**Introduction to Probability and Statistics for Ecologists Spring 2021**

Brief Description:

This course is intended to provide students with an introduction to probability and statistics as applied to ecological problems. This course fulfills a prerequisite for several upper-level courses in the Fisheries and Wildlife curriculum, and the material you learn in this course will provide a critical base for future courses you will take. The course format will include lectures and lab exercises. My goal is to provide you with the conceptual basis for statistical techniques and include examples that will be relevant to you in future classes.

Course Code: STT 224, Section 1, 2, 3, 4

Prerequisites: MTH 103 or MTH 116 or (MTH 124 or concurrently) or (MTH 132 or concurrently) or (MTH 152H or concurrently) or (LB 118 or concurrently)

Time: Lecture MW 12:40 - 1:30

 Lab section 001 M 3:00 – 4:50

 Lab section 002 Tues 3:00 – 4:50

 Lab section 003 F 12:40 – 2:30

 Lab section 004 Tues 12:40 – 2:30

Office Hours: Wednesdays 1:30-2:30, during lab times, or as arranged.

Number of Credits: 3

Instructor: Daniel Hayes

 Room 165 Natural Resources Building

 432-3781

 hayesdan@msu.edu

Teaching Assistant: Trey McClinton

Recommended Texts: Introductory Biological Statistics, 3rd edition. Raymond E. Hampton and

 John E. Havel. Waveland Press, Inc. (previous editions are also fine; book

 is optional, and meant to help students who's learning style is aided by text

 books)

An Excel Companion for an Introductory Statistics Course in Social and Behavioral Sciences. Available at Cognella.com

Web access to course materials:

Copies of class Powerpoint slides can be found at the course web site in D2L. Recorded lectures will be posted in Mediaspace. Laboratory assignments will generally be implemented through LON-CAPA. **Grading**:

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| --- | --- |
|  | **% of Grade** |
| Exam 1 | 17.5% |
| Exam 2 | 17.5% |
| Final Exam | 30% |
| Laboratory Assignments | 35% |
| **TOTAL** | 100% |

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| --- | --- | --- | --- | --- | --- |
| **Grade** | Letter | % | **Grade** | Letter | % |
| **4.0** | A | 93-100% | **2.0** | C | 73-77% |
| **3.5** | A- / B+ | 88-92% | **1.5** | C- / D+ | 68-72% |
| **3.0** | B | 83-87% | **1.0** | D | 63-67% |
| **2.5** | B- / C+ | 78-82% | **0.0** | F | < 63% |

In addition to these grading criteria, I reserve the right to fail any student who achieves a 60% or less on the cumulative final exam.

Another critical note is that we will use D2L to record your grades, and to allow you to check to see if we have received materials and recorded grades accurately, BUT, D2L does not compute the final weighted average correctly, so DO NOT rely on D2L to provide you with your overall average.

**Attendance and assignment policies:**

Attendance is not taken in this class. If you are unable to attend class or are not interested in attending class on a particular day, it is your responsibility to make up the work missed. Before seeing me about what you missed for the day, obtain a copy of the Powerpoint slides for the day and speak with another student in the class about getting any additional notes for the class. If you are still unclear about what was covered in class, you should visit me in office hours or during our computer lab times to clarify any confusing issues.

Assignments are due on the date listed unless you have made specific arrangements with me **ahead of time**. Assignments turned in late may be docked points according to the following schedule:

Late 1-10 days Minus 20 percentage points

Late more than 10 days Minus 50 percentage points

Please e-mail me if you need an extension (without penalty points) due to illness or other serious circumstances. I want to emphasize that if you have fallen far behind in class, for whatever reason, I would prefer you to hand in work and learn the material rather than give up. Handing in work more than 10 days late means that you will receive a 50% at best for that assignment (which is failing), but this is far better than receiving a 0% and not learning the material at all. **One limitation to the late turn-in policy is that the last day for turning in homework will be noon the Friday before finals week. I will not accept homework during finals week unless you have made prior arrangements with me - this is unfair to the grader and me as this is a crunch time for us as well.**

All students are expected to write exams on the date listed on the syllabus. Failure to attend the scheduled exam period will result in a zero for the exam. If circumstances arise where you are unable to take an exam on the specified date (e.g., conflict with scientific conference), please see me as early as possible to make other arrangements.

**Academic Integrity and Dishonesty:**

Academic dishonesty is not tolerated at Michigan State University and the consequences for this are taken seriously and may have a range of outcomes. All members of MSU’s community must be confident that the work of each individual has been responsibly and honorably acquired, developed, presented, and written. All students who are enrolled in university courses are expected to do their own work. Dishonesty includes, but is not limited to, cheating on assignments or exams; plagiarizing; engaging in unauthorized collaborations on academic work; submitting false records of academic achievement; and misusing, fabricating, or falsifying data. Instances of academic dishonesty will be dealt with on a case-by-case basis, and the penalty may range from receiving a zero on an assignment to failure for the class as a whole.

