STAT 335 – Principles of Study Design
Course Syllabus – Fall 2016

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OFFICE HOURS: Office hours are listed on my website (http://course1.winona.edu/thooks/).

COURSE WEBSITE and D2L: All announcements, notes, homework assignments, and other important documents will be posted on the course website: http://course1.winona.edu/thooks/STAT_335.html. Grades only will be posted on D2L: https://winona.ims.mnscu.edu/.

TEXT: There is no text required for this course. Course materials will be posted on the website.

STAT 335 LEARNING OUTCOMES: Successful completion of this course will promote your abilities to…

- correctly use data gathering techniques and understand their limitations in research studies. A successful student will be knowledgeable of basic data gathering techniques and the implications of using these methods for research studies.

- recognize the strengths and weaknesses of research designs used in research studies.

- correctly design and implement a research study. A successful student will be able to design an ethical and valid study to evaluate a hypothesis of interest.

- report and communicate conclusions effectively. A successful student will be able to communicate essential features and results of a research study in a manner which is understandable to both technical and non-technical audiences.

- Students will learn to recognize and reflect critically on ethical issues commonly encountered in research studies.

- use appropriate technology to describe and analyze data from research studies. A successful student will be able to use statistical software packages to perform analyses and interpret the results from the given output.

LEARNING REQUIREMENTS: To both achieve and demonstrate the above learning outcomes, you will be asked to complete the following tasks. Your grade earned in the course will be based on the level of mastery of the learning outcomes that you attain.

1. Homework Assignments/Projects
   Written homework assignments will be given frequently throughout the course. Some of these assignments will ask you to critically analyze the research of others; other assignments/projects may involve designing and/or carrying out your own research studies.
HOMEWORK/PROJECT POLICIES:
- A hard copy of each completed homework assignment is due at the beginning of class on its assigned due date.
- Late homework assignments/projects will be assessed a 10% penalty for being late and WILL NOT BE ACCEPTED after graded assignments are returned to other students or after solutions have been posted.

2. Midterm Exam
This exam will require you to demonstrate your understanding of the material as opposed to your ability to memorize certain concepts.

EXAM POLICY: The date will be announced at least one week in advance. Rescheduling of the exam will be permitted only if there is a family/medical emergency or if you have a note from your advisor stating explicit reasons why the exam must be missed. Also, you must contact me before the exam is to be taken. Arrangements will be made for the exam to be taken at an earlier time, if at all possible.

3. Final Exam
Again, you will be asked to demonstrate your achievement of the learning outcomes. The final exam is scheduled for 1-3 pm on Tuesday, December 6. You are expected to arrange your personal and work schedule to allow you to take the exam at the scheduled time.

GRADING POLICY: At the end of the semester, I will use the following guidelines for grading:
- 92% and above guarantees at least an A
- 82% and above guarantees at least a B
- 72% and above guarantees at least a C
- 62% and above guarantees at least a D
- Below 62% will likely result in failure of the course

LAPTOP POLICY: I encourage you to bring your laptop to class every day so that our classroom can function as a computer lab.

ACADEMIC INTEGRITY POLICY: All students must abide by Winona State University’s Academic Integrity Policy: http://www.winona.edu/sld/academicintegrity.asp.

EXPECTATIONS: The following excerpt was taken from Rob Jenkins’ article “Defining the Relationship” which was published in The Chronicle of Higher Education (August 8, 2016). This accurately summarizes what I expect of you in my classroom (and also what you should expect of me).

“I’d like to be your partner. More than anything, I’d like for us to form a mutually beneficial alliance in this endeavor we call education.

I pledge to do my part. I will:

• Stay abreast of the latest ideas in my field.
• Teach you what I believe you need to know, with all the enthusiasm I possess.
• Invite your comments and questions and respond constructively.
• Make myself available to you outside of class (within reason).
• Evaluate your work carefully and return it promptly with feedback.
• Be as fair, respectful, and understanding as I can humanly be.
• If you need help beyond the scope of this course, I will do my best to provide it or see that you get it.
In return, I expect you to:

- Show up for class each day or let me know (preferably in advance) if you have some good reason to be absent.
- Do your reading and other assignments outside of class and be prepared for each class meeting.
- Focus during class on the work we’re doing and not on extraneous matters (like whoever or whatever is on your phone at the moment).
- Participate in class discussions.
- Be respectful of your fellow students and their points of view.
- In short, I expect you to devote as much effort to learning as I devote to teaching.

What you get out of this relationship is that you’ll be better equipped to succeed in this and other college courses, work-related assignments, and life in general. What I get is a great deal of professional and personal satisfaction. Because I do really like you guys and want the best for you.”

COMMITMENT TO INCLUSIVE EXCELLENCE:

WSU recognizes that our individual differences can deepen our understanding of one another and the world around us, rather than divide us. In this class, people of all ethnicities, genders and gender identities, religions, ages, sexual orientations, dis/abilities, socioeconomic backgrounds, regions, and nationalities are strongly encouraged to share their rich array of perspectives and experiences. If you feel your differences may in some way isolate you from WSU’s community or if you have a need of any specific accommodations, please speak with the instructor early in the semester about your concerns and what we can do together to help you become an active and engaged member of our class and community.

