**MSIS 5503 – Statistics for Data Science**
**(On-campus and online/web sections)**
**Fall 2021**

**Instructor:** Dr. Rathindra Sarathy, Professor of MSIS

**Contact Information**
Email: rathin.sarathy@okstate.edu
Phone: 744-8646
Course Site: (Canvas): http://canvas.okstate.edu
Canvas Tutorials for Students: https://osuonline.okstate.edu/Canvas.vbhtml

**On-Campus Students**
Classroom: Business Building 070
Class Meeting Times: Mondays, Tuesdays 6:45 – 9:30 p.m.
Office: 407 New Business Building
Office Hours: Mondays, Tuesdays 5:30 – 6:30 pm. CST (Central Standard Time)

**Online Students**
Greenwood Center for Online Excellence Support: spearsonline@okstate.edu; Phone: 405-744-4048
Facebook: https://www.facebook.com/SpearsOnline/

**Instructor Response**
Either my Graduate Teaching Assistant or I will respond to student inquiries within 24 hours during Monday-Friday business hours and 48 hours for inquiries over the weekend.

**Overview of the Course**
Traditional statistical courses focus on statistical inference about populations based on samples of primary data obtained from experiments or surveys. Data Science, on the other hand focuses on the analysis of large secondary data sets. However, concepts of probability and statistics underlie many of the analytical techniques in data science. In this course, we will focus on understanding and applying statistical models and techniques to obtain useful information from small as well as large data sets. These techniques are part of supervised statistical machine learning.

**Course Prerequisites:** None

| Course Objective | Program Learning Goal |
|---|---|
| Educate the student on basic statistical properties of data | • Technical competence<br>• Critical thinking |
| Teach the student basic univariate discrete and continuous distributions | • Technical competence<br>• Critical thinking |
| Educate the student the basis and techniques of inferential statistics | • Technical competence |
| Develop student expertise in applying linear models to data | • Technical competence |
| Educate the student on statistical techniques such as multiple regression, time series regression, contingency tables and logistic regression | • Technical competence<br>• Critical thinking |

**Texts and Supplementary Materials**
Text for First Half of Course:
Free Downloadable Book: Introductory Statistics, BARBARA ILLOWSKY, and SUSAN DEAN. Download for free at https://openstax.org/details/books/introductory-statistics.

**Other Material**
Other course material will consist of handouts distributed via Canvas and in-class exercises. Students should check the class Canvas site for course material prior to each class.

**R-Language**
We will be using R-language for completing assignments. *RStudio* will be the development platform and is free for download at: https://www.rstudio.com/products/rstudio/download/#download along with the R-Language download. It is also available through the Spears Lab VM at http://desktop.okstate.edu.

**Calculator**
Students will need a scientific calculator with statistical functions for answering exam problems. The recommended calculator is Texas Instruments TI-30X IIS.

**On-Campus Students Attendance Policy**
Students who have not participated in at least one assignment in Canvas within the first month of the course will be reported as not having attended class. The instructor will then recommend that the student drop the course.

**Breakdown of Grades (Tentative – Subject to Adjustments)**
Exams (2) – 50 points total, Assignments and Project – 80 - 100 points.
**A**: 90% and above; **B**: 80% - 89.99%; **C**: 70% - 79.99% **D**: 60%- 69.99%, **F**: < 60%
I may (or may not) normalize the grades based on my assessment of its appropriateness.

**Grade Disputes:**
If you disagree with the grade for an assignment or exam, ***you must bring it to my attention and resolve it within one week of receiving the grade***. I will not re-grade after the one-week deadline.

**Individual Assignments:** Several *individual* homework assignments will be given over the semester. You have to turn in your typed, well-organized write-up electronically (using Canvas's "Assignments" submission procedure) by 11:59 PM of the stated due date. These assignments help you prepare for the exams, and you are **strongly advised** to do them. You are **not** to solve problems together or compare answers prior to turning in the work. Cooperative efforts on individual work will result in an immediate score of zero for all parties involved (see Academic Integrity Policy below). ***Late assignments will be penalized 10% of grade for each hour that it is late and will have a 0 grade after the solution is posted (usually the next day).***
I will generally grade assignments within one week.