The Spartan Code of Honor embodies the approach we want you to take in your studies, and is “As a Spartan, I will strive to uphold values of the highest ethical standard. I will practice honesty in my work, foster honesty in my peers, and take pride in knowing that honor is worth more than grades. I will carry these values beyond my time as a student at Michigan State University, continuing the endeavor to build personal integrity in all that I do.”

Inclusiveness and Professionalism: Numerous topics are covered in this course, and students are expected to be respectful of one another’s views and comments. Everyone is expected to show a professional level of commitment to cooperatively learning the course material. Demonstrating professionalism in the classroom includes: (1) willingness and ability to participate in class discussions or ask informed questions about course material, (2) having a cooperative and responsible work ethic with the instructors and other students in class to maximize learning, (3) demonstrating quality and originality of individual and group work, (4) being on time, (5) having a professional attitude and respect for the class and individual peers, and (6) no disruptive behaviors. Professionalism also includes the ability to receive constructive criticism without resorting to avoidance behaviors or attitudes.

**Students with Disabilities**

So that all students have equal access in the course, please notify me if you have a situation that requires additional accommodations. Students with disabilities are also encouraged to contact the Resource Center for Persons with Disabilities at (http://www.rcpd.msu.edu/Services/Home) or 353-9642.

**Exemptions for Religious Holidays:**

If you have a conflict with course attendance or exam due to a religious holiday, see me ahead of time to make arrangements. Likewise, if you have a conflict with another course or professional activity (e.g., scientific conference), see me ahead of time.

**Emergency Situations:**

In the event of an emergency in the classroom or laboratory the Instructor will notify you of what actions may be required to ensure your safety. It is the responsibility of each student to understand the evacuation, “shelter-in-place,” and “secure-in-place” guidelines posted in each facility and to act in a safe manner. You are allowed to maintain cellular devices in a silent mode during this course, in order to receive emergency SMS text, phone or email messages distributed by the university. When anyone receives such a notification or observes an emergency situation, they should immediately bring it to the attention of the Instructor in a way that causes the least disruption. If an evacuation is ordered, please ensure that you do it in a safe manner and facilitate those around you that may not otherwise be able to safely leave. When these orders are given, you do have the right as a member of this community to not follow that order. Also, if a shelter-in-place or secure-in- place is ordered, please seek areas of refuge that are safe depending on the emergency encountered and provide assistance if it is advisable to do so.

**MSU Grief Absence Policy:**

The faculty and staff should be sensitive to and accommodate the bereavement process of a student who has lost a family member or who is experiencing emotional distress from a similar tragedy so that the student is not academically disadvantaged in their classes or other academic work (e.g. research). For undergraduate and master’s (Plan B) students without research responsibilities, it is the responsibility of the student to: a) notify the Associate Dean or designee of their college of the need for a grief absence in a timely manner, but no later than one week from the student’s initial knowledge of the situation, b) provide appropriate verification of the grief absence as specified by the Associate Dean, and c) complete all missed work as determined in consultation with the instructor. It is the responsibility of the Associate Dean or designee to: a) determine with the student the expected period of absence – it is expected that some bereavement processes may be more extensive than others depending on individual circumstances, b) notify the faculty that the student will be absent, and c) receive verification of the authenticity of a grief absence request upon the student’s return. It is the responsibility of the instructor to work with the student to make reasonable accommodations and to include appropriate language describing such accommodations in their course syllabus, so that the student is not penalized due to a verified grief absence.

Students who believe their rights under this policy have been violated should contact the University Ombudsperson.

Students seeking a grief absence should be directed to the Grief Absence Request Form found on the RO home page (https://reg.msu.edu/) under ‘Student Resources – Forms - Grief Absence Request Form’ OR to StuInfo (https://stuinfo.msu.edu/) under ‘Academics - Enrollment Information and Services – Grief Absence Request Form.’

In CANR the Associate Dean for Academic Programs is Dr. Kelly Millenbah millenba@anr.msu.edu

**Policy on Requesting Review of Assignment, Lab or Exam for Possible Grade Change:**

Upon receipt of an exercise, lab, assignment or exam it is in your best interest to review your graded work to 1) ensure the points were added correctly and 2) to ensure that points were not taken away incorrectly (i.e., you feel your answer is correct but was not graded correctly). At the same time, you should also match the score of your work with the score posted on D2L to confirm the correct score was entered into the grading spreadsheet. If you have a discrepancy with the way in which points were added, the way in which a grade was assigned, or the score posted on D2L you need to follow the protocol listed below.

1) On your assignment, exercise, lab, or exam clearly indicate in writing the problem or problems you have identified with grading on the top of the first page of the document. You may include this as a note on a separate sheet of paper if needed. If I am unclear about what you are asking me to review, I will request a meeting with you for further explanation. Out of fairness to you and your grade, I will not answer change in grade issues “on the spot”. I request time to thoroughly look at your concern to give it fair consideration before making a decision.

