CS 4347 Introduction to Machine Learning
Spring 2022 Syllabus
updated: Jan 18, 2022

Lectures: Monday Wednesday 3:30-4:50 PM
Zoom – see Canvas for Meeting Info (Jan 19th – Jan 26th)
INGRAM 03101 (Jan 31st – May 2nd)

Instructor: Dr. Jelena Tešić, jtesic@txstate.edu, NetID: j_t463
Student Hours: Wednesday 10:30 – 11:30 AM and on Zoom by appt.
TA: Debojyoti Biswas (Bishal), ubq3@txstate.edu, NetID: ubq3
Student Hours: Tue 4-5:30 PM contact ubq3 on MS Teams for 1-1 meet availability
Thu 4-5:30 PM open door on Zoom https://txstate.zoom.us/my/bishal

Communication: Microsoft Teams chat is a preferred mode of communication for the instructor and the TA, email is second. Do not expect a response if the question has been answered in Canvas announcements, syllabus, or in the class. Please allow several hours for a response, and do not expect responses over weekends, holidays, or at night. We do not guarantee any response to messages or email inquiries sent during the last 24 hours before homework due date, exam, or project due date. This policy exists to encourage timely work.

Internal course Canvas page: https://canvas.txstate.edu/courses/1860894
Internal course git page: https://git.txstate.edu/ML/2022Spring.git

Course Description
Provides a systematic introduction to machine learning, covering basic theoretical as well as practical aspects of machine learning methods and their applications. Covers learning theory and algorithms, and applications in the fields of face recognition, text recognition, biometrics, bioinformatics, and multimedia retrieval.

Course Objectives
At the end of the semester, the student will be able to *describe* learning methodologies such as unsupervised learning, supervised learning; *recognize* various learning tasks, such as regression and classification, and choose appropriate learning approaches for the task*; implement* machine learning algorithms such as Logistic Regression, SVM, K-means etc.; *build* learning systems, train the systems on training datasets, and generate predicted results on testing datasets; *evaluate* the performance of machine learning algorithms in terms of precision, recall, and F-measure; and *analyze* a target problem and apply machine learning techniques to it.

Course Prerequisites
- C or higher in CS 3358: Data Structures OR Equivalent.
- Knowledge of basic computer science principles and skills, at a level sufficient to **write a reasonably non-trivial computer program.**
- Familiarity with the basic probability theory and basic linear algebra.
- Familiarity with basic software engineering tools (**source version control**), teamwork, and principles.

Course Instruction Mode
The class meets in person Mondays Wednesday 3:30 p.m. in Ingram 3101 Jan 31 – May 2nd unless otherwise announced on Canvas class page. Students are expected to attend each lecture in person. Only students with written (email or MS Teams chat) permission from the instructor may attend remotely. Those students will be provided a Zoom link for the course, and lectures may be recorded to facilitate remote instruction.
Syllabus is subjected to change. Canvas course information trumps information in the pdf file. Please check Canvas Announcements and Course Summary before contacting instructors.

Resources
The course has no required textbook. Course materials come from the following sources:
- *Introduction to Machine Learning with Python: A Guide for Data Scientists*, by Andreas C. Müller, Sarah Guido, ISBN-13: 978-1449369415 (ebook available from Alkek Library)
- *An Introduction to Statistical Learning*, by James, G., Witten, D., Hastie, T., Tibshirani, R. ISBN 978-1-4614-7138-7 (Free PDF: https://web.stanford.edu/~hastie/ISLRv2_website.pdf)
- Material released by instructor, link: https://git.txstate.edu/ML/2022Spring
- Texas State LinkedIn Learning instructor collections, e.g. Python Data Analysis

Course Tools
Canvas is used by the instructors to post lecture slides, tutorial links, homework announcements, handouts, and grades. Canvas is used by the students in this class to submit homework files (1-9), to complete the quizzes and surveys. Make sure the submission is correct, as these will be the only files graded for homeworks. Please double check your submissions by downloading the uploaded files to make sure that they are okay. Note that the timestamp of the last submitted file counts.

