FWE 375: Data and GIS Tools for Ecology (Spring 2024)

Credits: 3

Canvas Course URL: https://canvas.wisc.edu/courses/386019

Course Designations and Attributes:
Breadth – Physical Sci. Counts toward the Natural Sci requirement
Level – Intermediate to Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement

Meeting Time and Location
Lecture: Fridays 2:30 – 3:45 pm
Lab: Fridays 4:00 – 5:15 pm
In Russell Labs room A120/A121

Class schedule for the semester indicates the flow of material and timeline.

Instructional Modality
In person (and occasionally online)

Credit Hours met
One 75-minute of direct faculty instruction in the form of a lecture and one 75-minute of direct faculty instruction in the form of a lab. The course will require a minimum of two hours of out of class student work per hour in class each week over approximately 15 weeks, or an equivalent amount of engagement over a different number of weeks.

INSTRUCTOR

Instructor: Prof. Mutlu Ozdogan
Office Hours: The instructor will be available every Friday before the lecture in Russell Labs room A129. The best way to contact the instructor is by email.
Email: ozdogan@wisc.edu **Phone:** (608) 262-0873

OFFICIAL COURSE DESCRIPTION

Course Description
Quantitative tools applicable to the investigation of ecological problems, including, but not limited to basic statistics, Geographic Information Systems (GIS), Remote Sensing, and spatial analysis. This course provides an overview of commonly used quantitative techniques in ecological sciences, with strong emphasis on GIS and spatial analysis. The course will introduce quantitative/spatial tools, will provide examples of practical applications, and will provide opportunities to use the tools on datasets that originate from ecological/environmental

investigations. The quantitative tools will include generating, manipulating, and analyzing ecological data using spreadsheets and GIS software, statistical description of datasets, geographic (spatial) analysis, and generating descriptive charts and maps. The lab portion of the course will focus on learning a GIS software, introductory to intermediate analytics with spreadsheets including descriptive statistics, and data presentation using charts/graphs as well as maps. Students from many different disciplines and majors including forestry, wildlife ecology, soil sciences, environmental studies, and climate sciences are welcome and are expected to benefit from the course.

Requisites
None

COURSE WEBSITE, LEARNING MANAGEMENT SYSTEM and INSTRUCTIONAL TOOLS

https://canvas.wisc.edu/courses/334015

COURSE LEARNING OUTCOMES

Course Learning Outcomes
After taking this course, students will (i) learn how to use spreadsheet (e.g. Excel) and Geographic Information Systems (GIS) software (e.g. ArcGIS); ii) be able to acquire and map spatially explicit ecological data using GIS tools; (iii) be able to use GIS and spreadsheet tools to describe ecological datasets spatially and statistically; (iv) will be able to find patterns in complex datasets; (v) carry out common statistical analysis of digitized data, including description, correlation, univariate regression, and hypothesis testing; and (vi) critically evaluate the results including validation.

GRADING

The course is graded on a letter basis and is based on the following elements. Please note, *there will be no exams for this course*.

Homework (a total of 7 homework assignments):	70%
Final Project:	30%

Letter grades for the course will follow the following grade scheme: A: > 93%; AB: 88-93%; B: 83-88%; BC: 78-83%; C: 70-78%; D: 60-70%; F: < 60%. Final grades in the class may be curved.

Lab component:
There is a once-per-week lab portion focused on learning spreadsheet and GIS software, in-class applications of quantitative analyses to specific problems in ecological sciences. Students will have access to the required software both as installed on their personal computers as well in the lab located in Russell Labs building room A120. The instructor will provide the datasets relevant to each lab/topic but students are encouraged to bring and use their own datasets if applicable.

REQUIRED TEXTBOOK, SOFTWARE & OTHER COURSE MATERIALS

There is no required textbook for this course. Students will work from material provided in class and in labs. There are a few recommended books that would be of help throughout the semester:

Statistics for Ecologists Using R and Excel: Data Collection, Exploration, Analysis and Presentation (Data in the Wild), by Mark Gardener, Pelagic Publishing (2012).