**Exams:** The exams will have problems/questions. There may be matching, multiple choice, fill-in-the-blank and/or short answer sections, and problems. I will give additional guidance on exam content ahead of time. The exams WILL be proctored; I will give clear instructions on permissible materials that you may use. The exams will be administered through the Canvas Quiz feature and may require the use of the Respondus Browser (available through Canvas). **All exams are proctored**.

***On-Campus Students*** will be taking the ***Exams in Business 070 on the designated dates for each section***.

***Online Students***:

- You must take the exams on the designated days (generally a 48-hour window is provided) at a proctored testing center or through ProctorU. Testing Center fees may apply for proctored exams, with a range of $20 - $75, depending on your location.
- CHOOSE A PROCTOR NOW FOR YOUR EXAM(S)!: one week prior to, or at the latest, the first week of the course start date, go to the Spears School Greenwood Center for Online Excellence proctor/exam website to choose a testing center at: spearsonline.okstate.edu, and click on "Select Testing Center;" at the top right of the page then click on Edit Testing Center next to each course. Follow the instructions to identify your testing center. Up to one week before each exam start date, make your appointment directly with your testing center to take each exam while being monitored by a proctor for test security reasons. The instructor, nor the Greenwood Center for Online Excellence cannot schedule exam appointments. The exam and/or exam instructions will be sent to your testing center, from the Greenwood Center, 4 days prior to the exam start date. To confirm your testing center received the exam/exam information, call your testing center at least one day prior to your appointment time. If the center does not have your exam, contact the Spears School Greenwood Center for Online Excellence immediately at spearsonline@okstate.edu, or call (405) 744-4048 to request the exam to be sent. Contact that same office if you have any questions regarding the testing center sign up process. You may also visit https://business.okstate.edu/online/guide/proctor-policies.html.

**Canvas Discussion Board Netiquette Guidelines**

Students are expected to demonstrate appropriate "netiquette" in the Canvas Discussion Board. Here are some guidelines for communication within this course:

- REFRAIN FROM USING ALL CAPS. Considered SHOUTING when communicating online.
- Do not post or forward offensive or racially insensitive jokes or comments.
- Be careful with humor and sarcasm.
- Don't respond to personal attacks: Contact the instructor for action and referral.
- Always add in the subject line a concise statement describing the email or discussion post.
- Respect others' opinions. If you disagree with what another has said, post your thoughts in an objective, respectful manner. Do not make remarks that can be taken personally.
- Reflect upon the text you have entered before posting.
- Keep the discussion within the scope of the course material.
- Communication should be grammatically correct. Proofread for errors before posting a message.
- Read all the messages related to that message before replying to message previously posted.
- Send out an email to a group using the blind carbon copy field – BCC does not allow your recipients to view who was sent the email.

**Make-up Policy**

Students are expected to take each exam on the date given and submit each assignment in a timely manner. If for any reason a student cannot attend an exam or submit an assignment, he or she must notify the instructor ***prior*** to the examination.

**University Policy**

Drop Policy

Information about university drop policy and dates is at this website:
http://registrar.okstate.edu/
To drop this course, contact the Registrar's office, (405) 744-6876, or drop through Banner Self Service, http://my.okstate.edu

Academic Integrity

Oklahoma State University is committed to the maintenance of the highest standards of integrity and ethical conduct of its members. This level of ethical behavior and integrity will be maintained in this course. Participating in a behavior that violates academic integrity (e.g., unauthorized collaboration, plagiarism, multiple submissions, cheating on examinations, fabricating information, helping another person cheat, unauthorized advance access to examinations, altering or destroying the work of others, and fraudulently altering academic records) will result in your being sanctioned. Violations may subject you to disciplinary action including the following: receiving a failing grade on an assignment, examination or course, receiving a notation of a violation of academic integrity on your transcript (F!), and being suspended from the University. You have the right to appeal the charge. Contact the Office of Academic Affairs, 101 Whitehurst, 405-744-5627, http://academicintegrity.okstate.edu/.

Accessibility

Any student in this course who has a disability that may prevent him or her from fully demonstrating his or her abilities should contact the instructor as soon as possible, so we can discuss accommodations necessary to ensure full participation and facilitate your educational opportunity. For more information about OSU Student Disability Services, please go to: http://sds.okstate.edu.

