CSCE 3214/5214: Software Development for Artificial Intelligence
Spring 2023
Syllabus

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Class Meets
Fridays, 2.30-5.20pm, NTDP K120

Course Description
New programming paradigms are needed to create and manage systems with embedded AI capabilities. Students in this course will be taught how to leverage available artificial intelligence APIs flexibly and reliably. Additionally, as data management is integral to AI system development, an emphasis will be made to collect and process data for AI system training and testing. Traditional programming concepts and software design principles will be covered in a task-oriented manner to interface with advanced AI libraries and frameworks in order to build and maintain AI infrastructure.

Course Structure
The course takes place in person at NTDP K120 from 2.30pm till 5.20pm on Fridays. Attendance is not mandatory but expected. There are 16 weeks of content that you will move through. All announcements and assignments will be available via Canvas.
Course Modules (tentative)

Module 1. Python (refresher)
Module 2. Data Analysis
Module 3. Machine Learning
Module 4. Project 1
Module 5. Graphical User Interface (GUI)
Module 6. Web Development
Module 7. Model Deployment
Module 8. Project 2
Module 9. Cloud APIs
Module 10. Open Source Software
Module 11. Version Control
Module 12. Project 3 (GRAD STUDENTS ONLY) and Final Exam (ALL STUDENTS)

Course Prerequisites

● No formal course prerequisites.
● Experience with Python is helpful as it is used extensively in the course, but significant prior programming experience with any language will be sufficient.

Course Objectives

By the end of the course, students will be able to:
1. Use a high-level programming language to build and evaluate different machine learning models.
2. Manage data collection, visualizing, preprocessing, and partitioning for machine learning applications.
3. Analyze problems and craft appropriate solutions using existing products, API’s and other tools in combination with custom development as required.
4. Create graphical user interfaces (GUI) and web applications for AI.
5. Store code’s history and collaborate with others using code repositories and other collaboration tools.
6. Properly document, share, and explain problem solutions to collaborators and potential clients.
Materials

All materials (readings, videos, tutorials, assignments and exams) will be accessible online and posted on the course modules. Readings will all be fairly dense, so please search for additional resources (e.g. Wikipedia, Coursera lectures) as needed. All attempts will be made to provide sufficient resources for everyone.

Textbook: No textbook is required. Students are encouraged to consult online sources which will be referenced throughout the course and linked in the course module where appropriate. For example,

- The Python 3 tutorial documentation: https://docs.python.org/3/tutorial/
- The scikit-learn documentation: https://scikit-learn.org/stable/documentation.html

Course communication: We will be using the Canvas Discussion for student interaction and exchange of ideas. Feel free to use the discussion board to ask questions of the group, ask about partners for problem sets, or to make comments that the rest of the class might find useful.

Course Technology & Skills

Minimum Technology Requirements

- Computers are required throughout the course.
- Quizzes and exams will use the Canvas quiz system.
  - Canvas Technical Requirements
    (https://clear.unt.edu/supported-technologies/canvas/requirements)
- Students will be expected to download and install Anaconda Python version 3 and be able to open a Jupyter notebook.

Course Requirements

Discussions: The instructor will post discussion questions on the discussion board. All students are expected to participate in the discussions.

Canvas quizzes: These quizzes are meant to focus students on the important aspects of the readings or lectures. You will be allowed to take these quizzes online, as many times as you would like before the due dates.
Assignments: Assignments are generally due at the end of the day one week after they are assigned, unless otherwise specified. Assignments are to be turned in individually, although students are encouraged to work together extensively. As observed below in class grade points, these small assignments will have minimal impact on grades - they are for learning and self-evaluation rather than grading.

Exam: There will be a final exam. The exam will be on the computer using the Canvas quiz system. It is expected to be cumulative in scope. Prior arrangements can potentially be made without loss of points, but have to be discussed. Missed exam: The exam cannot be missed without prior arrangements or later documented proof of extenuating circumstances.

