Course Information

**Class meeting time:** Mondays at 5:30 - 8:30 PM CST  
**Location and Modality:** Asynchronous Online.

This class aims to offer students an excellent experience through the main course components: lectures, assignments, and research project activities. This class will enable students to practice and deepen knowledge, effectively interact with new technologies and methods, and make them highly competitive computer scientists for industry and academia. Lectures will record and post along with lecture slides to Canvas by the end of Monday or Tuesday. The instructor updates the lecture contents even after the lecture to keep students updated with the class topics' current technologies. ALL course materials will be available at the course site on Canvas that is accessible to all students. Students will submit all assignments through the tools available on Canvas.

**Summary of the entire class requirements:** This course will consist of (5) programming assignments in Python language only (10% each and 50% total) and (2) online exams: Exam 1 and Exam 2 (25% each, and 50% total) **PLUS 25% bonus (optional)** to special topics’ projects. Interested students in getting the 25% bonus (extra credit) must contact the professor within 2 weeks of the beginning of the semester to discuss allowed project topics and related details before proceeding with this optional bonus to get approval and guidance. Students are allowed up to three free late days without penalty for all programming assignments’ submissions. The instructor understands that students have emergencies or unforeseeable circumstances that prevent them from submitting their works to Canvas on time. This late submission policy will help students avoid losing grades and encourage them to submit their late submissions even though passing the deadlines. Students also will be given an optional non-programming assignment to overcome/replace one programming assignment grade if they miss or didn’t do well in one of the programming assignments to help them enhance their grades.

**Time requirement:** Students should spend 10-12 hours per week on this course to understand the course topics. Students are strongly encouraged to check the time requirements for their other classes and responsibilities, such as full or part-time jobs, to avoid time management issues or withdraw from the classes and maintain satisfying knowledge/GPA.

**Disclaimer:** This syllabus is subject to change as the need arises. This syllabus represents my current plans and objectives. Those plans may need to change to enhance the class learning opportunity as we go through the semester. Such changes will be communicated clearly and announced through Canvas, which are not unusual and should be expected. Course topics and submission deadlines are tentative and subject to change as needed. Students should always adhere to the syllabus policies only and ignore any modified policies if mistakenly listed in the lecture slides.

Instructor Information

**Name:** Mohammed Aledhari, Ph.D.  
**Email:** mohammed.aledhari@unt.edu  
**Website:** https://cohblab.vercel.app/  
**Office Location:** Discovery Park, Room E236E  
**Office phone:** 940-565-3641  
**Office Hours:** By appointments  
**Teaching Assistant:** Ms. Varsha Bhavandlapelli email: varshabhavandlapelli@my.unt.edu  
**Teaching Assistant:** TBD

Communicating with your professor and TAs

This course will have a website in UNT Canvas (https://unt.instructure.com/login/canvas) for online discussion, assignment submissions, and sharing of reading materials. Students are welcome to make an appointment with the professor and/or the teaching assistants (TAs) to discuss course-related questions. Please email them in advance if you need to schedule an individual meeting with the professor or the TAs. Students are also encouraged to use a discussion forum in Canvas where they can ask questions and get answers from the professor, TAs, and other students. The main method of communication with the professor is the email to (mohammed.aledhari@unt.edu) Please include ‘INFO 5505:001’ in the subject of your email when contacting me.
Netiquette Policy

- I will communicate with all students **professionally** and **respectfully** all times for that I expect all students do the same when communicating with me through emails and other communication methods.
- You **have** to start your email with accepted greeting phrases **AND** my title and last name or Professor.
- Accepted salutations (greetings) are (Dear, Hello, Hi, and Good Morning/Afternoon/Evening).
  
  For example, you might use any of listed opening lines to start your email:
  
  1. **Dear Dr. Aledhari/Professor,**
  2. **Hello Dr. Aledhari/Professor,**
  3. **Hi Dr. Aledhari/Professor,**
  4. **Good Morning/Afternoon/Evening Dr. Aledhari/Professor,**

- **Any** email or communication that doesn’t start with any of listed above 4 opening lines will **NOT get any reply and response.**

When communicating with your professor, you must always:

- **Treat your instructor(s) with respect,** even in email or in any other online communication. **Otherwise, you will not get any reply or responses.**
- Use clear and concise language. Be respective of readers’ time and attention.
- Remember that all college level communication should have correct spelling and grammar.
- Avoid slang terms such as “wassup?” and texting abbreviations such as “u” instead of “you”.
- Use standard fonts that are optimized for online reading (e.g., sans serif) along with a consistent and readable size (12 or 14 pt.).
- Avoid using the caps lock feature **AS IT CAN BE INTERPRETED AS YELLING.**
- Limit and possibly avoid the use of emoticons. Not everyone knows how to interpret them.
- Be cautious when using humor or sarcasm as tone is sometimes lost in an email or discussion post and your message might be taken literally or offensively.
- Be careful sharing personal information online (both yours and other’s).
- **The next page includes an example for you to follow when emailing me your questions and inquiries.**

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Include a subject line that is meaningful and accurately reflects the content and purpose of the email.

