DSA/ISE 5103
INTELLIGENT DATA ANALYTICS

Tuesdays and Thursdays 3:00p – 4:15p
CEC 117
Fall 2022

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Office hours: *see Canvas announcement*
Office hour location: *see Canvas announcement*

Zoom links:

- Instructor office hours:

  https://oklahoma.zoom.us/j/92199869128?pwd=VFRiZjBBbGdJemN2RTBqc3ZYTEFkUT09

  - Passcode: OfficeHrs

Course description: Intelligent Data Analytics is an approach to addressing real-world data intensive problems that integrates human intuition with data analysis tools to best draw out meaningful insights. Topics include problem approach and framing, data cleansing, exploratory analysis and visualization, dimension reduction, linear and logistic regression, decision trees, and clustering, among others. Students will be introduced to a powerful open source statistical programming language (R) and work on hands-on, applied data analysis projects.

Student outcomes: You will demonstrate mastery in 4 areas:

(1) Defining and framing Analytics Problems,
(2) Understanding and coping with Data,
(3) Selecting and using appropriate Analytical Tools,
(4) Discovering and communicating the Insight.

Textbooks

- Max Kuhn and Kjell Johnson. 2013. *Applied Predictive Modeling.* Springer http://libraries.ou.edu/access.aspx?url=http://link.springer.com/book/10.1007/978-1-4614-6849-3
- Gareth James, Daniela Witten, Trevor Hastie, and Robert Tibshirani. 2013. *An Introduction to Statistical Learning with Applications in R*. 4th printing. http://www-bcf.usc.edu/~gareth/ISL/
- Trevor Hastie, Rober Tibshirani, and Jerome Friedman. 2009. *The Elements of Statistical Learning: Data Mining, Inference, and Prediction.* 2nd Ed. http://statweb.stanford.edu/~tibs/ElemStatLearn/

Software Resources

R	http://www.r-project.org/
RStudio IDE	http://www.rstudio.com/ide/
R for Beginners	http://cran.r-project.org/doc/contrib/Paradis-rdebuts_en.pdf
Introduction to R	http://cran.r-project.org/doc/manuals/R-intro.pdf

Grading Policy

All assignments must be uploaded to course website by the due date and time indicated for that assignment on the course website. Ensure your familiarity with the system in advance, and allot a sufficient amount of time for assignment submission *and any technical difficulties that may arise*.
Assignments should be submitted in advance of an anticipated absence.

Late assignments will be penalized. See following table for breakdown:

Submission is:	Maximum grade possible:
On time + up to 10 min late	100%
Up to 12 hours late	80%
12 to 24 hours late	60%
More than 24 hours late	0%

Slack day

Each student will be allocated *two slack days* per semester. A slack day is a 24-hour extension for a homework assignment (not a course project or other assessment task). The slack day may be invoked only once, but it may be used as the student sees fit. To invoke the slack day please provide a comment in the submission location when the work is submitted. Note: for team assignments, each "slack day" value is equal to 24 hours / # of students on the team. For example, if there are two students, and one student uses their slack day, there will be a 12-hour extension. If all students invoke their slack days, then there will be a 24-hour extension.

Grading Details

Percentages of course grading requirements are as follows:

Homework	60%
Project • Project Team Selection and Proposal • Project: Initial data analysis (12%) • Project: Initial draft (12%) • Project: Critique (6%) • Project: Presentation (35%) • Project: Final report (35%)	30%
Participation	10%

Grading scale

Total grade percentages in the following intervals result in the associated letter grade:

[90-100] ← A; [80-90) ←B; [70,80) ← C; [60,70) ← D; [0,60) ←F

Homework

Assignments consist of a variety of written and programming problems. Students must perform the majority of work in R, however this can be supplemented with other tools (e.g., Excel, Python). For each assignment please read the submission requirements outlined in the instructions.

Class Project

The class project will be developed during the last half of the semester. Instructions, guidelines and due dates will be posted on the course website. The project has several deliverables. Make sure you are aware of the deadlines for each.