Projects: There will be 3 group projects. Each project will have additional requirements compared to the previous one as more contents are taught during lectures. You are required to work in groups, as this is part of a full and complete education. All people in the group are expected to contribute. This is your opportunity to demonstrate what you have learned in a way that reaches beyond the selection of tools, data sets, and approaches demonstrated in the course. Commonly students find a unique, complex data set and associated learning problem and apply the techniques presented in the class. The expected result is to create a coherent, completed project for presentation demonstrating your efforts on your project. NOTE: Undergraduate students are only required to do the first 2 projects.

Grading

Grades are determined by a simple points system, with a total of at least 100 points as the goal though more than 100 points are likely. The expected distribution of points is given below, with the exact scale determined by point values given for each task or exam - this is subject to minor modification based on actual points given. Note, even though the majority points are on projects, exams are also a significant means of establishing your final grade, so please complete the Canvas take-home quizzes and assignments in a timely way and study appropriately prior to each exam.

- Discussions: 5 pts
- Assignments and Canvas take-home quizzes: 20 pts
  - Canvas take-home quizzes: ~ 10 pts
  - Assignments: ~ 10 pts
Projects: 60 pts (Split into three 20 point project efforts)
  ○ Brainstormings: 3 pts (1 pt each)
  ○ Proposals: 6 pts (2 pts each)
  ○ Consultations: 3 pts (1 pt each)
  ○ Updates: 3 pts (1 pt each)
  ○ Reports: 15 pts (5 pts each)
  ○ Project presentations: 15 pts (5 pts each)
  ○ Individual Assessments: 15 pts (5 pts each)

Exam: 15 pts

Grading Scale: A=90, B=80-89.9, C=70-79.9, D=60-69.9, F=0-59.9 pts. No exceptions. If class grades are low (e.g. I expect the vast majority of students will end with A’s and B’s), extra quizzes or assignments will be given to add points to the class. (Note, these grades are based on points and not percentages, so if 120 points are given, you only need 90/120 for an A!)

Course Evaluation
Student Perceptions of Teaching (SPOT) is the student evaluation system for UNT and allows students the ability to confidentially provide constructive feedback to their instructor and department to improve the quality of student experiences in the course.

Course Policies

Class Participation
Students must complete quizzes, discussions, assignments, projects, and exams in time to receive the points associated with each activity.

Late Work
When assignments and project work are turned in after the due date, this places an undue burden on the instructor and the TA, especially when this policy is abused. As a compromise, if the assignment or project work is turned in prior to grading there will be no reduction in points, however, grading can occur any time after the due date (including the following morning!). A request for missing submissions may be sent at the discretion of the TA or the instructor, but is not guaranteed, and a reduction of points may also occur in a way that is consistent for the rest of the class.
Examination Policy
The exams will be on the computer/laptop using the Canvas quiz system. It is open book, open note, and open internet unless otherwise specified in advance, however, no communication with others other than the instructor or the TA is allowed in any form (e.g., email, chatting, etc.). Anyone involved in cheating (copying other students’ exams, helping others cheat, etc.) will be reported to the university and receive an F in the final grade. The exam has a time limit, but it can be taken anytime during the exam day. Once it is started, it cannot be paused. Exams cannot be missed. Any accommodations must be given by prior arrangement with the instructor, otherwise documentation proving an extenuating circumstance will have to be provided after the missed exam. Exams are expected to be cumulative in scope.

Technical Errors during Exams
If during the exam there is a technical error which affects your ability to submit the exam, you should immediately notify the instructor and the TAs by email with evidence (screen shots, finished notebooks, etc.) attached. In the event of any unexpected server outage or any unusual technical difficulty which prevents students from completing a time sensitive assessment activity, the instructor will provide an appropriate accommodation based on the situation. Students should immediately report any problems to the instructor.

Assignment Policy
Assignments are generally due at the end of the day one week after they are assigned, unless otherwise specified. Results should be presentable, with appropriate comments for someone to follow what you have done. Assignments can be done individually or in a group of no more than 3 people, but must be submitted to Canvas individually unless otherwise specified.