GIS for Biologists: A Practical Introduction for Undergraduates, by Colin D. MacLeod, Pictish Beast Publications (2015).

Landscape ecological analysis: issues and applications, by Jeffrey M. Klopatek, Robert H. Gardner, editors, Springer (1999).

Students are also encouraged to register and attend a few introductory training courses provided by the software vendor (ESRI makers of ArcGIS) available here:

https://www.esri.com/training/

Online Lecture Notes: Online material provided by the instructor will be available in Canvas throughout the semester. The class website will have links to these notes. Some of these materials may be copyrighted, so if you use them in your research, be sure to cite them!

Required Software: This course will make use of Google Sheets, Microsoft Excel and ESRI's ArcGIS software. This software will be available in Russell Labs building room A120. The software will also be available for installation in students' personal computers at no cost.

HOMEWORK & OTHER ASSIGNMENTS

Homework:
Homework will be assigned approximately every two weeks. Many of the homework assignments will require computations and will include examples in common GIS and tabular analysis (e.g. Excel) format. Each homework assignment will include several problems where students apply the specific analysis technique to relevant data.

Final Project:
The final project for this course will involve analysis of a particular phenomenon or ecological process that is of interest to each student. Students will be required to analyze, relate, and map ecological data as well as find patterns between variables. The final write-up (10 pages max) should include: (i) a brief introduction to the final project topic; (ii) a description of the data sets used for the project; (iii) methods and results; and (iv) a conclusion and discussion section that includes a summary of results including maps. The bulk of the final project should occur throughout the course. The final project, including the write up, is not expected to take more than four class meeting times.

EXAMS, QUIZZES, PAPERS & OTHER MAJOR GRADED WORK

This course has no exams. However, the following statements are provided as required by the university.

Privacy of Student Information and Digital Proctoring Statement
The privacy and security of faculty, staff and students' personal information is a top priority for UW-Madison. The university carefully reviews and vets all campus-supported teaching and learning tools, including proctoring tools and takes necessary steps to ensure that tool providers prioritize proper handling of sensitive data in alignment with FERPA, industry standards and best practices.

Under the Family Educational Rights and Privacy Act (FERPA – which protects the privacy of student education records), student consent is not required for the university to share with Honorlock those student education records necessary for carrying out the proctoring service. 34 CFR 99.31(a)(1)(i)(B). FERPA specifically allows universities to treat vendors as school officials and to share student education records with them where they perform services for the university and are subject to FERPA requirements governing the use and redisclosure of personally identifiable information from education records. Honorlock is FERPA compliant and is bound by the terms of its agreement with the university to comply with FERPA's restrictions on the use of student education records.

PRIVACY OF STUDENT RECORDS and the USAGE of AUDIO RECORDED LECTURES
See information about privacy of student records and the usage of audio-recorded lectures.

Usage of Audio Recorded Lectures Statement
Lecture materials and recordings for [insert class name] are protected intellectual property at UW-Madison. Students in this course may use the materials and recordings for their personal use related to participation in this class. Students may also take notes solely for their personal use. If a lecture is not already recorded, you are not authorized to record my lectures without my permission unless you are considered by the university to be a qualified student with a disability requiring accommodation. [Regent Policy Document 4-1] Students may not copy or have lecture materials and recordings outside of class, including posting on internet sites or selling to commercial entities. Students are also prohibited from providing or selling their personal notes to anyone else or being paid for taking notes by any person or commercial firm without the instructor's express written permission. Unauthorized use of these copyrighted lecture materials and recordings constitutes copyright infringement and may be addressed under the university's policies, UWS Chapters 14 and 17, governing student academic and non-academic misconduct.