- Project team selection and proposal
- Initial data analysis
- Initial draft
- Peer critique
- Powerpoint slides and recorded video
- Final report

Tentative Schedule

Week beginning (Monday)	Topic	Notes	Due (subject to change)
22-Aug	Introduction to ISE 5103; Intro to Analytics Intro to R and RStudio Project Understanding	First day of course: 8/25 Assign: HW #1	Install R and RStudio on your computers Download the textbooks
29-Aug	Data Understanding: visualizations, outlier analysis, missing value mechanisms	Assign: HW #2	HW #1 (R and R Studio): 31-Aug @ 11:59 pm (Wednesday)
5-Sep	Data Understanding: Dimension Reduction (PCA, LDA, t-SNE)	Assign: HW #3 *Labor Day: 5-Sep*	HW #2 (Data Understanding): 7-Sep @ 11:59 pm (Wednesday)
12-Sep	Data Preparation: dealing with outliers, missing value imputation, feature engineering, and transformation	Assign: HW #4 *Engineering Career Fair, 9/15 – no class Thursday!*	HW #3 (Dimension Reduction): 14-Sep @ 11:59 pm (Wednesday)
19-Sep	Principles of Modeling: performance metrics (I) and resampling Multiple Linear Regression (MLR): OLS	Assign: HW #5	HW #4 (Data Preparation): 22-Sep @11:59 pm (Thursday)
26-Sep	OLS and OLS variants: PCR, PLS, Ridge, Lasso, Elasticnet, MARS, SVM-R		

3-Oct	OLS variants continued	Assign: HW #6 *Fall Break - October 7*	HW #5 (MLR I): 6-Oct @11:59 pm (Thursday)
10-Oct	Principles of Modeling: performance metrics (II) Classification: Logistic Regression	*Check Project information!*	**Form Project Teams
17-Oct	Classification: Decision Trees, Random Forests, Boosted Trees, SVM, Neural Networks		**Project Teams/Proposal: 21-Oct @11:59 pm (Friday)
24-Oct	Classification continued	Assign: HW #7	HW #6 (MLR II): 26-Oct @11:59 pm (Wednesday)
31-Oct	Classification continued		**Project Data Analysis: 1-Nov @11:59 pm (Tuesday)
7-Nov	Clustering: k-means, PAM, hierarchical, density-based clustering		
14-Nov	Association Mining	Assign: HW #8	HW #7 (Classification): 15-Nov @11:59 pm (Tuesday)
21-Nov	Unsupervised Learning: Autoencoding	*Thanksgiving: 11/23-11/27*	
28-Nov	Project discussion	Conduct Peer Review	**Project Report 1st draft: 29-Nov @11:59p (Tuesday) HW #8 (Unsupervised Learning): 4-Dec @11:59 pm (Sunday)
5-Dec	Open Topics	*Finalize projects*	**Project Report Critique: 7-Dec @ 11:59 pm (Wednesday) **Recorded Presentations 11-Dec (Sunday) @ 11:59p
12-Dec		No final exam!	**Final Project: 15-Dec @ 11:59p (Thursday)

Attendance, Participation, Assessment

Participation is evaluated and counts toward your final grade. You are expected to view all videos and complete all reading assignments. Also, you will be expected to participate in online discussions and attempt all Self-Check Quizzes.

Professional behavior

While many of the tools necessary for the completion of this course will be discussed in the course content or via guided assignments, nevertheless ***considerable work outside of class in learning R or researching analytical techniques is expected.***

Academic honesty

Cheating, plagiarism, or any act of dishonesty will NOT be tolerated. This policy applies to all parties involved in the incident. Never take credit for anyone else's intellectual property, be it on an exam or homework assignment. This includes, but is not limited to, copying from another student's paper, copying from a paper from a previous semester, using forbidden information on exams, and copying from published writings. Additionally, you are strictly prohibited from using online services such as Chegg.com to complete homework, quizzes, or exams in this course. Students are responsible for knowing the requirements of the Academic Misconduct Code, available at http://integrity.ou.edu/.

Reasonable accommodation policy

Students requiring academic accommodation should contact the Disability Resource Center for assistance at (405) 325-3852 or TDD: (405) 325-4173. For more information please see the Disability Resource Center website http://www.ou.edu/drc/home.html. Any student in this course who has a disability that may prevent him/her from fully demonstrating his/her abilities should contact me personally as soon as possible so we can discuss accommodations necessary to ensure full participation and facilitate your educational opportunities.