Instructor/TA Responsibilities and Feedback
- Instructor responsibilities include: Helping students grow and learn, providing clear instructions for projects and assessments, answering questions about assignments, identifying additional resources as necessary, providing grading rubrics, reviewing and updating course content, etc..
- TA responsibilities include: Grading assignments and exams, answering questions about assignments, helping students grow and learn.
- Estimated timeline for feedback:
  - Assignments and exams are graded within a week since submission;
  - Emails are responded within 24 hours during the work week (M-F);
○ Messages on Canvas are not recommended, and might not receive a response.
○ Comments on Canvas are only used for TAs to provide feedback to students; student’s comments won't be read - send an email instead.

Syllabus Change Policy
Any substantial changes to the syllabus after the first week will be highlighted in red on the online platform. Approximate point values are expected to vary but will be fixed when the assignment or exam is given.

UNT Policies
Academic Integrity Policy
Academic Integrity Standards and Consequences. According to UNT Policy 06.003 (https://policy.unt.edu/policy/06-003), Student Academic Integrity, academic dishonesty occurs when students engage in behaviors including, but not limited to cheating, fabrication, facilitating academic dishonesty, forgery, plagiarism, and sabotage. A finding of academic dishonesty may result in a range of academic penalties or sanctions ranging from admonition to expulsion from the University.

ADA Policy
UNT makes reasonable academic accommodation for students with disabilities. Students seeking accommodation must first register with the Office of Disability Accommodation (ODA) to verify their eligibility. If a disability is verified, the ODA will provide a student with an accommodation letter to be delivered to faculty to begin a private discussion regarding one’s specific course needs. Students may request accommodations at any time, however, ODA notices of accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of accommodation for every semester and must meet with each faculty member prior to implementation in each class. For additional information see the ODA website (https://disability.unt.edu/).

Prohibition of Discrimination, Harassment, and Retaliation (Policy 16.004)
The University of North Texas (UNT) prohibits discrimination and harassment because of race, color, national origin, religion, sex, sexual orientation, gender identity, gender expression, age, disability, genetic information, veteran status, or any other characteristic protected under applicable federal or state law in its application and admission processes; educational programs and
activities; employment policies, procedures, and processes; and university facilities. The University takes active measures to prevent such conduct and investigates and takes remedial action when appropriate.

**Emergency Notification & Procedures**
UNT uses a system called Eagle Alert to quickly notify students with critical information in the event of an emergency (i.e., severe weather, campus closing, and health and public safety emergencies like chemical spills, fires, or violence). In the event of a university closure, please refer to Canvas for contingency plans for covering course materials.

**Retention of Student Records**
Student records pertaining to this course are maintained in a secure location by the instructor of record. All records such as exams, answer sheets (with keys), and written papers submitted during the duration of the course are kept for at least one calendar year after course completion. Course work completed via the Canvas online system, including grading information and comments, is also stored in a safe electronic environment for one year. Students have the right to view their individual record; however, information about student’s records will not be divulged to other individuals without proper written consent. Students are encouraged to review the Public Information Policy and the Family Educational Rights and Privacy Act (FERPA) laws and the University’s policy. See UNT Policy 10.10, Records Management and Retention for additional information.

**Acceptable Student Behavior**
Student behavior that interferes with an instructor’s ability to conduct a class or other students' opportunity to learn is unacceptable and disruptive and will not be tolerated in any instructional forum at UNT. Students engaging in unacceptable behavior will be directed to leave the classroom and the instructor may refer the student to the Dean of Students to consider whether the student’s conduct violated the Code of Student Conduct. The University's expectations for student conduct apply to all instructional forums, including University and electronic classroom, labs, discussion groups, field trips, etc. Visit UNT’s Code of Student Conduct ([https://deanofstudents.unt.edu/conduct](https://deanofstudents.unt.edu/conduct)) to learn more.

**Access to Information - Eagle Connect**
Students’ access point for business and academic services at UNT is located at: my.unt.edu. All official communication from the University will be delivered to a student’s Eagle Connect account.
For more information, please visit the website that explains Eagle Connect and how to forward email: Eagle Connect (https://it.unt.edu/eagleconnect).