Git is used by the instructors to post coding examples, research project examples, and to post homeworks. Git is used by the students in the class to submit research project material.

Course Lecture Format
The lectures are organized into six modules:
- m1: Introduction to Machine Learning Concepts
- m2: Regression
- m3: Classification
- m4: Modeling Improvements
- m5: Deep Learning

The lecture slides for each module will be made available on Canvas before they are covered in class. Wednesday lectures introduce new material through a combination of presentation slides and coding examples. Monday lectures review the new concepts, introduce related Python packages, and discuss homework and exercise problems. All students are expected to work on these problems and participate in the class discussions. Python will be used as the primary programming language of the course.

Assessment

Exams 40pt There are two exams. Both exams are in person, closed book closed notes, one handwritten sheet. Midterm Exam 20pt covers first 7 weeks of instruction, and it is held on March 9th, 2022, 3:30 – 4:50 PM in HINE 202. **Final Exam 20pt** is a comprehensive exam with focus on the last 6 weeks of instructions and is help on May 11th, 2022, 2 – 4:20 PM in HINE 202. If an exam proctor walks out of the classroom without your exam, it is automatic zero grade.

Homework 40pt Each of the nine homework assignments is worth 5pt. The lowest homework grade will automatically be dropped and will not be counted towards your course grade. It is highly recommended that you submit all homework to maximize your grade and to best prepare for the projects and especially the exams. Late homework submissions incur 1pt penalty per day, for up to 2 days. After 2 days, no submission will be accepted. There will be no homework makeup.

Research Project 20pt Research project is a programming project that covers the material learned in class as applied to real world data. More details in the class. You can work in the groups of up to 3 people. If you work with someone on the research project, you will be asked to evaluate the contributions of the team members, and each team member grade will be based on that. It is your responsibility to find a collaborator if you wish to work together. All members of a group need to contribute roughly equal amounts to the project. No extra credit is given to people who work alone.

Quizzes 10pt 5 Quizzes on Canvas will cover 5 modules. They will help you prepare for the exams. The quizzes are timed.

Class participation 5pt Active participation will prepare you well for homework assignment, midterm exam, and projects. **Students are expected to attend the classes**, interact actively during lectures, complete canvas questionnaires, and discuss homework assignment solutions in the class.

Makeup Work and Extra Credit
Extra credit for missed homeworks, quizzes and class participation are built into assessment (extra HW, 115pt out of 100pt max). If you miss an exam or due date because of a valid medical or family emergency, you will be required to provide adequate proof for the exam or assignment to not be counted. If you cannot make an exam for a valid reason and provide adequate proof, you may be able to schedule a make-up exam that takes place before the official exam date. Fabricated reasons and proofs are considered cheating and carry the same penalty (see below).

Attendance and Drop Policy
Attendance, though not mandatory, is **highly** encouraged. Class participation is assessed through **class attendance and participation** component of the grade. You must follow the **withdrawal and drop** policy set up by the University and the College of Science. You are responsible for checking the drop deadlines and making sure that the drop process is complete. http://www.registrar.txstate.edu/registration/drop-a-class.html

Grade Grievance Policy
If a student believes a mistake has been made in grading a homework assignment, the student needs to email the TA first. If it is not resolved, the student needs to email instructor next to resolve an issue.

Academic Integrity and Student Conduct
You are expected to adhere to Code of Student Conduct, the University's Academic The Honor Code, and the Computer Science Department Honor Code. Here are some examples of cheating:

Students are encouraged to study together and to discuss information and concepts covered in the lectures. You can help to or receive help from other students. This permissible cooperation must never involve one group having possession of a copy of all or part of the work done by another group, including solutions from previous semesters, other course sections, the Internet, or other sources. At no time you are allowed to grant anyone (outside of your group in case of a group project) access to your files. Providing such information or enabling others to easily obtain it from you is considered cheating and carries the same penalty.