2) You have one (1) week from the date the assignment, exercise, lab, or exam is returned in class to grieve your case. For example, if a graded assignment is returned on Wednesday October 5 you have until Wednesday October 12 at 5pm to return your assignment and concern to me. Change in grade requests must be accompanied by the document you want reviewed. Failure to include the affected assignment or exam will result in no review. If after one week since I returned your assignment, exercise, lab, or exam you have NOT submitted a change in grade review request you are acknowledging that you are in agreement with the grade received.

3) I will return all change of grade requests by the class period after the request was received with either a change in grade or a reason why your grade stands as indicated.

4) Numeric grade changes (points were added incorrectly) will be revisited at any time during the semester.

**Relationship violence, sexual misconduct, and harassment of any nature:**

The faculty in FW take the physical and emotional safety and health of our students very seriously. In light of the very troubling realization, through the Nasser case, that MSU students (and others) were being abused, and not heard, I want to emphasize to all of you that you can reach out to me or to any faculty member to report concerns and/or seek support regarding issues related to relationship violence, sexual misconduct, and harassment of any nature. If you want to contact a faculty member, but don’t know whom to contact, you should know that two of our faculty members have volunteered specifically to be individuals whom you can contact. Those individuals are Mr. Jim Schneider, our FW academic advisor, and Dr. Dana Infante, a professor in FW. Their contact information is shown here:

Jim Schneider

FW Advising Center, Room 40, Natural Resources Building

schne181@msu.edu

517-353-2979 (direct)

517-353-9091 – to schedule an appointment

Dr. Dana Infante

Manly Miles Building, Suite 318

1405 South Harrison Road

infanted@anr.msu.edu

East Lansing, MI 48823

517-432-7232 phone

**Course Outline**

**Part I. Probability**

 Probability Rules

 Combinations

 Permutations

 Binomial Distribution

**Part II. Descriptive statistics and sampling**

 Descriptive statistics

 Sampling

 Presenting data - tables

 Presenting data - graphs

**Part III. Inferential Statistics**

 One sample t-test

 Two sample t-test

 Two sample paired t-test

 Chi-square

 Regression

 Analysis of Variance

Note: topics will not be covered in above order

**Tentative Lecture Schedule**

Note: this is likely to change, and should only be used for rough guidance

|  |  |
| --- | --- |
| **Date** | **Topic/Activity** |
| Mon | 11-Jan | Reading/Reflection |
| Wed | 13-Jan | Reading/Reflection |
| Mon | 18-Jan | **NO CLASS** - Martin Luther King Day |
| Wed | 20-Jan | Course Introduction/Probability Rules |
| Mon | 25-Jan | Probability Rules – Permutations |
| Wed | 27-Jan | Combinatorials |
| Mon | 1-Feb | Binomial |
| Wed | 3-Feb | Descriptive statistics |
| Mon | 8-Feb | Descriptive statistics and sampling |
| Wed | 10-Feb | Sampling |
| Mon | 15-Feb | Sampling |
| Wed | 17-Feb | **1st EXAM** |
| Mon | 22-Feb | Sampling |
| Wed | 24-Feb | Sampling |
| Mon | 1-Mar | Inference |
| Wed | 3-Mar | **BREAK DAY** |
| Mon | 8-Mar | Inference |
| Wed | 10-Mar | Inference |
| Mon | 15-Mar | ANOVA |
| Wed | 17-Mar | Graphical principles |
| Mon | 22-Mar | review for exam |
| Wed | 24-Mar | **2nd EXAM** |
| Mon | 29-Mar | Correlation and Regression |
| Wed | 31-Mar | Correlation and Regression |
| Mon | 5-Apr | Chi-square |
| Wed | 7-Apr | Catch up |
| Mon | 12-Apr | Examples from Literature |
| Wed | 14-Apr | Examples from Literature |
| Mon | 19-Apr | Statistical Analysis using R |
| Wed | 21-Apr | Review |
|  |  |  |
| **Final Exam: Monday, April 26 2021 12:45pm - 2:45pm** |
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**Approximate Lab Schedule**

Note: You can attend any lab section that fits in your schedule, but we encourage you to make use of your primary scheduled time to ensure we can address everyone’s needs. Homework will become available progressively through the semester to match with our lecture schedule. Due dates for each lab will be posted when the homework is made available.

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| --- | --- | --- |
| **Week** | **Starting Date** | **Topic** |
| 1 | 11-Jan | **NO LAB This Week** |
| 2 | 18-Jan | **NO LAB This Week** |
| 3 | 25-Jan | Probability I  |
| 4 | 1-Feb | Probability II |
| 5 | 8-Feb | Excel Basics |
| 6 | 15-Feb | Descriptive statistics |
| 7 | 22-Feb | Descriptive statistics |
| 8 | 1-Mar | **NO LAB This Week due to Break Days** |
| 9 | 8-Mar | Sampling |
| 10 | 15-Mar | Inference  |
| 11 | 22-Mar | ANOVA |
| 12 | 29-Mar | Presenting Data |
| 13 | 5-Apr | Regression |
| 14 | 12-Apr | Chi-square |
| 15 | 19-Apr | Applications |