

Environmental Science Research Methods and Data Analysis

EVSC 01202 and ENST 94202

Syllabus, Fall 2020 Semester

Instructor: Dr. Patrick Crumrine

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Virtual Office Hours: Monday Wednesday 11:00 am - 12:00 pm

Meeting Times and Locations:

Lecture:	Monday	9:30 am – 10:45 am	232 Science Hall
Lecture:	Wednesday	9:30 am – 10:45 am	109 Westby Hall
Lab:	Friday	9:30 am – 12:15 pm	105 Westby Hall

- This is a Physical Presence Required (PPR) course. Lecture sessions will be held virtually in both asynchronous and synchronous formats. We will meet outside, in-person, on campus for lab sessions. In person meetings are required and will introduce new content. For in-person meetings plan to meet in the loading dock area of Westby Hall adjacent to Meditation Walk unless the instructor provides other details.

Textbook and Materials:

Textbook: Introductory Biological Statistics, Raymond Hampton, John Havel, and Scott Meiners, 4th Edition. Waveland Press, ISBN: 9781478638186 (**required**)

Software: [IBM SPSS 27](#) SPSS can be downloaded for use on your personal computer or it can be used through the Rowan Cloud using Citrix/Virtual Desktop.

Course Description and Learning Outcomes:

From the Course Catalogue

"In this course students will build upon basic statistical concepts introduced in Statistics I with applications to the environmental disciplines. Emphasis is placed on developing valid sampling approaches, hypothesis testing, experimental design, and analysis of environmental data. A variety of parametric and non-parametric statistical approaches will be covered. Methods used to collect environmental data from the field will be introduced. Computer software will be used regularly to manipulate and analyze data and present results."

Professionals in the environmental field draw from both natural science and social science disciplines to understand interactions between humans and the environment and use a number of methods to collect and analyze data in an effort to promote human health and environmental quality. Simply measuring environmental variables and responding to critical environmental situations is a reactionary approach. A much more powerful approach is to develop a predictive framework which can be used to prevent environmental catastrophes before they happen. Students will begin to develop this predictive framework in Environmental Science Research Methods and Data Analysis. After completing this course students should:

- be familiar with common methods used to measure environmental variables.
- be able to identify different types of data.
- be able to use descriptive statistics to summarize and present data.
- be able to design and carry out studies and experiments to investigate relevant environmental problems.
- be able to use inferential statistics to analyze environmental data.
- be familiar with the approaches researchers use to develop a mechanistic understanding of environmental systems.

Format:

Environmental Science Research Methods and Data Analysis will be taught using the “Hyflex Flipped” model. Asynchronous video lectures will be made available to students on a weekly basis. Links to videos will be posted in Canvas, our new learning management system that is replacing Blackboard. We will meet synchronously using the Webex or Zoom videoconferencing apps to do group activities and engage with the course material in real-time. We will plan to meet in person each week for hands-on outdoor lab sessions, weather permitting. Since field lab sessions will be designed to introduce important environmental field methods, I view these as required. Meeting outside will allow us to physically distance and maintain a safer environment than what can be achieved inside a classroom.

Policies

- **Attendance and Participation:** Attendance and participation are critical for your success in this course. Attendance at all class sessions (both in-person and virtual) is expected unless accommodations have been arranged through Office of Disability Resources. All aspects of the Rowan University [Attendance Policy](#) and the [Interim Amendment to the Attendance Policy Fall 2020](#) apply in this course. If you know you will miss class due to an expected excused absence (excused absences are outlined in the Rowan University Student Information Guide), notify the instructor at least one week **prior** to that session to arrange for make-up work. If you miss a class unexpectedly due to an illness or another event, please let the instructor know as soon as possible and provide documentation for your absence.
- **Academic Integrity:** I strongly support the Rowan University [Academic Integrity Policy](#) and expect students to comply with this policy. Any student found responsible for violations (i.e. cheating of any kind, plagiarism, copying, lying, etc.) risks losing some/all points on assignments, receiving a failing grade in the course, and/or other sanctions outlined in the policy.
- **Special Accommodations:** Your academic success is important. If you have a documented disability that may have an impact upon your work in this class, please contact the instructor. Students must provide documentation of their disability to the Academic Success Center in order to receive official University services and accommodations. The Academic Success Center can be reached at 856-256-4234. The Center is located on the 3rd floor of Savitz Hall. The staff is available to answer questions regarding accommodations or assist you in your pursuit of accommodations.
- **In-Class Behavior:** Please be respectful of other students and the instructor during class sessions both in-person and virtual. Among other things this means arriving/logging in to sessions on time, staying engaged and focused during sessions, and recognizing that your behavior affects those around you. Follow this link to the full Rowan University [Classroom Behavior Policy](#) and the [Interim Amendment to the Classroom Behavior Policy Fall 2020](#).