**To:**

**Cc:**

**Subject:** CS 4267/01 – Machine Learning – Project Proposal

**Dear** Dr. Noah,

Hi Professor,

Dr. Noah, Professor,

Hi Professor,

Good Morning Professor,

Good Afternoon Professor,

Good Evening Professor,

My name is John Smith and I am a student in your Machine Learning course.

I need to clarify an aspect of the project proposal due next week. Are we allowed to use XXX for this assignment?

Thank you,

John

Be concise:

- Keep the email as short as possible
- Stay on topic
- Divide the text into shorter paragraphs
- Use paragraph breaks to break up and make the text more visually appealing

Identify yourself with name and additional information that may be relevant

Use a proper opening and closing line with courteous language such as “please” and “thank you”. If appropriate, use a signature that contains your full name, position, and contact information
Course Description

INFO 5505.001 – Applied Machine Learning for Data Science (3 Class Hours, 0 Laboratory Hours, 3 Credit Hours).

Prerequisite:
1. Mathematics: Strong mathematical skills (linear algebra, calculus, probability, derivatives, and statistics) are needed.
2. Programming: Proficiency in programming with Python, Jupyter notebooks, and basic with LaTeX (text editor).
3. Other Courses: There are no specific prerequisite courses. Courses in AI, machine learning, deep learning, computer vision, or image processing are not required.

Welcome to INFO 5505.001 – Applied Machine Learning for Data Science! This 15-week course was designed to give you a comprehensive view of the world of machine learning.

Objectives

Machine learning is one of the most fundamental knowledge areas for Data Science. Through a combination of advanced computing techniques, training techniques and architectural components of neural networks, it is now possible to create much more complex machine learning models to learn hierarchies of information in a way that is like the function of the human brain. This course trains data science students basic understanding of modern neural networks and their applications in data science problems including information retrieval, natural language processing, and computer vision. It starts with an introduction of concepts of machine learning and widely adopted machine learning algorithms including linear regression, logistic regression, clustering algorithms, decision trees, naive Bayes Learning, and Support Vector Machine. This course then introduces building blocks of neural networks including fully connected layers, convolutional and recurrent layers. Students will use these building blocks to define complex modern architectures in Google TensorFlow and Keras frameworks using Python programming language. This course finally introduces the applications of machine learning to computer vision with Convolution Neural Networks (CNN), natural language processing with Recurrent Neural Network (RNN) such as Long Short-Term Memory (LSTM), and information retrieval with RNN and CNN.

Learning Outcomes

INFO 5505.001 – Applied Machine Learning for Data Science satisfies one of University of North Texas’s general education program requirements. It addresses the Applied Machine Learning for Data Science general education learning outcome(s). The learning outcome states:
1. Be able to explain basic concepts and learning process of machine learning models.
2. Be able to use tools to build machine learning applications with machine learning models.
3. Be able to explain neural networks (deep and otherwise) compared to other machine learning models.
4. Be able to select machine learning models and framework to build real-world data science solutions.
5. Be able to select a deep neural network to solve a particular data science problem.
6. Be able to conduct verification, validation, and optimization of machine learning systems.

Course Materials

We will not rely on a single, modern textbook available to cover the topics in this course because it's a hands-on and project focus class that aims to prepare students for both: industry and higher education. We will use published papers and tutorials extensively. Nonetheless, the following recommended textbooks will be helpful for study (most of them are freely available).

Recommended Texts:
5. An Introduction to Statistical Learning with Applications in R
6. The Elements of Statistical Learning: Data Mining, Inference, and Prediction
7. Understanding Machine Learning: From Theory to Algorithms
8. A Brief Introduction to Neural Networks
Technology requirements:
The assignments must be completed using the Python language. We will use the OpenCV library, TensorFlow, and PyTorch for the class assignments and projects. Students are recommended to prepare their own laptops. If anyone does not have a laptop, she/he can borrow one from UNT library (https://library.unt.edu/services/laptop-checkout/).
I also recommend using Google Co-laboratory (CoLab) or Jupyter if you don’t have sufficient computing resources. Google CoLab provides: (1) Pre-Installed Libraries; (2) Saved on the Cloud; (3) Collaboration; (4) Free GPU and TPU Use. You also need to use LaTeX, Microsoft Office, and Computer with a Webcam for the class requirements. Students are responsible for securing the webcam to their exams, assignments, and online meetings (if needed) using MS Teams with their professor during the entire semester.

