

NRES 797: Research Methods, Design and Analysis
(3 credits)

Spring 2020

INSTRUCTOR: Dr. Paul Doruska
OFFICE: TNR 239
PHONE: 346-3988
EMAIL: pdoruska@uwsp.edu (or through Canvas)

Class Time: **Lecture:** Tuesday 4:00 – 5:50pm (with one 10-minute break) TNR 320
Discussion: Friday 10:00 – 10:50am TNR 252

Final exam: Tuesday May 12, 2020 5:00-6:50pm TNR 320

Office Hours: Tuesdays 2:00-2:50pm; Wednesdays 11:00-11:50am

I am generally available to answer quick questions anytime I am in my office and the door is ajar. Larger, more time-consuming questions require meeting during office hours or an appointment. Questions can be posed via Canvas as well.

Prerequisite(s): MATH 355 Elementary Statistical Methods or FOR 321 Forest Biometry or equivalent, or consent of the instructor

Text: *Experimental Design and Data Analysis for Biologists*
by G.P. Quinn and M.J. Keough Cambridge University Press ISBN: 0-521-00976-6

Learning Outcomes: Students in this course will learn basic & advanced techniques in experimental design and select statistical analyses and how they are utilized when performing research on natural resource-based topics. Upon completion of this course, students will be able to:

- (1.) Define and recognize the fundamental components of an experiment/experimental design including, but not limited to: randomization, responses, treatments, factors, blocks, covariates, experimental units, and observational units,
 - (2.) Identify and apply valid experimental designs for a host of natural resource-based research hypotheses,
 - (3.) Identify the types of errors present in an experiment and their roles in hypothesis testing,
 - (4.) Correctly obtain and interpret statistical results, drawing statistically sound conclusions therein,
 - (5.) Correctly recognize and analyze repeated measures designs and mixed modeling scenarios that commonly occur in the field of natural resources, and
 - (6.) Use SAS®, or R® or another statistical package, to assist in objectives (2.) through (5.) where appropriate.
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Grading:

There will be six 40 POINT assignments/projects, a 30 point statistical summary/presentation of a published research paper and a 50 point *concept based* exam over the course of the semester. When determining final grades, the weight of one's lowest assignment/project score will carry ½ the weight of the other scores.

COURSE TOTAL POINTS (after adjustments): 300 points.

Normally, cumulative-weighted percentages will be rounded to the nearest tenth and course grades will be assigned as follows (instructor reserves the right to curve):

91.6% or higher	A	77.6% to 79.5%	C+	
89.6% to 91.5%	A-	71.6% to 77.5%	C	
87.6% to 89.5%	B+	69.6% to 71.5%	C-	
81.6% to 87.5%	B	67.6% to 69.5%	D+	
79.6% to 81.5%	B-	59.6% to 67.5%	D	Less than 59.6% F

Instructor's tips:

- (1.) Come to class willing to learn and have fun, I certainly plan to do so.
- (2.) Keep up with the topics, readings and assignments.
- (3.) Partial credit, within reason, is often awarded. Therefore, you are *strongly encouraged* to show/include your work at all times.

Instructor's rules:

- (1.) Discussion of assignments/projects between students is encouraged, however all work (unless part of any group projects) must be done independently.
- (2.) Cheating and/or plagiarism will not be tolerated (see also the Professionalism Statement)
- (3.) Assignments/projects are due at the start of class on the respective due dates. Any project/assignment turned in any time AFTER the start of class will be considered late. Late assignments will be accepted up to 5 semester weekdays past the due date, though 10% of the total points are deducted per day late.
- (4.) All work is expected to be neat and well organized. Work that is sloppy and/or difficult to read will be returned ungraded. The student will then have 1 week to resubmit in a neat format, however, only 50% of the original points are available on resubmitted work.