- **Technology in the classroom:** Technology is fully integrated into the fabric of this course as Canvas and Zoom will be used to deliver portions of the course. In virtual settings it is critical that you focus on the tasks at hand and resist the urge to multi-task on more than one device. During in-person sessions, use technology to enhance your experience in the course rather than detract from it. Follow this link to the Rowan University [Mobile Electronic Device Policy](#).
- **Late work policy:** Students are expected to hand in assignments by the deadline indicated. For some assignments, on-time completion is necessary to progress through the course or for an in-class activity to be successful. If you are unable to meet deadlines your performance in the course will likely suffer.
- **Email policy:** Email will be used to communicate information to students about the course. The instructor will only send email to your Rowan account, so you should check this account daily. Email is a very convenient way to correspond with the instructor but please maintain formality in your communications. Treat all message as if they were short letters. All messages should include a subject, consist of an opening greeting (i.e. Dear Dr. Crumrine) and should end with your signature (i.e. Sincerely, Jane Student). Emails not prepared in a professional format will not be answered.
- **Videoconferencing Policy:** Students are expected to be professional and respectful when attending class sessions that are held using Zoom, Webex or other videoconferencing apps.
- **General**
 - Login to virtual class sessions from a quiet space with limited distractions that is conducive to work such as a desk/table in a dorm room, home office, or similar workspace.
 - Maintain a professional appearance during virtual class sessions.
 - Sign in with your full first name (or preferred name) and last name. Do not use a nickname because it makes it difficult to know who is in attendance. Using your full name quickly sorts students into their groups when needed. Users who do not provide their full names will NOT be admitted to class.
 - If you do not have access to a computer or smartphone with internet access, call into class using a landline phone. This is not optimal; please try to locate an internet-enabled device to use for class.
 - Stay focused. Please stay engaged in class activities. Close any apps on your device that are not relevant and turn off notifications.
- **Video**
 - Turn on your video when possible. It is helpful to be able to see each other, just as in an in-person class.
 - Exception 1: If you have limited internet bandwidth or no webcam, it is ok to not use video.
 - Exception 2: If you're unable to find an environment without a lot of visual distractions, it is also ok to turn off your video.
- **Audio**
 - Mute your microphone when you are not talking. This helps eliminate background noise.
 - Use a headset when possible. If you own headphones with a microphone, please use them. This improves audio quality.
- **Chat**
 - Stay on topic. Use the chat window for questions and comments that are relevant to class. The chat window is not a place for socializing or posting comments that distract from the course activities
 - As with in-person sessions, respectful behavior is expected while chatting in virtual sessions.

Grading and Exams:

Point Distribution

Exam I	100
Exam II	120
Quizzes	80
Homework/Assignments	60
<u>Lab Assignments</u>	<u>140</u>
Total	500

Grading Scale

90% - 100%	A-, A
80% - 89%	B-, B, B+
70% - 79%	C-, C, C+
60% - 69%	D-, D, D+
0% - 59%	F

Exams will include data summary, analysis, and interpretation questions, and essay questions. Exams will be made available through Canvas and will have a strict time limit and hard deadline. If a student will not be able to complete an exam on the regularly scheduled day/time due to an unavoidable excused absence, that student must notify the instructor and take the exam prior to the regularly scheduled exam date and time. If a student misses an exam due to an unexpected excused absence, that student has one week from the scheduled exam date and time to make-up the exam. Make-up exams will only be given for unexcused absences in rare cases.

Description of Grades

The grade of A indicates excellence in learning and scholarship. Such scholarship should involve not only the recall of information, but also the ability to communicate the information effectively and to understand its importance and application.

The grade of B indicates substantial mastery of the objectives of the course.

The grade of C indicates average work and basic knowledge of key concepts.

The grade of D indicates substandard work and poor understanding of key concepts.

The grade of F indicates failure to meet the objectives of the course.