Teaching Philosophy
The instructor will take a problem-solving approach and work with students to challenge machine learning problems. The term machine learning assignments and exams, as a whole, are designed to conduct machine learning models. Learning by doing is another teaching philosophy in this course, and practicing is essential to understanding and mastering machine learning. The professor will monitor the student's progress and is open to student suggestions. Students are expected to study 12-15 hours per week and submit their assignments on time to achieve satisfactory class performance. Interactions with the professor are strongly encouraged.

Lesson Related Materials
• Lesson one:
  ➢ Coding environment: Jupyter Notebook (https://jupyter.org/)
  ➢ MOOC courses:
    ✓ Python for Everybody Specialization on Coursera: https://www.coursera.org/specializations/python
    ✓ Tutorials of Jupyter Notebook: https://www.youtube.com/watch?v=HW29067qVWk
  ➢ To get help:
    ✓ Python Docs: https://docs.python.org/3/
    ✓ Python Forums: https://python-forum.io/
    ✓ Stackoverflow: https://stackoverflow.com/
Course Topics and Outline (tentative)

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Monday</td>
<td>January 23</td>
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<tr>
<td></td>
<td>Monday</td>
<td>Introduction, Fundamentals, and syllabus discussion</td>
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<td>2</td>
<td>Monday</td>
<td>January 30</td>
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<td></td>
<td>Monday</td>
<td>Linear Algebra &amp; Probability Reviews &amp; ML System Design</td>
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<td>3</td>
<td>Monday</td>
<td>February 6</td>
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<td></td>
<td>Monday</td>
<td>Linear Regression</td>
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<td>4</td>
<td>Monday</td>
<td>February 13</td>
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<td></td>
<td>Monday</td>
<td>Logistic Regression</td>
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<td>5</td>
<td>Monday</td>
<td>February 20</td>
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<td></td>
<td>Monday</td>
<td>Artificial Neural Networks (ANNs)</td>
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<td>6</td>
<td>Monday</td>
<td>February 27</td>
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<td></td>
<td>Monday</td>
<td>Convolutional Neural Networks (CNNs)</td>
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<tr>
<td>7</td>
<td>Monday</td>
<td>March 6</td>
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<td></td>
<td>Monday</td>
<td>Recurrent Neural Networks (RNNs)</td>
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<td>8</td>
<td>Monday</td>
<td>March 20</td>
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<td></td>
<td>Exam 1</td>
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<tr>
<td>9</td>
<td>Monday</td>
<td>March 27</td>
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<td></td>
<td>Monday</td>
<td>Support Vector Machines (SVMs)</td>
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<td>10</td>
<td>Monday</td>
<td>April 3</td>
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<td></td>
<td>Monday</td>
<td>Naive Bayes Classifier &amp; Decision Trees</td>
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<td>11</td>
<td>Monday</td>
<td>April 10</td>
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<td></td>
<td>Monday</td>
<td>K-Means Clustering &amp; Hierarchical Clustering</td>
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<td>12</td>
<td>Monday</td>
<td>April 17</td>
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<td></td>
<td>Monday</td>
<td>Ensemble Learning</td>
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<tr>
<td>13</td>
<td>Monday</td>
<td>April 24</td>
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<td></td>
<td>Monday</td>
<td>Reinforcement Learning</td>
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<tr>
<td>14</td>
<td>Monday</td>
<td>May 1</td>
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<td></td>
<td>Exam 2</td>
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Some valuable dates listed on UNT’s calendar for Spring 2023 semester
- January 20 – Last Day to Add a Class Section
- January 30 - Last day to drop a course section to no longer appear on the official transcript.
- March 10 - Midpoint of the semester
- March 13-18 - Spring Break (no classes)
- April 7 - Last Day for a student to drop a course or all courses with a grade of W.
- April 8 - First day to request a grade of Incomplete
- May 4 - Last Regular Class Meeting
- May 6-12 - Final Exams
- May 15 - University Grade Submission Deadline 4 pm
- May 17 - Grades/Academic Standing posted on the Official Transcript 6 pm

Grading Scale and Course Policies

This course will consist of (5) programming assignments in Python language only (10% each and 50% total) and (2) online exams: Exam 1 and Exam 2 (25% each, and 50% total) PLUS 25% bonus/extra credit (optional) to special topics’ projects. Interested students in getting the 25% bonus (extra credit) must contact the professor within 2 weeks of the beginning of the semester to discuss allowed project topics and related details before proceeding with this optional bonus to get approval and guidance. Students are allowed up to three free late days without penalty for all programming assignments’ submissions. The instructor understands that students have emergencies or unforeseeable circumstances that prevent them from submitting their works to Canvas on time. This late submission policy will help students avoid losing grades and encourage them to submit their late submissions even though passing the deadlines. Students also will be given an optional non-programming assignment to overcome/replace one programming assignment grade if they miss or didn’t do well in one of the programming assignments to help them enhance their grades.