Title IX Resources and Reporting Requirement

Anyone who has been impacted by gender-based violence, including dating violence, domestic violence, stalking, harassment, and sexual assault, deserves access to resources so that they are supported personally and academically. The University of Oklahoma is committed to offering resources to those impacted, including: speaking with someone confidentially about your options, medical attention, counseling, reporting, academic support, and safety plans. If you would like to speak with someone confidentially, please contact OU Advocates (available 24/7 at 405-615-0013) or another confidential resource (see "Can I make an anonymous report?"). You may also choose to report gender-based violence and discrimination through other means, including by contacting the Institutional Equity Office (ieo@ou.edu, 405-325-3546) or police (911). Because the University of Oklahoma is committed to the safety of you and other students, I, as well as other faculty, Graduate Assistants, and Teaching Assistants, are mandatory reporters. This means that we are

obligated to report gender-based violence that has been disclosed to us to the Institutional Equity Office. This includes disclosures that occur in: class discussion, writing assignments, discussion boards, emails and during Student/Office Hours. For more information, please visit the Institutional Equity Office.

Religious Observance
It is the policy of the University to excuse the absences of students that result from religious observances and to reschedule examinations and additional required classwork that may fall on religious holidays, without penalty.

Adjustments for Pregnancy/Childbirth Related Issues
Should you need modifications or adjustments to your course requirements because of documented pregnancy-related or childbirth-related issues, please contact your professor or the Disability Resource Center at 405/325-3852 as soon as possible. Generally, modifications will be made where medically necessary and similar in scope to accommodations based on temporary disability. Please see www.ou.edu/content/eoo/faqs/pregnancy-faqs.html for commonly asked questions.

Final Exam Preparation Period
Pre-finals week will be defined as the seven calendar days before the first day of finals. Faculty may cover new course material throughout this week. For specific provisions of the policy please refer to OU's Final Exam Preparation Period policy.

Mental Health Support Services
If you are experiencing any mental health issues that are impacting your academic performance, counseling is available at the University Counseling Center (UCC). The Center is located on the second floor of the Goddard Health Center, at 620 Elm Rm. 201, Norman, OK 73019. To schedule an appointment call (405) 325-2911. For more information please visit: http://www.ou.edu/ucc

Emergency Protocol
During an emergency, there are official university procedures that will maximize your safety.
Severe Weather: If you receive an OU Alert to seek refuge or hear a tornado siren that signals severe weather.

1. Look for severe weather refuge location maps located inside most OU buildings near the entrances
2. Seek refuge inside a building. Do not leave one building to seek shelter in another building that you deem safer. If outside, get into the nearest building.
3. Go to the building's severe weather refuge location. If you do not know where that is, go to the lowest level possible and seek refuge in an innermost room. Avoid outside doors and windows.
4. Get in, Get Down, Cover Up
5. Wait for official notice to resume normal activities.

Additional Weather Safety Information is available through the Department of Campus Safety.

Armed Subject/Campus Intruder
If you receive an OU Alert to shelter-in-place due to an active shooter or armed intruder situation or you hear what you perceive to be gunshots:

1. Avoid: If you believe you can get out of the area WITHOUT encountering the armed individual, move quickly towards the nearest building exit, move away from the building, and call 911.
2. Deny: If you cannot flee, move to an area that can be locked or barricaded, turn off lights, silence devices, spread out, and formulate a plan of attack if the shooter enters the room.
3. Defend: As a last resort fight to defend yourself.

For more information, visit OU's Emergency Preparedness site.

Fire Alarm/General Emergency
If you receive an OU Alert that there is danger inside or near the building, or the fire alarm inside the building activates:

1. LEAVE the building. Do not use the elevators.
2. KNOW at least two building exits
3. ASSIST those that may need help
4. PROCEED to the emergency assembly area
5. ONCE safely outside, NOTIFY first responders of anyone that may still be inside building due to mobility issues.
6. WAIT for official notice before attempting to re-enter the building.

Students are responsible for any changes/additions to this syllabus announced during the semester.