OTHER COURSE INFORMATION

None

HOW TO SUCCEED IN THIS COURSE

This is a methods course, and the tools will be applicable to wide ranging disciplines and career choices for students. Since the course is quantitative, I encourage students with less quantitative background to reach out to the instructor and peers for support. The students may also seek additional resources and campus services including:

- University Health Services

- Undergraduate Academic Advising and Career Services
- Office of the Registrar
- Office of Student Financial Aid
- Dean of Students Office

STUDENTS' RULES, RIGHTS & RESPONSIBILITIES

During the global COVID-19 pandemic, we must prioritize our collective health and safety to keep ourselves, our campus, and our community safe. As a university community, we must work together to prevent the spread of the virus and to promote the collective health and welfare of our campus and surrounding community.

UW-MADISON BADGER PLEDGE

UW-MADISON FACE COVERING GUIDELINES

While on campus all employees and students are required to wear appropriate and properly fitting face coverings while present in any campus building unless working alone in a laboratory or office space.

Face Coverings During In-person Instruction Statement (COVID-19)

Individuals are expected to wear a face covering while inside any university building. Face coverings must be worn correctly (i.e., covering both your mouth and nose) in the building if you are attending class in person. If any student is unable to wear a face-covering, an accommodation may be provided due to disability, medical condition, or other legitimate reason.

Students with disabilities or medical conditions who are unable to wear a face covering should contact the McBurney Disability Resource Center or their Access Consultant if they are already affiliated. Students requesting an accommodation unrelated to disability or medical condition, should contact the Dean of Students Office.

Students who choose not to wear a face covering may not attend in-person classes, unless they are approved for an accommodation or exemption. All other students not wearing a face covering will be asked to put one on or leave the classroom. Students who refuse to wear face coverings appropriately or adhere to other stated requirements will be reported to the Office of Student Conduct and Community Standards and will not be allowed to return to the classroom until they agree to comply with the face covering policy. An instructor may cancel or suspend a course in-person meeting if a person is in the classroom without an approved face covering in position over their nose and mouth and refuses to immediately comply.

QUARANTINE OR ISOLATION DUE TO COVID-19

Students should continually monitor themselves for COVID-19 symptoms and get tested for the virus if they have symptoms or have been in close contact with someone with COVID-19. Students should reach out to instructors as soon as possible if they become ill or need to be isolated or quarantined, in order to make alternate plans for how to proceed with the course. Students are

strongly encouraged to communicate with their instructor concerning their illness and the anticipated extent of their absence from the course (either in-person or remote). The instructor will work with the student to provide alternative ways to complete the course work.

COURSE EVALUATIONS

Students will be provided with an opportunity to evaluate this course and your learning experience. Student participation is an integral component of this course, and your feedback is important to me. I strongly encourage you to participate in the course evaluation.

Digital Course Evaluation (AEFIS)

UW-Madison now uses an online course evaluation survey tool, AEFIS. In most instances, you will receive an official email two weeks prior to the end of the semester when your course evaluation is available. You will receive a link to log into the course evaluation with your NetID where you can complete the evaluation and submit it, anonymously. Your participation is an integral component of this course, and your feedback is important to me. I strongly encourage you to participate in the course evaluation.

ACADEMIC CALENDAR & RELIGIOUS OBSERVANCES

- See: https://secfac.wisc.edu/academic-calendar/#religious-observances

ACADEMIC INTEGRITY STATEMENT

By virtue of enrollment, each student agrees to uphold the high academic standards of the University of Wisconsin-Madison; academic misconduct is behavior that negatively impacts the integrity of the institution. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these previously listed acts are examples of misconduct which may result in disciplinary action. Examples of disciplinary action include, but are not limited to, failure on the assignment/course, written reprimand, disciplinary probation, suspension, or expulsion.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES STATEMENT

The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform faculty [me] of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty [I], will work either directly with the student [you] or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA. (See: McBurney Disability Resource Center)

DIVERSITY & INCLUSION STATEMENT

Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals.

The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background – people who as students, faculty, and staff serve Wisconsin and the world.