Campus Resources

- Inclusion and Diversity Office, Kryzsko Commons Room 236, 457-5595, www.winona.edu/inclusion-diversity/
- Access Services (Services for Students with Disabilities), Maxwell 314, 457-5878, www.winona.edu/accessservices/
- KEAP Diversity Resource Center Faculty Liaison, Professor Chuck Ripley, Minné Hall 307, 457-5445, wripley@winona.edu
- Advising Services, Maxwell 314, 457-5878, www.winona.edu/advising/
- [Rochester] UCR Learning Center, UCR Room AT 306, 285-7182
- [Rochester] Student & Campus Services, UCR Room SS 128, 285-7100, rochss@winona.edu, www.winona.edu/rochester
Details about Campus Resources

- Two good places to help you find resources of all kinds on campus are Student Support/Campus Services and the Inclusion and Diversity Office. Both offices are dedicated to helping students of all racial, ethnic, economic, national, sexual, and gender identities. They can facilitate tutoring and point you to a wide range of resources.

- If you have a mental, physical, or learning disability, the Access Services office can document it for your professors and facilitate accommodations. If you have a documented disability that requires accommodation, please contact Access Services as soon as possible.

- College can be very stressful. Counseling offices on both campuses are here to help you with a wide range of difficulties, ranging from sexual assault, depression, and grief after the loss of a loved one to stress management, anxiety, general adjustment to college, and many others.

- The KEAP-Diversity-Resource-Center Faculty Liaison can direct people to multicultural resources on and off campus.

- To find out about web registration, placement tests, program requirements and support tools to help students succeed, visit the Advising Services office and website for answers to all your questions!

- On the Rochester campus, the UCR Learning Center provides help with both the development and the writing of papers.

- On the Winona campus, for help with understanding the concepts of a particular class or understanding the requirements of an assignment, Tutoring Services offers three types of tutoring: drop-in appointments, 1-on-1 tutoring, and group sessions. You can visit them in Krueger Library 220 or go on-line and use TutorTrac to schedule a session, https://tutortrac.winona.edu/TracWeb40/Default.html.

- For help specifically with writing and the development of papers, the English department has a Writing Center that is staffed by trained graduate students pursuing their Master’s degree in English. The Writing Center is located in Minné Hall 348. You can make an appointment on the sign-up sheet on the door or call 457-5505.
COURSE OUTLINE

1. Research Cycle
   a. Formulating a research question
   b. Variables (Qualitative and Quantitative)
   c. Design of study
   d. Data collection
   e. Descriptive analysis
   f. Inferential analysis
   g. Drawing conclusions
      i. Actionable outcomes
      ii. Policy development
      iii. Future research

2. Types of Studies
   a. Designed Experiments
   b. Observational Studies
   c. Surveys

3. Design of Experiments
   a. Basic definitions (factors, treatments, experimental units)
   b. Confounding variables
   c. Fundamental design concepts: control, randomization, replication
   d. Placebos
   e. Single- and double-blind experiments
   f. Completely randomized designs
   g. Randomized block designs
   h. Cross-over studies
   i. Longitudinal studies

4. Observational Studies
   a. Descriptive vs. analytic studies
   b. Types of observational studies
      i. Prospective
      ii. Retrospective
      iii. Cross-sectional
   c. Effects of confounding variables
   d. Matching methods

5. Surveys
   a. Sampling Methods
      i. Probability sampling (simple random sampling, stratified sampling, cluster sampling, multistage sampling)
      ii. Non-probability sampling (convenience sampling, purposive sampling, quota sampling)
      iii. Comparison of sampling error estimates for different sampling methods
      iv. Oversampling
   b. Questionnaire Design
      i. Open- vs. closed-ended questions
      ii. Rating questions (e.g., Likert scale, visual analogue scale)
      iii. Ranking questions
iv. Select all that apply questions
v. Wording of individual questions
vi. Ordering of questions
c. Reliability
   i. Test-retest reliability (Pearson’s correlation, inter-class correlation coefficient, kappa coefficient)
   ii. Parallel forms reliability
   iii. Internal Consistency (inter-item correlations, split-half reliability, Cronbach’s alpha)
d. Validity
   i. Face validity
   ii. Content validity
   iii. Criterion-related validity (predictive, concurrent, convergent, discriminant)
e. Types of bias
   i. Non-response bias
   ii. Coverage bias
   iii. Self-selection/volunteer bias
   iv. Social desirability bias (can discuss the randomized response survey technique)
   v. Interviewer effects
   vi. Errors in transfer of findings
   vii. Survey format effects (e.g., wording/ordering of questions)

6. Ethical Considerations in the Design of Studies
   a. Ethical treatment of research subjects
      i. Belmont report/ Nuremberg code
      ii. Institutional Review Boards
      iii. Clinical trial considerations
   b. Responsibility to apply sampling and analysis procedures scientifically, without pre-determining the outcome
   c. Responsibility to clearly report the intent of a study, how it was performed, and any limitations on its validity