Students with Disabilities:

The university has a legal responsibility to provide accommodations and program access as mandated by Section 504 and the Americans with Disabilities Act (ADA). The university's philosophy is to not only provide what is mandated, but also convey its genuine concern for one's total well-being. If accommodations are needed, please contact the instructor as well as the Disability Services and Adaptive Technologies Center, 609 Library Resources Center, voice (715) 346-3365 or TDD (715) 346-3362

Attendance Policy

Missing class HABITUALLY almost always results in lower grades, particularly true for a class that meets just one day a week such as this one. Therefore, you are *strongly encouraged* to attend all classes. However, the instructor fully recognizes that as graduate students, research/conference activities may necessitate missing class. Please let the instructor know ahead of time that a class is going to be missed. Doing so will better facilitate the coverage of missed material.

University of Wisconsin Stevens Point College of Natural Resources-Principles of Professionalism

The College of Natural Resources at the University of Wisconsin – Stevens Point prepares students for success as professionals in many fields. As a professional, there are expectations of attainment of several personal characteristics. These include:

Integrity

Integrity refers to adherence to consistent moral and ethical principles. A person with integrity is honest and treats others fairly.

Collegiality

Collegiality is a cooperative relationship. By being collegial you are respecting our shared commitment to student education through cooperative interaction. This applies to all involved in the process: students, staff, faculty, administration and involved community members. You take collective responsibility for the work performed together, helping the group attain its goals.

Civility

Civility refers to politeness and courtesy in your interactions with others. Being civil requires that you consider the thoughts and conclusions of others and engage in thoughtful, constructive discussion to express your own thoughts and opinions.

Inclusivity

Inclusivity requires you to be aware that perspective and culture will control how communication is understood by others. While many values are shared, some are quite different. These differences in values should be both considered and respected.

Timeliness

Timeliness is the habit of performance of tasks and activities, planned in a way that allows you to meet deadlines. This increases workplace efficiency and demonstrates respect for others' time.

Respect for Property

Respect for property is the appreciation of the economic or personal value an item maintains. Maintaining this respect can both reduce costs (increase the operable life of supplies and equipment) as well as demonstrate respect for others rights.

Communication

Professional norms in communication require that you demonstrate the value of your colleagues, students, professors or others. The use of appropriate tone and vocabulary is expected across all forms of communication, whether that communication takes place face to face, in writing or electronically.

Commitment to Quality

Quality is the ability to meet or exceed expectations. By having a commitment to quality, we intend to provide a learning environment that is conducive to learning. Intrinsic to this commitment to quality is defining expectation (committed to in a syllabus through learning outcomes), implementation (with quality control in place) and assessment (where meeting of learning outcomes is determined).

Commitment to Learning

Learning is a lifelong process. By being committed to learning you are providing a model for all to follow. This model is not only professor to student but involves all combinations of people within our university and broader community

Adherence to this compact is required of the faculty and staff of the College of Natural Resources and of all students enrolled in College of Natural Resources courses.

Academic misconduct will not be tolerated.

Note the following as per the Univ. of Wisc.-Stevens Point Community Bill of Rights and Responsibilities:

UWSP 14.03 ACADEMIC MISCONDUCT SUBJECT TO DISCIPLINARY ACTION.

(1.) Academic misconduct is an act in which a student:

- (a) Seeks to claim credit for the work or efforts of another without authorization or citation;
- (b) Uses unauthorized materials or fabricated data in any academic exercise;
- (c) Forges or falsifies academic documents or records;
- (d) Intentionally impedes or damages the academic work of others;
- (e) Engages in conduct aimed at making false representation of a student's academic performance;
- or
- (f) Assists other students in any of these acts.
- (g) Violates electronic communication policies or standards as agreed upon when logging on initially (See uwsp.edu/it/policy).

(2) Examples of academic misconduct include, but are not limited to: cheating on an examination; collaborating with others in work to be presented, contrary to the stated rules of the course; submitting a paper or assignment as one's own work when a part or all of the paper or assignment is the work of another; submitting a paper or assignment that contains ideas or research of others without appropriately identifying the sources of those ideas; stealing examinations or course materials; submitting, if contrary to the rules of a course, work previously presented in another course; tampering with the laboratory experiment or computer program of another student; knowingly and intentionally assisting another student in any of the above, including assistance in an arrangement whereby any work, classroom performance, examination or other activity is submitted or performed by a person other than the student under whose name the work is submitted or performed.

