ADTA 5340-110 | Discovery and Learning with Big Data
Syllabus

Instructor Contact

Name: Dr. Tony Fantasia
Office Location: GAB 102H
Office Hours: Tuesday and Wednesday 12:00 pm – 3:00 pm or by appointment
Email: tony.fantasia@unt.edu

Communication Expectations: The best way to communicate with me is by emailing me directly or through the learning management system. Please email me any questions or personal concerns. I will check my email daily and make every effort to respond as quickly as possible. Please let me know in advance (8 hrs.) if you intend to schedule an appointment. Here is an excellent website provided by CLEAR to give you some communication tips for communicating online: Online Communication Tips.

Course Description

This course introduces the fundamentals of data analytics and machine learning with big data. The goal of this course is to provide students with both theoretical knowledge and practical experience, leading to mastery of big data analytics and machine learning, using both small and large datasets. As these fundamentals are introduced, exemplary technologies will illustrate how machine learning can be applied to real-world solutions. The problems are being considered in the context of big data analytics. Exercises and examples will consider both simple and complex data structures, and data ranges from clean and structured to dirty and unstructured.

Course Structure

This course is an 8-week online class covering one module per week.

Course Prerequisites or Other Restrictions

There are no prerequisites for the course.

Course Objectives

By the end of this course, students will be able to:

1. Develop an understanding of the fundamental concepts of big data and machine learning.
2. Apply Exploratory Data Analysis concepts leveraging the Python programming language and the Jupyter Integrated Development Environment.
3. Develop and articulate results from Supervised and Unsupervised Python Machine Learning models, including correctly identifying algorithms appropriate for the assigned data set.
4. Develop and articulate results from Supervised and Unsupervised Microsoft Machine Learning Studio models, including correctly identifying algorithms appropriate for the data set.
5. Apply skills and knowledge learned in class to real-world case study problems and develop Machine Learning models to solve problems.
Topics included in this course are as follows:

1. Python Basics
2. Data analytics life cycle
3. Data preprocessing
4. Exploratory Data Analysis (EDA)
5. Big data analytics and machine learning: Overview
7. Big data analytics and machine learning: Unsupervised Algorithms
8. Big data analytics and machine learning: Evaluating Algorithms
9. Big data analytics and machine learning with NumPy, Pandas, Scikit-Learn in Python
10. Azure Machine Learning

Materials

No textbook is required for this course, but we will have articles to read, podcasts to listen to, and videos to watch throughout the semester.

These books are NOT required, but you might find them beneficial for extra reinforcement of the material.

Teaching Philosophy

I want to create a learning environment that allows students to embrace learning through my experiences and their experiences with technology. I will set clear goals and expectations with reminders throughout the semester. I want to make sure students see the big picture, so I will incorporate real-world examples in my lectures. I believe my primary role in the classroom is to facilitate the construction of new knowledge through social engagement. As such, I will encourage students to take ownership of their learning. I will assess fairly and regularly through discussion forums, hands-on homework assignments, exams, team projects, and other collaborative activities to encourage learning.

Course Technology & Skills

Minimum Technology Requirements
A list of the minimum technology requirements:

- Computer
- Reliable internet access
- Speakers
- Microphone
- Plug-ins
- Microsoft Office Suite
- Canvas Technical Requirements

Computer Skills & Digital Literacy
A list of technical skills you must have to succeed in the course:

- Navigating Canvas
- Using email with attachments
- Downloading and installing software
- Using spreadsheet programs
- Using presentation and graphics programs
- Posting to discussion boards
- Printing Word documents OR opening and printing pdf files, using free Adobe Acrobat Reader

Course Requirements

The following are the course requirements for the course.

1. The student will be responsible for checking the announcements in the UNT email and other types of class communication daily.
2. The student will access and follow all course instructions found in the syllabus, announcements, assignments, and all other class-related documents.
3. The student will complete all the class assignments in the time frame specified in the class documents, including the course calendar, to participate effectively in-class activities. Please note only one extension will be granted without penalty. This one extension is in the form of the automatic lowest grade dropped in the canvas system. After one extension (lowest assignment dropped), there will be a 25% deduction for each day the work is submitted late.
4. The student will complete the midterm and project the time frame specified in the class documents, including the course calendar. **There are NO extensions for the midterm or final.**

**Grading**

**Assessment & Grading**

1. There will be **homework assignments** throughout the course.
   - Students are required to submit their homework on time.
2. There will be **discussion posts and participation activities** throughout the course.
   - Students are required to submit their discussion posts on time.
   - Students are required to attend class and participate in-class discussions and activities.
3. There will be **one midterm.**
   - Students are required to submit their midterm on time.
4. Lastly, there will be a **final project.**
   - Students will submit the final project by the deadline provided on the Course Calendar.