Tentative Schedule for Fall 2020

Week of 8/31/2020

- Topic: Introduction, Randomization, Measurement
- Reading: Chapters 1-3

Week of 9/7/2020

- Topic: Measures of Location and Variability
- Reading: Chapter 4

Week of 9/14/2020

- Topic: Probability and the Normal Distribution
- Reading: Chapters 5 and 8

Week of 9/21/2020

- Topic: Estimation and Sampling Distributions
- Reading: Chapter 8

Week of 9/28/2020

- Topic: Hypothesis Testing
- Reading: Chapter 6

Week of 10/5/2020

EXAM I, Monday October 5

- Topic: One Sample Hypothesis Tests
- Reading: Chapter 9

Week of 10/12/2020

- Topic: Non-Parametric Hypothesis Tests
- Reading: Chapter 9

Week of 10/19/2020

- Topic: Two Sample Hypothesis Tests
- Reading: Chapter 10

Week of 10/26/2020

- Topic: ANOVA
- Reading: Chapter 11

Week of 11/2/2020
• Topic: Regression and Correlation • Reading: Chapters 13 and 14
Week of 11/9/2020
EXAM II, Monday November 9
• Topic: Survey Design and Analysis • Reading: TBD
Week of 11/16/2020
• Topic: Survey Design and Analysis • Reading: TBD
Week of 11/23/2020
• Topic: Wetland Delineation • Reading: TBD
Week of 11/30/2020
• Topic: Wetland Delineation • Reading: TBD
Week of 12/7/2020
• Project Work Days

Laboratory:

In the laboratory component of this course, we will focus on learning how to collect data in the field, analyze data using statistics and presenting results in a variety of formats. Attendance at in-person outdoor on campus lab sessions is required. There will be no make-ups for missed laboratories. For students who miss labs due to excused absences, grades will reflect only graded assignments for labs the student attends.

Lab Safety

The Office of Research Compliance and Environmental Health Safety at Rowan University has developed a comprehensive web-based mandatory laboratory safety training program for working in research and teaching laboratories. All faculty, staff and students working in research and teaching laboratories must complete the mandatory "General Laboratory Training" (ID:104958) before starting laboratory work. This training is required annually. Reminder notices will be sent 60 and 30 days before the annual expiration date.

Additional Training to Work with Biologically Hazardous Materials:

In addition to General Laboratory training, faculty, staff and students working in teaching and research laboratories are required to complete the following additional training module based on the type of biological materials being used in research and teaching laboratories: "General Biological Laboratory Training" (ID:104795).

If you do not already have an account with CITI you will need to register in order to complete the required training:

1. Go to <https://www.citiprogram.org>
2. Click on "Register" to create an account. Follow the directions to provide the necessary Information, including your organizational affiliation with Rowan University.
3. Under the Institutional Courses menu, you can choose to "View Courses" for Rowan University
4. If you do not see choices under the "Active Courses" or "Courses Ready to Begin" menus, you can click on "Learner Tools" to add the appropriate courses.
5. You should select and complete the training modules "General Laboratory Safety Training" (if this has not been completed within the last calendar year) and "General Biological Laboratory" (if this has not been completed within the last three calendar years)

You must provide physical proof that you have completed the training. (i.e. in the form of a pdf file):

1. Once all modules are completed click on POST-COURSE COMPLETION OPTIONS.
2. Select the COMPLETION REPORT option and download it. Remember the location you choose to save your download.
3. You may print your COMPLETION REPORT and bring it to the first lab class, or you may email a copy to your instructor.
4. If a training certification has not expired, you can find a record of its completion by selecting "View Previously Completed Coursework under the Learner Tools menu.

When you have completed these two modules, print the certificates of completion and submit them to the instructor. All training modules must be completed by 5:00 pm on Friday September 11, 2020.

<u>Tentative</u> Lab Schedule for Fall 2020		
Lab #	Date	Topic
1	9/4	Introduction to sampling and data collection
2	9/11	Begin decomposition project, tree diameter measurements
3	9/18	Begin plant ecotoxicology experiment
4	9/25	Bird biodiversity and citizen science
5	10/2	Measuring plant diversity
6	10/9	Estimating population size
7	10/16	Visual habitat assessment of stream ecosystems
8	10/23	Soil sampling and soil quality measurements
	10/30	Habitat use of small mammals I
9	11/6	Habitat use of small mammals II
10	11/13	Conclude plant ecotoxicology experiment
11	11/20	Conclude decomposition project
	11/27	Thanksgiving Break – No Lab
13	12/4	Wetland delineation site Visit