In order to successfully pass the course, students require to choose and complete one track and related activities listed below of two possible tracks. Weights indicate the contribution to the final course grade.

1. Exams 50% (2 Exams, 25% each) – Exam 1 on March 20 and Exam 2 on May 1
2. Assignments 50% (5 Programming Assignments, 10% each)
3. bonus (optional) 25% (For fully running and justified results of big omics data-based projects such as gene expression, genomics, proteomics, and metabolomics that compare between three or more ML models using several evaluation metrics and optimizers). Students need to get the professor’s approval before working on such projects.

The listed above Bonus is the only extra credit that students can get for the entire semester, verbally promised other bonuses would not be given or accepted.
Evaluation and Grading Policies

Grading Scale
The following criteria provide guaranteed letter grades if a student’s overall scores fall within the stated range:

<table>
<thead>
<tr>
<th>Grading Scale</th>
<th>Interpretation</th>
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<tbody>
<tr>
<td>90 – 100%</td>
<td>A</td>
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<tr>
<td>80 – 89%</td>
<td>B</td>
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<tr>
<td>70 – 79%</td>
<td>C</td>
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<tr>
<td>60 – 69%</td>
<td>D</td>
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<tr>
<td>0 – 59%</td>
<td>F</td>
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</tbody>
</table>

- **A**: Excellent, exceeds average understanding as evidenced in course work and goes well beyond the basics.
- **B**: Far above average, fully meets average understanding as evidenced in course work and fully understands the basics and can deal with concepts somewhat beyond that level.
- **C**: Average meets minimum expectations and satisfies course requirements. Students need to get 70% (C) at least to pass this class.
- **D**: Below average, meets many minimum expectations and satisfies all or most course requirements.
- **F**: Fails to meet minimum expectations in understanding and course work as evidenced by performance and submission of graded elements.

I will round up grades if they are >= .5, for example, the 89.5 will be rounded to an (A), but 89.4 will be rounded to a (B). In other words, any fractions < .4 will not be counted, while fractions >= .5 will be adding 1 point to the grade.

Pre-Grading Policy to all submissions and deliverables of the assignments

Course Policies, Requirements, and Assignments

Exam Policies:

- There will be **two exams** during the entire semester that are **exam 1** and **2**.
- Both exams are **non-cumulative** (meaning that once we have finished with material on one exam, we will not be re-tested on that material on the next exam). In other words, the first exam will cover all materials taught from the 1st lecture to last lecture prior that exam (i.e., lecture 1 – lecture 7), while the second exam will cover all materials taught after the first exam (i.e., lecture 9 – lecture 13).
- Both exams require **webcam** and **Respondus LockDown Browser** (software you have to download and test it prior your exam) to record you during the exams. Also, the online exam using Canvas comes with the facial recognition feature to track student activities during the exam, so make sure you have the requirements in advance. Students will not be given any exams without listed two requirements: **webcam** and **Respondus LockDown Browser**, no exceptions or excuses.
- The total time for each exam is 75 minutes. Each exam consists of 10 main questions, and each main question includes several multiple-choice and/or true/false questions. Students will get/see their exam grades immediately after finishing the exam.
- Cell phones, watches with Internet capabilities, mp3 players, hand-held computers/personal digital assistants (PDAs) or other electronic devices, books, notes, hats, and any head coverings (except for medical or religious reasons), and other computers are **NOT ALLOWED** in the exam room while students taking the exam.
- Any student arriving after an exam has commenced will be penalized on a minute-by-minute basis. In other words,
a student arriving late gets no additional time on the exam.

- No smoking, chewing tobacco, drinking, or eating is allowed during exams.
- There will be **no make-up exams**. Students will not be allowed to make up missed exams unless providing a valid, documented, university-approved excuse.
- The professor is **might** or **might not** offer any curve. Also, in the event that the professor offered a curve to one exam, then that doesn’t mean the same will apply to the second exam (**each exam will be treated separately**). The standard is students are expecting to get their real grades without any curves unless the professor announces that at Canvas announcement tab prior the targeted exam.