**Student Evaluation Administration Dates**

Student feedback is important and an essential part of participation in this course. The student evaluation of instruction is a requirement for all organized classes at UNT. The survey will be made available during weeks 13, 14 and 15 of the long semesters to provide students with an opportunity to evaluate how this course is taught. Students will receive an email from "UNT SPOT Course Evaluations via IASystem Notification" (no-reply@iasystem.org) with the survey link. Students should look for the email in their UNT email inbox. Simply click on the link and complete the survey. Once students complete the survey they will receive a confirmation email that the survey has been submitted. For additional information, please visit the SPOT website (http://spot.unt.edu/) or email spot@unt.edu.

**Survivor Advocacy**

UNT is committed to providing a safe learning environment free of all forms of sexual misconduct. Federal laws and UNT policies prohibit discrimination on the basis of sex as well as sexual misconduct. If you or someone you know is experiencing sexual harassment, relationship violence, stalking and/or sexual assault, there are campus resources available to provide support and assistance. The Survivor Advocates can be reached at SurvivorAdvocate@unt.edu or by calling the Dean of Students Office at 940-5652648.

**Important Notice for F-1 Students taking Distance Education Courses**

**Federal Regulation**

To read detailed Immigration and Customs Enforcement regulations for F-1 students taking online courses, please go to the Electronic Code of Federal Regulations website (http://www.ecfr.gov/). The specific portion concerning distance education courses is located at Title 8 CFR 214.2 Paragraph (f)(6)(i)(G).

The paragraph reads:

(G) For F-1 students enrolled in classes for credit or classroom hours, no more than the equivalent of one class or three credits per session, term, semester, trimester, or quarter may be counted toward the full course of study requirement if the class is taken on-line or through distance education and does not require the student's physical attendance for
classes, examination or other purposes integral to completion of the class. An on-line or distance education course is a course that is offered principally through the use of television, audio, or computer transmission including open broadcast, closed circuit, cable, microwave, or satellite, audio conferencing, or computer conferencing. If the F-1 student’s course of study is in a language study program, no on-line or distance education classes may be considered to count toward a student’s full course of study requirement.

**University of North Texas Compliance**

To comply with immigration regulations, an F-1 visa holder within the United States may need to engage in an on-campus experiential component for this course. This component (which must be approved in advance by the instructor) can include activities such as taking an on-campus exam, participating in an on-campus lecture or lab activity, or other on-campus experience integral to the completion of this Course. If such an on-campus activity is required, it is the student’s responsibility to do the following:

1. Submit a written request to the instructor for an on-campus experiential component within one week of the start of the course.
2. Ensure that the activity on campus takes place and the instructor documents it in writing with a notice sent to the International Student and Scholar Services Office. ISSS has a form available that you may use for this purpose. Because the decision may have serious immigration consequences, if an F-1 student is unsure about his or her need to participate in an on-campus experiential component for this course, s/he should contact the UNT International Student and Scholar Services Office (telephone 940-565-2195 or email internationaladvising@unt.edu) to get clarification before the one-week deadline.

**Student Verification**

UNT takes measures to protect the integrity of educational credentials awarded to students enrolled in distance education courses by verifying student identity, protecting student privacy, and notifying students of any special meeting times/locations or additional charges associated with student identity verification in distance education courses. See UNT Policy 07-002 Student Identity Verification, Privacy, and Notification and Distance Education Courses (https://policy.unt.edu/policy/07-002).
Use of Student Work
A student owns the copyright for all work (e.g. software, photographs, reports, presentations, and email postings) he or she creates within a class and the University is not entitled to use any student work without the student’s permission unless all of the following criteria are met:

- The work is used only once.
- The work is not used in its entirety.
- Use of the work does not affect any potential profits from the work.
- The student is not identified.
- The work is identified as student work.

If the use of the work does not meet all of the above criteria, then the University office or department using the work must obtain the student’s written permission.

Download the UNT System Permission, Waiver and Release Form.

Transmission and Recording of Student Images in Electronically-Delivered Courses
1. No permission is needed from a student for his or her image or voice to be transmitted live via videoconference or streaming media, but all students should be informed when courses are to be conducted using either method of delivery.

2. In the event an instructor records student presentations, he or she must obtain permission from the student using a signed release in order to use the recording for future classes in accordance with the Use of Student-Created Work guidelines above.

3. Instructors who video-record their class lectures with the intention of re-using some or all of recordings for future class offerings must notify students on the course syllabus if students’ images may appear on video. Instructors are also advised to provide accommodation for students who do not wish to appear in class recordings.