Submitting your own unmodified solutions from a prior semester is also considered cheating. Any attempts at obtaining homework, project, or exam solutions from "note sharing sites" such as Chegg and CourseHero or from other sources are considered cheating. If you include code (or other materials) obtained from the Internet in your assignments except what is provided or allowed by the instructor that is considered cheating. Plagiarism is considered cheating. Examinations must be your own work. Talking or discussion is not permitted, nor may you compare notes, copy from others, or collaborate in any way. Any collaborative or inappropriate behavior during the examinations is considered cheating.

Should any form of cheating occur, the student(s) involved will automatically receive a zero on the homework, project, or exam in question as well as **a letter grade drop** in the overall course grade. The penalty for a second violation is automatic failure of the course. **All cheating will be referred to the university's Honor Code Council** (http://www.txstate.edu/honorcodecouncil/).

Campus Health, Wellness, and Safety
Please continue to follow the university's Roadmap for updates. Considering recent Centers for Disease Control and Prevention guidelines, Texas State has modified its COVID-19 mitigation strategy to address the current surge:

- Start classes remotely for two weeks and allow employees some flexibility in the workplace to slow the spread of the new variant, reduce risk of exposure for those that may be vulnerable, and allow the worst part of the COVID-19 surge to pass.
- Follow the new CDC COVID-19 Quarantine and Isolation Guidelines which shorten isolation and quarantine to 5 days and include either PCR or antigen testing.
- Use high-quality face masks (KN95 or surgical/procedure masks) for 5 or 10 days in accordance with the new CDC guidelines.
- While the university cannot mandate face masks, everyone is asked to wear a face mask indoors—regardless of vaccination status.
- Modify or defer large events or gatherings until after January 30th.
- Test for COVID-19 within 72 hours (3 days) prior to returning to our campuses, during the semester after high-risk activities, and whenever symptoms develop. For testing information, visit TXST Testing, Curative Testing, or TX Testing Sites.
- Continue to encourage vaccination and booster doses when eligible (5 months after second dose of Pfizer, 6 months after the second dose of Moderna, or 2 months after first dose of Johnson & Johnson).

Student Accommodations
Per standing guidance from Governor Abbott's executive orders and confirmed by The Texas State University System's Office of the Vice Chancellor and General Counsel, the university is not able to require face coverings or vaccinations. Every member of the university community is urged to get vaccinated and wear a mask indoors, regardless of vaccination status. Together, we can reduce the risk of infection and transmission of COVID-19 and live out our shared values of respect and compassion. More information: https://www.ods.txstate.edu/current-student-resources/COVID-19-Information.html The Office of Disability Services is no longer providing special accommodation approvals for students who state they are at higher-risk for complications from contracting COVID-19. The Office of Disability Services (ODS) provides reasonable accommodations to qualified students with disabilities. Faculty are responsible for implementing accommodations based on the office's process, assessment, and formal recommendations per UPPS 07.11.01, Disability Services for Students. Please note that although students with ODS accommodations may discuss alternatives with instructors if they are unable to attend a face-to-face class, a faculty member is not required to accommodate a request that represents a fundamental alteration to the delivery methods of a course or program. Student requests for modifications outside of the ODS process may be considered by a faculty member, but there is no requirement to make modifications.

Emergency Management In the event of an emergency, faculty, students, and staff should monitor the Safety and Emergency Communications web page. This page will be updated with the latest information available to the university, in addition to providing links to information concerning safety resources and emergency procedures. Faculty, students, and staff are encouraged to sign up for the TXState Alert system.