**Grading Table**

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Percentage of Final Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework Assignments (6)</td>
<td>40%</td>
</tr>
<tr>
<td>Participation</td>
<td></td>
</tr>
<tr>
<td>Discussion Posts (6)</td>
<td>20%</td>
</tr>
<tr>
<td>Class Discussions &amp; Activities</td>
<td></td>
</tr>
<tr>
<td>Midterm</td>
<td>20%</td>
</tr>
<tr>
<td>Final Project</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Total Percentage</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

The final letter grade will be determined as follows:

<table>
<thead>
<tr>
<th>Final Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90-100</td>
</tr>
<tr>
<td>B</td>
<td>80-89</td>
</tr>
<tr>
<td>C</td>
<td>70-79</td>
</tr>
<tr>
<td>D</td>
<td>60-69</td>
</tr>
<tr>
<td>F</td>
<td>0-59</td>
</tr>
</tbody>
</table>
Course Schedule

This schedule is subject to change by the professor. Any changes to this schedule will be communicated in class or via class email or Canvas announcement. Additional readings and activities may be added, which will be noted in the weekly modules overview and instructions.

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Activities</th>
<th>Assignment(s) Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>10/15-10/21</td>
<td>Welcome &amp; Overview Introduction to Python and Jupyter Notebook</td>
<td>Lecture 1 Readings/Video</td>
<td>Discussion Post #1 10/17/23 11:59 PM Assignment #1 10/22/23 11:59 PM</td>
</tr>
<tr>
<td>Week 2</td>
<td>10/22-10/28</td>
<td>Big Data and Machine Learning Analytics Life Cycle AI Ethics</td>
<td>Lecture 2 Readings/Video</td>
<td>Assignment #2 10/24/23 11:59 PM Assignment #2 10/29/23 11:59 pm</td>
</tr>
<tr>
<td>Week 3</td>
<td>10/29-11/4</td>
<td>Python Libraries Data Quality and Exploratory Data Analysis Data Visualization with Matplotlib MIDTERM Review</td>
<td>Lecture 3 Readings/Video</td>
<td>Assignment #3 10/31/23 11:59 PM Assignment #3 11/5/23 11:59 pm</td>
</tr>
<tr>
<td>Week 4</td>
<td>11/5-11/11</td>
<td>MIDTERM</td>
<td>MIDTERM</td>
<td>MIDTERM</td>
</tr>
<tr>
<td>Week 8</td>
<td>12/3-12/9</td>
<td>Final Project</td>
<td></td>
<td>Final Project 12/9/23 11:59 pm</td>
</tr>
</tbody>
</table>
Course Policies

Online Course Attendance
Students are expected to participate actively each week and to meet all deadlines for course assignments as detailed in the Course Calendar. Each lecture will be recorded if students cannot attend lectures at the weekly scheduled time. For more information about the University of North Texas Attendance Policy go to: http://policy.unt.edu/policy/15-2-5.

Recordings
All the video recordings in this course, including lecture videos and live class activity recordings, are for students enrolled in the class section to refer to throughout the semester. Class recordings are the intellectual property of the university or instructor and are reserved for use only by students in this class and only for educational purposes. Students may not post or otherwise share the recordings outside the class, or the Canvas Learning Management System, in any form. Failing to follow this restriction violates the UNT Code of Student Conduct and could lead to disciplinary action.

Late Work
All assignments are to be submitted by the due date and time. The deadline for submitting an assignment is 11:59 pm on the due date. You are allowed one late assignment without penalty. This one extension is in the form of the automatic lowest grade dropped in the canvas system. After the one late submission, the subsequent assignments will incur a 25% deduction for each day. No late midterm or final project will be accepted. Note: Late work is subject to the penalty described above unless previously approved by the instructor.

Online Assignment and Examination Policy
The University is committed to providing a reliable online course system to all users. However, in the event of an unexpected server outage or any unusual technical difficulty which prevents students from completing a time-sensitive assessment activity, the instructor will extend the time windows and provide an appropriate accommodation based on the situation. Students should immediately report any problems to the instructor and contact the UNT Student Help Desk: helpdesk@unt.edu or 940.565.2324. The instructor and the UNT Student Help Desk will work with the student to resolve any issues at the earliest possible time.