**Syllabus Attachment**

For more student resources, go to:
https://academicaffairs.okstate.edu/site-files/documents/2021-fall-syllabus-attachment-7-21-21.pdf

## Tentative Weekly Schedule
## (May be modified and updated throughout the semester)

| Week | Date | Lecture | Material |
|---|---|---|---|
| 1 | Aug-16, 17 | 1A – Understanding Data<br>1B – Events and Probability | Book Chapter 3 + Notes |
| 2 | Aug-23, 24 | 1C – Random Variables and Probability Distributions<br>2A – Discrete Probability Distributions | Book Chapter 4.1 & 4.3 + Notes |
| 3 | Aug-30, 31 | 2A – Discrete Probability Distributions (contd.) | Book Chapter 4.4 & 4.6 |
| 4 | Sep-08 | 2B – Continuous Probability Distributions | Book Chapter 5 & 6 |
| 5 | Sep-13,14 | 3A – Descriptive & Inferential Statistics | Book Chapter 2 & 7 + Notes |
| 6 | Sep-20, 21 | 3B – Inferential Statistics – Confidence Intervals | Book Chapter 8 |
| 7 | Sep-27, 28 | 3C – Inferential Statistics – Hypothesis Testing | Book Chapter 9 |
| 8 | Oct-04, 05 | 3D – Inferential Statistics – Two-Samples & ANOVA | Book Chapter 10 + Notes |
| 9 | Oct-11, 12 | **Exam 1** | |
| 10 | Oct-18, 19 | 4A – Correlation and Simple Regression | Book Chapter 12 + Notes |
| 11 | Oct-25, 26 | 4B – Multiple Regression/ANOVA | Notes |
| 12 | Nov-01, 02 | 4C – Testing Multiple Regression Assumptions | Notes |
| 13 | Nov-08, 09 | 4D – Multiple Regression with Interaction<br>4E – Time Series Multiple Regression | Notes |
| 14 | Nov-15, 16 | 5A – The Chi-Square Distribution<br>5B – Logistic Regression | Book Chapter 11<br>Notes |
| 15 | **Thanksgiving week – no classes** | | |
| 16 | Nov 29, 30 | 5C - Polytomous Logistic Regression | Notes |
| | Dec-06, 07 | **Exam 2** | |

** Notes indicates material I provide in overheads + videos

## Tentative Assignment Schedule
## (May be modified and updated throughout the semester)

| Assignment | Lecture | Assignments Due in Canvas | Points |
|---|---|---|---|
| 1 | 1A – Understanding Data<br>1B – Events and Probability | Sunday, Aug. 22 – 11:59 pm | 5 |
| 2 | 2A – Discrete Probability Distributions | Sunday, Aug. 29 – 11:59 pm | 5 |
| 3 | 2A – Discrete Probability Distributions (contd.) | Sunday, Sept.05 – 11:59 pm | 5 |
| 4 | 2B – Continuous Probability Distributions | Sunday, Sept.12 – 11:59 pm | 5 |
| 5 | 3A – Descriptive & Inferential Statistics | Sunday, Sept.19 – 11:59 pm | 5 |
| 6 | 3B – Inferential Statistics – Confidence Intervals | Sunday, Sept.26 – 11:59 pm | 5 |
| 7 | 3C – Inferential Statistics – Hypothesis Testing | Sunday, Oct. 03 – 11:59 pm | 5 |
| 8 | 3D – Inferential Statistics – Two-Samples & ANOVA | Sunday, Oct. 17 – 11:59 pm | 5 |
| 9 | 4A – Correlation and Simple Regression | Sunday, Oct. 24 – 11:59 pm | 5 |
| 10 | 4B – Multiple Regression/ANOVA | Sunday, Oct. 31 – 11:59 pm | 10 |
| 11 | 4C – Testing Multiple Regression Assumptions | Sunday, Nov. 07 – 11:59 pm | 15 |
| 12 | 4D – Multiple Regression with Interaction<br>4E – Time Series Multiple Regression | Sunday, Nov. 21 – 11:59 pm | 10 |
| 13 | 5A – The Chi-Square Distribution<br>5B – Logistic Regression<br>5C – Polytomous Logistic Regression | Friday, Dec. 03 – 11:59 pm | 10 |