- Students need be aware listed requirements of the online exam using the Respondus LockDown Browser and Respondus Monitor (Webcam) as follows (**these instructions are subject to change by the software provider**):
  1. Right click of student’s computer mouse will be disabled during the entire exam time.
  2. Students cannot access the Email tool, Instant Messages tool, or their alerts if they have a quiz attempt in progress.
  3. Students can try and see one question per page.
  4. Students will not be able to move backwards through pages. So, students need make sure that they solve questions in the order i.e. solve the 1st question, then go the 2nd question to solve it, after that go to the 3rd question, and so on. Please be aware if you skip any question, then you cannot return to solve it later.

- **Respondus Monitor** uses a webcam to record student exam sessions after passing listed Startup Sequence (the startup sequence is the set events that occur before a Monitor webcam session begins):
  1. The system will ask students to take their photos via the Student Photo to ensure the identity.
  2. Students need to Show their UNT IDs.
  3. Students need to show all surrounding objects and tables in the exam room through a window called the Environment Check.
  4. Students need to allow the system to detect their faces and eyes all times (Facial Detection Check). So, I recommend students try test exam multiple times as soon as possible prior the actual exams to be familiar with the startup sequence and best background and lighting settings.
- The system will prevent students from starting the exam if the face cannot be detected during the startup sequence (see above steps).
- The system will notify students during the exam if the face cannot be detected, then report that to the professor after the exam to take further actions.

**Respondus LockDown Browser** and Respondus Monitor (Webcam) are requiring and will be utilized for exams. You may need to install and test a Web camera and microphone prior to beginning the semester before exams. All exams are closed-book and closed-note. NO inside or outside resources or communications are permitted on any exam. Respondus will instruct you with the steps required to install and activate both options (watch the following videos) for each exam.

Student perspective video: https://www.youtube.com/watch?v=Apb8tArU6JI
System Requirements for Respondus software (Students)
Windows: 10, 8, 7
Mac: OS X 10.10 or higher
Adobe Flash Player (bundled with the LockDown Browser installation)
Web camera (internal or external) & microphone
A broadband internet connection

**Warning:** Web camera should be on and active during the entire exam period. Turning off or blocking the web camera at any time during any phase of the exam period is strictly prohibited. Students’ faces and eyes should be in front of the web camera during the exam period so clear recording can occur and be available for later inspection. Environment check request recording must clearly show the space around the exam space, table, and computer that is used for taking the exam. Any deviation from any of these conditions will be strictly interpreted as dishonesty. According to UNT’s policies on academic dishonesty, any student who is found cheating or exercising any form of dishonesty will receive an automatic F grade in the course and other consequences.

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**Submissions and Deliverables** of the assignments from **ALL STUDENTS** as follows:
1. A Single **zipped folder** for **Python programming assignments** that must include the following items:
   a. Complete and running the entire Python source code of the assignment. Non running source codes will get zero for the entire assignment grade even if students submit their videos.
   b. Video illustrates the entire Python source code **AND results** using student’s voice. Videos without student’s voice will get a zero even if students submit their running source codes. 
   
   **Missing any assignment components (fully running Python source codes and a video illustrating the entire assignment Python source code) will result in getting a zero for the whole assignment grade (0% of 12.5%).** The assignment grade follows the rule of **all requirements or zero grade.**

2. A Single **zipped folder** for all projects that must include the following items (**this applies to the 25% bonus (optional) to special topics’ projects only):**
   a. Writeup report (in a Latex Package of IEEE format that **includes several files**)
   b. Complete and running of the entire project Python source codes. Non running source codes will get zero for the entire project grade even if students submit other requirements.
   c. Video illustrates the entire project Python source code **AND results** using student’s voice. Videos without student’s voice will get a zero even if students submit their running source codes.
   
   **Missing any project components (writeup report in LaTex, running Python source codes, and a video illustrates the entire project Python source code) will result in getting a zero for the entire project grade (0% of 50%).** The project grade follows the rule of **all requirements or zero grade**.

Submissions and deliverables will be checked through Canvas **Turnitin** software to detect similarity/plagiarism that displays three flags: red, yellow, and green. The submission will grade if the flag is **green**, while grade zero will be given for the works flag in **red** or **yellow** through Turnitin report. So, students are responsible for avoiding academic misconduct such as cheating, plagiarism, fabricating results, and any other dishonest forms.

