DSA 3013 Machine Learning for Data Science

Fall 2020
Monday and Wednesday, 1730 - 1845, SEC 209

	Instructor	Teaching Assistant
Name	TBA	TBA
Email	TBA	TBA
Office	TBA	TBA
Office Hours	TBA	TBA

Course Description:

Machine Learning for Data Science provides a broad overview of widely accepted and state-of-the-art machine learning approaches to automatically extract information from a variety of data types. This course will include conceptual background on data, methods, and application approaches; coverage of issues of data security, privacy, and ethics related to machine learning; and practical, hands-on exercises.

Student Outcomes:

1. Recognize the role of learned models in data science and determine appropriate model type(s) and analysis methods based on data type(s) and application.
2. Explain the fundamental categories of machine learning (supervised, unsupervised, etc.) and particular algorithms within each category.
3. Appraise the security, privacy, and ethical issues raised by the choice of data representation and machine learning method(s) selected for the application.
4. Prepare/preprocess data, apply machine learning algorithms to it, and analyze the models learned.
5. Iteratively refine the data representation, algorithm choice and parameters, and analysis methods to optimize system performance.

Prerequisites:

CS 1213 or CS 1313 or CS 1321 or CS 1323 or CS 1324

Required Materials:

No textbook is required for this course.

The Canvas Course Management System will be used as the main mode of communication and information for this class, in that all announcements, notes, assignments and additional class resources can be found there. For fastest response, email should be sent directly to the instructor and not through Canvas email.

Communication Plan:

E-mail communication is the primary method with me in this course. I will respond to students' e-mails within 48 hours or sooner. To ensure a prompt response, please put "DSA 3013" in your e-mail subject line as a prefix. For example, your subject line could be: DSA 3013: Question about Assignment.

Tech Support: If you cannot access canvas.ou.edu, please contact 405-325-HELP

Course Expectations:

For online students: 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.

For on-campus students: Class periods will be used for a combination of lecture, discussion and activity. Attendance is required. It is expected that all students will be prepared and will participate in classroom learning opportunities. there may be unannounced assessments. Students are also expected to engage in out-of-class learning activities including preparatory readings and online activities utilizing Canvas.

Grading:

Coursework will consist of quizzes, homework, exams, and a semester project. I do not rely on Canvas for final grade calculations and neither should you. All grades are calculated off-line according to the structure defined below and traditional letter grade cut-offs (>=90% is A;

Textbook and case study reading assignments are to be completed prior to class discussion. Readings from are available in pdf format on the course Canvas site. Your preparedness for class is considered in your participation grade and in any quizzes given at the start of class.

GRADING STRUCTURE

Homework & Quizzes	25%
Participation	5%
Project	35%
Mid-term Exams (2)	20%
Final Exam	15%

Missed Deliverables:

Make-up homework, exams and quizzes will only be permitted for officially documented absences. All documented absences due to religious observances and officially approved trips will be guaranteed a make-up opportunity. Absences due to other unavoidable reasons (e.g., death in the family, illness) will

be considered on a case-by-case basis, with appropriate documentation required. Except in the case of an emergency, the student must **always** seek instructor consent **prior to** the absence. If an emergency, you must contact the instructor as soon as feasibly possible. Make-up work will be scheduled at the discretion of the instructor and might occur before the scheduled absence. Typically, make-up work will be scheduled as close to the original assignment date as possible.

Schedule:

Week	Topic
1	Introduction/Course Overview; Types of Data (numeric, categorical, text, time series, etc.)
2	Supervised Learning – Classification with Trees and Forests
3	Supervised Learning – Classification with Artificial Neural Networks (ANNs)
4	Supervised Learning – Classification with Deep ANNs
5	Supervised Learning – Regression with Statistical Methods
6	Supervised Learning – Regression with ANNs
7	Supervised Learning – Regression with Deep ANNs
8	Supervised Learning – Applications to Time Series Data
9	Unsupervised Learning – Clustering with K-Means, DBSCAN, etc.
10	Unsupervised Learning – Clustering with ANNs
11	Unsupervised Learning – Clustering with Deep ANNs and Autoassociative Learning
12	Reward-based Learning – Reinforcement Learning (RL) and Evolutionary Computation (EC)
13	Reward-based Learning – RL and EC with ANNs (including Deep ANNs)
14	Natural Language Processing – Preprocessing and Rule Based Approaches
15	Natural Language Processing – Statistical and Machine Learning Approaches
16	Combining Learning Methods

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 programming tools 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. Violations will be reported to the office of Academic Integrity.

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.** *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:

For any concerns regarding gender-based discrimination, sexual harassment, sexual assault, dating/domestic violence, or stalking, the University offers a variety of resources. To learn more or to report an incident, please contact the Sexual Misconduct Office at 405/325-2215 (8 to 5, M-F) or smo@ou.edu. Incidents can also be reported confidentially to OU Advocates at 405/615-0013 (phones are answered 24 hours a day, 7 days a week). Also, please be advised that a professor/GA/TA is required to report instances of sexual harassment, sexual assault, or discrimination to the Sexual Misconduct Office. Inquiries regarding non-discrimination policies may be directed to: Bobby J. Mason, University Equal Opportunity Officer and Title IX Coordinator at 405/325-3546 or bjm@ou.edu. For more information, visit http://www.ou.edu/eoo.html.

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. Also, see http://www.ou.edu/eoo/faqs/pregnancy-faqs.html for answers to 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 (https://apps.hr.ou.edu/FacultyHandbook#4.10).

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.

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. GET OUT: 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. HIDE OUT: 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. TAKE OUT: As a last resort fight to defend yourself. For more information, visit
http://www.ou.edu/emergencypreparedness.html

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.

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

All students are responsible for any changes/additions to this syllabus announced in class.