Example: This course employs lecture capture technology to record class sessions. Students may occasionally appear on video. The lecture recordings will be available to you for study purposes and may also be reused in future course offerings.

No notification is needed if only audio and slide capture is used or if the video only records the instructor's image. However, the instructor is encouraged to let students know the recordings will be available to them for study purposes.
Academic Support & Student Services

Student Support Services

Mental Health

UNT provides mental health resources to students to help ensure there are numerous outlets to turn to that wholeheartedly care for and are there for students in need, regardless of the nature of an issue or its severity. Listed below are several resources on campus that can support your academic success and mental well-being:

- Student Health and Wellness Center (https://studentaffairs.unt.edu/student-health-and-wellness-center)
- Counseling and Testing Services (https://studentaffairs.unt.edu/counseling-and-testing-services)
- UNT Care Team (https://studentaffairs.unt.edu/care)
- Individual Counseling (https://studentaffairs.unt.edu/counseling-and-testing-services/services/individual-counseling)

Chosen Names

A chosen name is a name that a person goes by that may or may not match their legal name. If you have a chosen name that is different from your legal name and would like that to be used in class, please let the instructor know. Below is a list of resources for updating your chosen name at UNT.

- UNT ID Card (https://sfs.unt.edu/idcards)
- UNT Email Address (https://sso.unt.edu/idp/profile/SAML2/Redirect/SSO;jsessionid=E4DCA43DF85E3B74B3E496CAB99D8FC6?execution=e1s1)
- Legal Name (https://studentaffairs.unt.edu/student-legal-services)

*UNT euIDs cannot be changed at this time. The collaborating offices are working on a process to make this option accessible to UNT community members.
**Pronouns**

Pronouns (she/her, they/them, he/him, etc.) are a public way for people to address you, much like your name, and can be shared with a name when making an introduction, both virtually and in-person. Just as we ask and don’t assume someone’s name, we should also ask and not assume someone’s pronouns.

Below is a list of additional resources regarding pronouns and their usage:

- What are pronouns and why are they important? ([https://www.mypronouns.org/what-and-why](https://www.mypronouns.org/what-and-why))
- How do I use pronouns? ([https://www.mypronouns.org/how](https://www.mypronouns.org/how))
- How do I share my pronouns? ([https://www.mypronouns.org/sharing](https://www.mypronouns.org/sharing))
- How do I ask for another person’s pronouns? ([https://www.mypronouns.org/asking](https://www.mypronouns.org/asking))
- How do I correct myself or others when the wrong pronoun is used? ([https://www.mypronouns.org/mistakes](https://www.mypronouns.org/mistakes))

**Additional Student Support Services**

- Registrar ([https://registrar.unt.edu/registration](https://registrar.unt.edu/registration))
- Financial Aid ([https://financialaid.unt.edu/](https://financialaid.unt.edu/))
- Student Legal Services ([https://studentaffairs.unt.edu/student-legal-services](https://studentaffairs.unt.edu/student-legal-services))
- Career Center ([https://studentaffairs.unt.edu/career-center](https://studentaffairs.unt.edu/career-center))
- Multicultural Center ([https://edo.unt.edu/multicultural-center](https://edo.unt.edu/multicultural-center))
- Counseling and Testing Services ([https://studentaffairs.unt.edu/counseling-and-testing-services](https://studentaffairs.unt.edu/counseling-and-testing-services))
- Pride Alliance ([https://edo.unt.edu/pridealliance](https://edo.unt.edu/pridealliance))
- UNT Food Pantry ([https://deanofstudents.unt.edu/resources/food-pantry](https://deanofstudents.unt.edu/resources/food-pantry))

**Academic Support Services**

- Academic Resource Center ([https://clear.unt.edu/canvas/student-resources](https://clear.unt.edu/canvas/student-resources))
- Academic Success Center ([https://success.unt.edu/asc](https://success.unt.edu/asc))
- UNT Libraries ([https://library.unt.edu/](https://library.unt.edu/))
- Writing Lab ([http://writingcenter.unt.edu/](http://writingcenter.unt.edu/))