**Labeling Directions of Submissions and Deliverables:**
Label all submissions and deliverables (files and zipped folders) as follows:

**Assignments Labeling:** This applies to **both tracks**
1. Programming Assignment-01-INFO5505-First-name Last-name
2. Programming Assignment-02- INFO5505-First-name Last-name
3. Programming Assignment-03- INFO5505-First-name Last-name
4. Programming Assignment-04- INFO5505-First-name Last-name
5. Programming Assignment-05- INFO5505-First-name Last-name
6. Non-Programming/Replacement Assignment-INFO5505-First-name Last-name

**Example:** Programming Assignment-01-INFO5505-Mary Jones

**Assignment Policies**
Students will be given (5) different Python programming problems covered during this course utilizing appropriate libraries and packages. Each assignment weights 10% of the class grade (5% for the video and 5% for the source code). The rubric of each assignment will be listed in the assignment announcements. Students need to upload their works to the Canvas in a single zipped folder that includes all Python source code(s), used dataset(s), a video explaining the running source code(s) and generated results in their voices, and any other files that allow the source codes to run on the instructor’s computer. The instructor might ask students to run their source codes in online meetings to validate their implementations and understanding of the model. **This assumes the submitted assignment includes a fully running source code and the video that explains the source code and obtained results. Missing any assignment components (fully running Python source codes and a video illustrating the entire assignment Python source code) will result in getting a zero for the whole assignment grade (0% of 10%).** The assignment grade follows the rule of **all requirements or zero grade.**

**Tentative assignment timeline and grades**
1. Thursday February 16, at 11:59 PM Programming Assignment 01 (10%)
2. Thursday March 2, at 11:59 PM Programming Assignment 02 (10%)
3. Thursday March 9, at 11:59 PM Programming Assignment 03 (10%)
4. Thursday March 16, at 11:59 PM Programming Assignment 04 (10%)
5. Thursday April 6, at 11:59 PM Programming Assignment 05 (10%)
6. Thursday April 20, at 11:59 PM Non-Programming/Replacement Assignment (10% (optional))

**Project Policies** - This applies to the 25% bonus/extra credit (optional) to special topics’ projects only.
The project is an opportunity for you to apply what you have learned in class to a problem of your interest in machine learning. Students might work alone (individually) or in groups of up to 5 students per group to complete a project. The first step is to propose a project idea/topic. I have two options for you, shown below. You need to write a short word document illustrating your project topic and a plan to use ML model, whether you picked option 1 (suggested ideas by the instructor) or option 2 (your own idea for a project after getting the professor’s approval).

**Option 1:** The professor will announce suggested project ideas by the second week of the semester.

**Option 2:** students’ ideas. Students are strongly encouraged to bring their interest ideas after getting the professor’s approval.

You could select a topic in machine learning that interests you most and work on it as your project. Potential projects could be based on applications and models:

1. **Applications:** You would apply the techniques of machine learning to some specific applications with your background and interest, such as some disease detection, cancer detection, stock prediction mobile APP and video recognition software.
2. **Models:** You would build up some new models, or improve previous models or methods, then evaluate the proposed models systematically on some standard image datasets to show the improvement.

**Report**

The writeup report should be (9) or more pages in LaTex of IEEE format, including references. The report should be in IEEE format (double columns) through Overleaf (LaTex). It should be structured like a research paper, with sections for abstract, introduction, related works, the approach/algorithm, experimental results, conclusion, and cited references. I expect at least 30 hours of work per team member on the project. Project reports should be individually submitted, and the contributions of each team member should be clearly described.

**Regarding the reports:**

1. Each student should submit an individual copy. All the members of the group can share figures and text. But each copy should have one section that will be individual and should describe the contribution made by the student.
2. The rest of the document can be identical across members.
3. Each copy should include the names of all the collaborators.
4. Projects must be solely for this class, and all group members must be from this class only. Sharing or using this class project with other classes will result in getting a "0" for the entire project grade.
5. Students can choose to work alone if their schedules don't match their partners or project ideas don't fit all group members.
6. All students must submit all project requirements, even if they work in teams of several students. A group of two or more students can submit identical copies but must change the submission labels to include the submitter’s names.
7. Students should prepare themselves to work independently on the proposed project at the beginning of the semester if their partners decide to drop the class later after the add/drop week.
8. Students are encouraged to report their partners if they don't contribute to the project or show carelessness.
9. After receiving the proposals, the professor will create a shared folder for each project team using the overleaf (LaTex).

You should describe and evaluate what you did in your project, which may not necessarily be what you hoped to do originally. A small result described and evaluated well will earn more credit than an ambitious result where no aspect was done well. Be accurate in describing the problem you tried to solve. Explain in detail your approach and specify any simplifications or assumptions you have taken. Also demonstrate the limitations of your approach. When doesn’t it work? Why? What steps would you have taken have you continued working on it? Make sure to add references to all related work you reviewed or used.

You are allowed to submit any supplementary material that you think it important to evaluate your work, however I do not guarantee that I will review all of that supplementary material, and you should not assume that. The report should be self-contained.