UWSP 14.04 DISCIPLINARY SANCTIONS.

(1) The following are the disciplinary sanctions that may be imposed for academic misconduct in accordance with the procedures of s. UWSP 14.05, 14.06 or 14.07:

- (a) An oral reprimand;
- (b) A written reprimand presented only to the student;
- (c) An assignment to repeat the work, to be graded on its merits;
- (d) A lower or failing grade on the particular assignment or test;
- (e) A lower grade in the course;
- (f) A failing grade in the course;
- (g) Removal of the student from the course in progress;
- (h) A written reprimand to be included in the student's disciplinary file;
- (i) Disciplinary probation; or
- (j) Suspension or expulsion from the university.

(2) One or more of the disciplinary sanctions listed in sub. (1) may be imposed for an incident of academic misconduct.

Required Statement on Emergency Preparedness:

In the event of a medical emergency, call 911 or use red emergency phone located outside Rm151 or 172 on the first floor; 2nd floor between Rms 252 and 255 or between Rms 219 and 221 (on other side of hall); 3rd floor by Rms 320 or 358. Offer assistance if trained and willing to do so. Guide emergency responders to victim.

In the event of a tornado warning and on the 3rd floor proceed to the southern hallways on the 1st or 2nd floors, away from the windows. Those are appropriate shelters.

In the event of a fire alarm, evacuate the building in a calm manner. Meet at the northwest corner of parking lot E. Notify instructor or emergency command personnel of any missing individuals.

Active Shooter – Run/Escape, Hide, Fight. If trapped hide, lock doors, turn off lights, spread out and remain quiet. Follow instructions of emergency responders.

See UW-Stevens Point Emergency Management Plan at www.uwsp.edu/rmgmt for details on all emergency response at UW-Stevens Point.

Lectures (Tuesdays 4:00 pm – 5:50 pm timeslot with 10 minute break) Outline

Date	Topic(s)	Readings
1/21	Basics of Experimental Design/Completely Randomized Designs	1.1-1.3; 1.5.2; 2.1-2.3; 3.1-3.2.1; 8.1-8.1.4
1/28	Treatment Comparisons/Assumptions	8.3; 8.6-8.8
2/4	Random Effects Experiments	8.2.1
2/11	Factorial Designs	9.2.-9.2.8; 9.2.10-9.2.11 (save random to next week)
2/18	Mixed Models	9.2.7
2/25	Blocking/Analysis of Covariance	10.1.1; 10.2.1; 12.1-12.3
3/3	Considerations for the Basic Designs Above	
3/10	Categorical Data Analysis	14.1-14.2.1
3/17	Spring Break	
3/24	Logistic Regression	13.1-13.2
3/31	Repeated Measures	11.1.2-11.1.3
4/7	Split-Plot Designs (tentative)	9.1-9.1.3; 11.1.1
4/14	Let's see where we are at...	
4/21	Spillover/Additional Topics/ Presentations	
4/28	Spillover/Additional Topics/ Presentations	
5/5	Spillover/Additional Topics	

Discussions (Fridays 10:00-10am timeslot) Outline

Date	Topic(s)/Applications	Assigned Work
1/24	Intro to SAS and R	
1/31	CRD/Treatment Comparisons/Assumptions	Project 1
2/7	Random Effect Application	
2/14	Factorial Application	Project 2
2/21	Mixed Model Application	
2/28	Blocking/Covariance Application	Project 3
3/6	Sampling/Randomization Concerns	
3/13	Working with Counts	Project 4
3/20	Spring Break	
3/27	Logistic Regression Application	
4/3	Repeated Measures Application	Project 5
4/10	Split Plot Application (tentative)	
4/17	Let's see where we are at...	
4/24	Spillover/Additional Topics	Project 6
5/1	Spillover/Additional Topics	
5/8	Spillover/Additional Topics	

Note the above schedules are a guide. The instructor reserves the right to make minor changes to the schedules based on assessment of class progress during the semester and needs identified therein.