Instructor Responsibilities and Feedback
The instructor is responsible for responding to student questions about assignments and projects, presenting the course material, and providing additional resources to enhance understanding of course material. Timely feedback is essential for student success, and the instructor is responsible for providing timely feedback to students throughout the course. The instructor or TA will grade submitted assignments and post grades for students within ten days of the assignment due date.

Syllabus Change Policy
Changes to the course syllabus or due dates are not anticipated, but should they be necessary, the instructor will provide ample notification to students to complete assignments in a timely manner without penalty.
Welcome to UNT!

As members of the UNT community, we have all made a commitment to be part of an institution that respects and values the identities of the students and employees with whom we interact. UNT does not tolerate identity-based discrimination, harassment, and retaliation. UNT’s full Non-Discrimination Policy can be found in the UNT Policies section of the syllabus.

Rules of Engagement

Rules of engagement refer to the way students are expected to interact with each other and with their instructors. Here are some general guidelines:

- While the freedom to express yourself is a fundamental human right, any communication that utilizes cruel and derogatory language on the basis 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 will not be tolerated.
- Treat your instructor and classmates with respect in any communication online or face-to-face, even when their opinion differs from your own.
- Ask for and use the correct name and pronouns for your instructor and classmates.
- Speak from personal experiences. Use “I” statements to share thoughts and feelings. Try not to speak on behalf of groups or other individuals’ experiences.
- Use your critical thinking skills to challenge other people’s ideas, instead of attacking individuals.
- Avoid using all caps while communicating digitally. This may be interpreted as “YELLING!”
- Be cautious when using humor or sarcasm in emails or discussion posts as tone can be difficult to interpret digitally.
- Avoid using “text-talk” unless explicitly permitted by your instructor.
- Proofread and fact-check your sources.
- Keep in mind that online posts can be permanent, so think first before you type.

See these Engagement Guidelines (https://clear.unt.edu/online-communication-tips) for more information.

Online Course System

The University is committed to providing a reliable online course system to all users. However, part of working in the online environment involves dealing with the inconveniences and frustration that can arise when technology breaks down or does not perform as expected. Here at UNT we have a Student Help Desk that you can contact for help with Canvas or other technology issues.

UIT Help Desk: UIT Student Help Desk site (https://www.unt.edu/helpdesk)
Email: helpdesk@unt.edu
Phone: 940-565-2324
In Person: Sage Hall, Room 130
Walk-In Availability: 8am-9pm
Telephone Availability:
- Sunday: noon-midnight
- Monday-Thursday: 8am-midnight
UNT Policies

Academic Integrity Policy
According to UNT 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 reasonable accommodation for every semester and must meet with each faculty member prior to implementation in each class. Students are strongly encouraged to deliver letters of reasonable accommodation during faculty office hours or by appointment. Faculty members have the authority to ask students to discuss such letters during their designated office hours to protect the privacy of the student. 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) 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 e-mail 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 online 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 online 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 online 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

6. 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.

7. In the event an instructor records a student presentation, 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.

8. 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.

Class Recordings & Student Likenesses

In case synchronous (live) sessions in this course will be recorded for students enrolled in this class section to refer to throughout the semester: Class recordings are the intellectual property of the university or instructor and are reserved for use only by students in this class and only for educational purposes. Students may not post or otherwise share the recordings outside the class, or outside the Canvas Learning Management System, in any form. Failing to follow this restriction is a violation of the UNT Code of Student Conduct and could lead to disciplinary action.
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 Records
- UNT ID Card
- UNT Email Address
- Legal Name

*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.

You can add your pronouns to your Canvas account so that they follow your name when posting to discussion boards, submitting assignments, etc.

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

- What are pronouns and why are they important?
- How do I use pronouns?
- How do I share my pronouns?
- How do I ask for another person’s pronouns?
- How do I correct myself or others when the wrong pronoun is used?
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://careercenter.unt.edu](https://careercenter.unt.edu))
- **Multicultural Center** ([https://idea.unt.edu/multicultural-center](https://idea.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://idea.unt.edu/pridealliance](https://idea.unt.edu/pridealliance))
- **UNT Food Pantry** ([https://studentaffairs.unt.edu/food-pantry](https://studentaffairs.unt.edu/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 Center** ([https://writingcenter.unt.edu](https://writingcenter.unt.edu))
- **Math Lab** ([https://learningcenter.unt.edu/math-lab](https://learningcenter.unt.edu/math-lab))

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