**Project Grading Policy - This applies to the 25% bonus (optional) to special topics’ projects only:**

The following is the weight for four parts of the project submissions that require fully running source code and the video that explains the source code and obtained results:

1. Project proposal (2%)
2. Research component of final project (23%). This assumes the submitted project includes a fully running source code and the video that explains the source code and obtained results. Missing any project components (writeup report in LaTex, running Python source codes, and a video illustrates the entire project Python source code) will
result in getting a zero for the entire project grade (0% of 25%). The project grade follows the rule of all requirements or zero grade.

[1] Abstract (2%)
[2] Introduction (2%)
[3] Related work (5%)
[4] Approach (and technical correctness) (4%)
[5] Experimental results (and technical correctness) (4%)
[6] Conclusion (2%)
[7] References (2%)
[8] Reproducibility: can the work be reproduced from the information given in the report? (2%)

The dataset is the most crucial element in machine learning, deep learning, computer vision, and data analytics projects. *Non-running source codes of the final project submission will get zero for the final project grade (0% of 25%).* Students are encouraged to find publicly accessible, sufficient, and big labeled datasets with their source codes through the listed links before deciding on the project proposals and ideas to save their time unless they want to start new ideas from scratch.

**Learning outcomes of the class project (content-based).**
At the end of the project, students should be able to:
1. Define the terminology associated with research and theory in their field.
2. Describe past research studies in their field of study.
3. Articulate how their research study makes a contribution to their academic field.
4. Explain the rationale for choosing particular research methodologies and data analytic techniques.
5. Evaluate research studies they see in the media or encounter in other courses.

**Tentative project deadlines and grades - This applies to the 25% bonus (optional) to special topics' projects only**

1. Tuesday February 28, at 11:59 PM  
   Project Proposal  
   (2%)
2. Monday April 24, at 11:59 PM  
   Final Project  
   (23%)

Within the six weeks of the semester, students should think of projects they want to work on if they decide to pursue the 25% bonus (optional) for special topics' projects only. The professor will also suggest some project ideas, but it's even better if students bring their ideas.

**Late Submission Policy**
The instructor understands that students have emergencies or unforeseeable circumstances that prevent them from submitting their works to Canvas on time. This late submission policy will help students avoid losing grades and encourage them to submit their late submissions even though passing the deadlines. For *all assignments*, students are allowed up to three free late days without penalty. After that, the grade will be zero unless providing a valid, documented, university-approved excuse. *The exam dates are firm and NOT included in the late submission policy.*

Students will not be allowed to make up missed exams, project assignments, or homework assignments unless providing a valid, documented, university-approved excuse. Students are expected to read the text and any other supporting documents that the professor distributes. The professor expects students to locate additional materials or resources to solve some problems or better understand the topics and concepts. The Professor expects students to take advantage of offering on-demand online meetings upon the agreement between the professor and students on the best working time for both of them when students need further clarification or help. The professor greatly supports students sending emails at any time – it will be the goal of the Professor to reply to emails within two business days.

**Feedback promptly**
The response time to emails will be within *two business days*. You will also be getting your grades on all submitted assignments, projects, and exams within *two weeks* after the submission deadlines.

**Talk to me**
I want you to learn lots and I want you to enjoy taking this course. So that I can find out if this is happening, I encourage feedback—be it positive or negative—on all aspects of the course at any time during the semester. For example, if something I'm doing is making it difficult for you to learn, then say something before it's too late; or if you particularly enjoyed something we did in class, say so that we can do it again. You can do this by just speaking to me, by sending me an email, or stop by my office.
Student wellness
Do your best to maintain a healthy lifestyle this semester by eating well, exercising, avoiding drugs and alcohol, getting enough sleep, and taking time to relax. Despite what you might hear, using your time to take care of yourself will actually help you achieve your academic goals more than spending too much time studying.

All of us benefit from support and guidance during times of struggle. There are many helpful resources available on campus. An important part of the college experience is learning how to ask for help. Take the time to learn about all that’s available and take advantage of it. Ask for support sooner rather than later – this always helps.

If you or anyone you know experiences any academic stress, difficult life events, or difficult feelings like anxiety or depression, we strongly encourage you to seek support. Consider reaching out to a friend, faculty, or family member you trust for assistance connecting to the support that can help.

Academic Dishonesty
Plagiarism and cheating will result in a zero for the course. You can use images, codes, slides, and material from papers and websites for the (optional/bonus) project only (assignments are not allowed to use other resources); however, you must cite the source.

Classroom Behavior:
All students are reminded to conduct themselves following the Student Code of Conduct, as published in the University Catalog. Every UNT student is responsible for upholding the provision. Students who violate the UNT policy will be subject to disciplinary action by the University.

Technical Requirements/Assistance
UIT Help Desk: http://www.unt.edu/helpdesk/index.htm
The University of North Texas provides student technical support in the use of Canvas and supported resources. The student help desk may be reached at:

Email: helpdesk@unt.edu
Phone: 940.565-2324
In Person: Sage Hall, Room 330
Hours are:
- Monday-Thursday 8am-midnight
- Friday 8am-8pm
- Saturday 9am-5pm
- Sunday 8am-midnight
- Canvas technical requirements: https://clear.unt.edu/supported-technologies/canvas/requirements

Minimum Technical Skills Needed
Using the Internet and the learning management system Canvas, using email with attachments, creating and submitting files in commonly used word processing program formats, downloading and installing software are necessary. Also, students should be proficient in coding in Python and can read, clean, and integrate data using external Python libraries such as Pandas, NumPy, and Scikit-learn.

Student Academic Support Services
- Code of Student Conduct: provides Code of Student Conduct along with other useful links
- Office of Disability Access: exists to prevent discrimination based on disability and to help students reach a higher level of independence
- Counseling and Testing Services: provides counseling services to the UNT community, as well as testing services; such as admissions testing, computer-based testing, career testing, and other tests
- UNT Libraries
• **UNT Learning Center:** provides a variety of services, including tutoring, to enhance the student academic experience
• **UNT Writing Center:** offers free writing tutoring to all UNT students, undergraduate and graduate, including online tutoring
• **Succeed at UNT:** information regarding how to be a successful student at UNT

### Course Evaluation

#### 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 at http://spot.unt.edu/ or email spot@unt.edu.

#### Syllabus Change Policy
The instructor(s) may, at his/her/their discretion, change any part of the course before or during the term, including assignments, grade breakdowns, due dates, and schedule. Such changes will be communicated to students via either email or Canvas announcement.

#### Course Incomplete Grade
The UNT Graduate Catalog ([http://catalog.unt.edu/index.php?catoid=16](http://catalog.unt.edu/index.php?catoid=16)) describes and explains grading policies. A grade of Incomplete (I) will be given only for a justifiable reason and only if the student is passing the course. The student is responsible for meeting with the instructor to request an incomplete and discuss requirements for completing the course. If an incomplete is not removed within the time frame agreed to by instructor and student, the instructor may assign a grade of F.

#### Withdrawal
The UNT Graduate Catalog ([http://catalog.unt.edu/index.php?catoid=16](http://catalog.unt.edu/index.php?catoid=16)) describes and explains withdrawal policies and deadlines. The UNT semester course schedule lists specific deadlines regarding withdrawal. A grade of Withdraw (W) or Withdraw-Failing (WF) will be given depending on a student's attendance record and grade earned. Please note that a student who simply stops attending class and does not file a withdrawal form may receive an F.

### Face Coverings
UNT encourages everyone to wear a face covering when indoors, regardless of vaccination status, to protect yourself and others from COVID infection, as recommended by current CDC guidelines. Face covering guidelines could change based on community health conditions.

### COVID-19 Impact on Attendance
While attendance is expected as outlined above, it is important that you communicate with the professor and the instructional team prior to being absent, so you, the professor, and the instructional team can discuss and mitigate the impact of the absence on your attainment of course learning goals. Please inform the professor and instructional team if you are unable to attend class meetings because you are ill, in mindfulness of the health and safety of everyone in our community. If you are experiencing any symptoms of COVID ([https://www.cdc.gov/coronavirus/2019-ncov/symptoms testing/symptoms.html](https://www.cdc.gov/coronavirus/2019-ncov/symptoms testing/symptoms.html)) please seek medical attention from the Student Health and Wellness Center (940-565-2333 or askSHWC@unt.edu) or your health care provider PRIOR to coming to campus. UNT also requires you to contact the UNT COVID Team at COVID@unt.edu for guidance on actions to take due to symptoms, pending or positive test results, or potential exposure.

### Students’ Responsibility for Their Learning
The students are required to follow course schedule and finish the class work, assignments, and exams. Students are expected to study 12-15 hours per week to achieve satisfactory class performance. Students do not have programming experience are encouraged to find extra materials to study.

**Inclusion, Diversity, Equity, and Access**

I desire for students from all diverse backgrounds and perspectives be encouraged by this course, that learning needs are addressed, and that the diversity you carry into class is seen as a resource, strength and benefit. We should all be respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, culture, and more. All of your voices should be heard. Suggestions are welcomed and respected – please let me know ways to improve the course. If any class assignments conflict with your religious events, let’s make arrangements. