
- Notebook 6%

**Unless specifically stated, assignments are to be completed and submitted individually.**

**Lab report writing assignments:** There are two types of writing assignments: short lab write-ups and formal lab reports. Unless otherwise stated, lab reports are individual assignments. Formal lab reports are to be written in the style of a journal article and will be subjected to in-class peer review. Late lab reports will be penalized -10% each day they are late, including weekends (up to a max deduction of -50%).

**Short lab write-ups:**

Lab 1: Water Quality; *Due Week 4.*

Lab 3: Methane by Gas Chromatography; *Due Week 8.*

Lab 4: PAH Analysis by High Performance Liquid Chromatography; *Due Week 11.*

**Formal lab reports** (usually due two weeks **after** the final lab):

Lab 2: Nutrient Inputs and Eutrophication. *Due Week 8 (before Spring Break) and revisions due Week 9 (Fri after Spring Break)*

Lab 5: Metals in the Raritan River. *Draft Due Week 13. Final revised version due last day of class (April 29, 2024).*

**Pre-Lab Quizzes:** Short quizzes will be assigned each week to determine whether you are prepared for the lab exercise. The pre-lab quizzes will begin Week 2 (Jan 23 – Jan 25) and take place during the first 5 min of class. Latecomers will not be accommodated without a university-approved excuse.

**Technical Skills Assessments:** Three technical skills will be assigned in the semester to assess various technical skills. These include pipetting accuracy, ability to prepare and evaluate standards, and process data in Excel. These assessments will take place in lab during Weeks 4, 5, & 6 of the semester.

**Lab Notebook:** Good record keeping is essential to conducting scientific research. Students are expected to record all scientific information generated in the lab in a self-contained notebook dedicated to this class. Acceptable notebooks include spiral notebooks and composition-type notebooks. Loose-leaf folders are not acceptable. Students should be prepared to show their lab notebooks at any time to their TA or instructor for review and grading. A rubric is provided.

**Boat Trip:** On Saturday April 20, 2024, each student will take a boat trip down the Raritan River on board the R/V Rutgers research vessel. Students will have the opportunity to collect field data, water, and sediment samples at three different stations along the river. Students may choose either the morning or afternoon trip (3 hours in length). This is a **required** activity and will occur rain or shine. Missing this event will result in a **-5% penalty in the course** except in the event of a university or instructor-approved absence.

**LATE ASSIGNMENTS AND MAKE-UPS:**

Meeting deadlines and completing assignments on time are important parts of this class. Thus, late lab reports and write-ups without an acceptable excuse will be penalized -10% per day, including weekends. There are no makeups for Pre-Lab Quizzes, or lab activities except for those that qualify for university-approved exemptions (e.g. illness, etc..).

**ATTENDANCE POLICY:**

Students are expected to be on-time and attend all classes, including both lecture and lab. **If you are sick, please stay home and notify your TA** as soon as possible so that accommodations can be made for you to stay on top of the material and not fall behind.

**SCHEDULE:**

Week	Date	Topic
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1	Jan 16	<p>Lab Class meets the first week!  <b>Introduction to Lab Procedures</b> (<i>Activity due by end of class – graded as Prelab Quiz</i>)</p>
2	Jan 23	<p><b>Lab 1 Water Quality:</b> CTD and TSS measurements  <b>Lab 3:</b> Prepare sediment microcosms  <b>Prelab Quiz 1 on Lab Safety and Lab Procedures</b></p> <p><i>Canvas Activity: Excel functions and graphing</i>  <i>Due Friday: Excel Lesson</i></p>
3	Jan 30	<p><b>Lab 1 Water Quality:</b> pH and alkalinity; finish TSS and POC  <b>Lab 2 Nutrients:</b> prepare microcosms &amp; collect initial timepoint (N&amp;P)  <b>Prelab Quiz 2</b>  <i>Lab 1 due next week during lab class</i></p> <p><i>Canvas Activity: Manuscript Design – how to write a scientific manuscript</i></p>
4	Feb 6	<p><b>Lab 2 Nutrients:</b> finish microcosms, collect final timepoint (N&amp;P), protein, and particulate P  <b>Prelab Quiz 3</b>  <b>Technical Assessment #1 – pipetting accuracy</b></p> <p><b>LAB 1 DUE: Submit Lab 1 report on Canvas (due at start of lab period)</b></p> <p><i>Canvas Activity: Introduction Section; Literature search and how to cite properly</i>  <i>Due Friday: Quiz on Scientific Writing</i></p>
5	Feb 13	<p><b>Lab 2 Nutrients:</b> protein and phosphate measurement by spectrophotometry  <b>Prelab Quiz 4</b>  <b>Technical Assessment #2 – preparation of analytical standards</b></p> <p><i>Canvas Activity: How to write the Materials &amp; Methods section</i>  <i>Due Friday: Introduction &amp; Materials and Methods section for Peer Review</i></p>
6	Feb 20	<p><b>Lab 2 Nutrients:</b> nitrate measurement by spectrophotometry  <b>Prelab Quiz 5</b>  <b>Technical Assessment #3 – Excel and data analysis</b></p> <p><i>Canvas Activity: Complete Peer Review of last week's Introduction &amp; Materials and Methods</i></p>
7	Feb 27	<p><b>Lab 2 Nutrients: Discuss research findings, finalize figures, and manuscript design</b>  <i>Lab 2 formal report is due before lab class next week</i></p>
8	Mar 5	<p><b>Lab 3 Gas Chromatography:</b> measure methane in sediment microcosms prepared week 2  <b>Prelab Quiz 6</b>  <b>Lab 3 report is due by end of class</b></p> <p><b>LAB 2 DUE: Submit Lab 2 report on Canvas (due at start of lab period)</b></p>

		<i>Canvas Activity: Conduct peer review of lab 2 reports</i>
SPRING BREAK – March 11 - 15		
9	Mar 19	<b>Lab 4 Identification and quantification of complex mixtures by HPLC:</b> introduction to HPLC using individual and mixed PAH standards, prepare unknown for HPLC <b><i>Prelab Quiz 7</i></b>  <b><i>LAB 2 Revisions DUE Friday Mar 22: Submit revised Lab 2 report on Canvas</i></b>
10	Mar 26	<b>Lab 4 HPLC:</b> identification and quantification of unknown PAH mixtures  <b><i>Prelab Quiz 8</i></b> <i>Lab 4 due next week before lab class</i>
11	Apr 2	<b>Lab 5 Metals</b> <b><i>Prelab Quiz 9</i></b>  <b><i>LAB 4 DUE: Submit Lab 4 report on Canvas (due at start of lab period)</i></b>
12	Apr 9	<b>Lab 5 Metals by ICP-OES</b> <b><i>Prelab Quiz 10</i></b>
13	Apr 16	<b>Lab 5 Discussion of results</b> <b><i>LAB 5 Draft DUE in Lab Class: Peer Review of Lab 5 draft</i></b>  <b>BOAT TRIP Sat April 20: R/V Rutgers on Raritan River (meet @Rutgers Boathouse)</b>
14	Apr 23	NO LECTURE or LAB MEETING THIS WEEK
15	Apr 29	<b><i>LAB 5 Final Report DUE: Submit final Lab 5 report on Canvas for grading</i></b>

\*Schedule is subject to change; see Canvas for latest updates

**FINAL EXAM:**

There is no final exam.

**ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES:**

Please follow the procedures outlined at <https://ods.rutgers.edu/>

**DIVERSITY, EQUITY, AND INCLUSION STATEMENT:**

It is our intention that students of all backgrounds will be well served by this course. We will work to create an environment of inclusion which respects and affirms the inherent dignity, value, and uniqueness of all individuals, communities and perspectives. Disrespectful language or behavior against any individual or group will not be tolerated. If you feel as though you have been disrespected or treated unfairly by the instructor, TA, student or any other individual, please immediately inform one of the instructors, preferably Dr. Jeffra Schaefer. You may speak with the instructors in person, over email or report anonymously via the Office of Academic Programs. In addition, you may also report bias to the Rutgers Diversity and Inclusion initiative using this link: <http://inclusion.rutgers.edu/report-bias-incident/>

**ACADEMIC INTEGRITY:**

Cheating will be taken very seriously in this class. All suspected cases of cheating will be automatically referred to the Office of Judicial Affairs, and we will recommend penalties appropriate to the gravity of the infraction.

The university's policy on Academic Integrity is available at <http://academicintegrity.rutgers.edu/academic-integrity-policy>. The principles of academic integrity require that a student:

- properly acknowledge and cite all use of the ideas, results, or words of others.
- properly acknowledge all contributors to a given piece of work.
- make sure that all work submitted as his or her own in a course or other academic activity is produced without the aid of impermissible materials or impermissible collaboration.
- obtain all data or results by ethical means and report them accurately without suppressing any results inconsistent with his or her interpretation or conclusions.
- treat all other students in an ethical manner, respecting their integrity and right to pursue their educational goals without interference. This requires that a student neither facilitate academic dishonesty by others nor obstruct their academic progress.
- uphold the canons of the ethical or professional code of the profession for which he or she is preparing.

Adherence to these principles is necessary in order to ensure that

- everyone is given proper credit for his or her ideas, words, results, and other scholarly accomplishments.
- all student work is fairly evaluated and no student has an inappropriate advantage over others.
- the academic and ethical development of all students is fostered.
- the reputation of the University for integrity in its teaching, research, and scholarship is maintained and enhanced.

Failure to uphold these principles of academic integrity threatens both the reputation of the University and the value of the degrees awarded to its students. Every member of the University community therefore bears a responsibility for ensuring that the highest standards of academic integrity are upheld.

**STUDENT WELLNESS SERVICES:**

**Counseling, ADAP & Psychiatric Services (CAPS)**

(848) 932-7884 / 17 Senior Street, New Brunswick, NJ 08901/ <http://health.rutgers.edu/>

CAPS is a University mental health support service that includes counseling, alcohol and other drug assistance, and psychiatric services staffed by a team of professional 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.

**Violence Prevention & Victim Assistance (VPVA)**

(848) 932-1181 / 3 Bartlett Street, New Brunswick, NJ 08901 / [www.vpva.rutgers.edu/](http://www.vpva.rutgers.edu/)

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.

### **Disability Services**

(848) 445-6800 / Lucy Stone Hall, Suite A145, Livingston Campus, 54 Joyce Kilmer Avenue, Piscataway, NJ 08854 / <https://ods.rutgers.edu/>

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: <https://ods.rutgers.edu/students/documentation-guidelines>. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: <https://ods.rutgers.edu/students/registration-form>.

### **Scarlet Listeners**

(732) 247-5555 / <http://www.scarletlisteners.com/>

Free and confidential peer counseling and referral hotline, providing a comforting and supportive safe space.