Sexual Misconduct Reporting (SB 212) Effective January 2, 2020, state law (SB 212) requires all university employees, acting in the course and scope of employment, who witness or receive information concerning an incident of sexual misconduct involving an enrolled student or employee to report all relevant information known about the incident to the university's Title IX Coordinator or Deputy Title IX coordinator. According to SB 212, employees who knowingly fail to report or knowingly file a false report shall be terminated in accordance with university policy and The Texas State University System Rules and Regulations.

Relevant Campus Resources

Free Online Courses through LinkedIn Learning Hub: https://doit.txstate.edu/services/online-training.html

Computer Science Department Tutoring: https://cs.txstate.edu/resources/labs/tutoring/

ITAC: itac.txstate.edu

Bobcat Cares is intended to assist students with emergency costs that arose due to the coronavirus or any component of their cost of attendance. Applications open through **February 1, 2022.**
https://www.txstate.edu/cares

The Bobcat Online Scholarship System (BOSS) allows you to use one application to apply for as many Texas State scholarships as you're interested in. Most applications are due February 1st 2022.
https://www.finaid.txstate.edu/scholarships/boss/

Food Insecurity: Bobcat Bounty is the first student-run, on-campus food pantry at Texas State University. It is run by students under the direction of faculty from the Food Security Learning Community in the Nutrition & Foods Program. Our goal is to decrease food insecurity by providing healthy food to the students, faculty, and administration at Texas State University. Most of our food comes from the Hays County Food Bank, a partnership to create a grocery store style experience for clients.
https://bobcatbounty.txstate.edu/Eligibility.html

Texas State Counseling Center: Counseling Center services are free, confidential, and provided by trained professionals to currently enrolled Texas State students while classes are in session. Counseling Center Services include brief individual, group, and couples counseling, consultation and crisis response, and workshops about coping with stress and other mental health topics.
https://www.counseling.txstate.edu/

Dean of Students Office for any question or guidance you need, contact Dean of Student office
https://www.dos.txstate.edu/

Student Complaints
https://www.avpas.txstate.edu/Student-Complaints.html
If it is an academic complaint – please start with the faculty or staff person at the department level office involved in the complaint, and if the complaint cannot be resolved at that level, then contact the next higher office on the organizational chart (such as the department chair/director or dean's office).
   ❖ Examples of academic student complaints may include grade appeals, academic suspension appeals, appeals related to a disagreement about an absence for the observance of a religious holy day, complaints related to the Family Educational Rights and Privacy Act (FERPA), or an honor code violation appeal.
If it is a non-academic complaint – please start with the faculty or staff person at the department level office involved in the complaint, and if the complaint cannot be resolved at that level, then contact the next higher office on the organizational chart (such as the department chair/director or the Office of the Dean of Students). https://www.txstate.edu/oei/policies/complaints.html

   ❖ Examples of non-academic student complaints may include student employee grievances, appeals of a disciplinary decision or parking citation, or a Department of Housing and Residential Life Administrative Review appeal.
   ❖ **Discrimination Complaints:** Texas State prohibits discrimination and harassment based on race, color, national origin, age, sex, religion, disability, veterans' status, sexual orientation, gender identity, or gender expression. Additionally, Texas State prohibits retaliation against a person who files a harassment or discrimination complaint, or who assists or participates in the investigation of a report. Discrimination complaint form:

https://compliance.txstate.edu/oeotix/discrimination.html

If it is a sexual misconduct complaint - if you need to make a report, please contact Title IX Coordinator TitleIX@txstate.edu or fill in the form: https://compliance.txstate.edu/oeotix/
If in doubt, contact Dean of Student office https://www.dos.txstate.edu/

- Texas State Alliance: https://twitter.com/TxstAlliance
- **Full List of On-Campus Resources:** https://www.studentsuccess.txstate.edu/programs/faces/On-Campus-Resources.html
- **Search Student Organizations:** https://www.lbjsc.txstate.edu/soc/join/search-orgs.html
- **Texas State Mission, Shared Values and Goals: https://www.txstate.edu/about/mission.html**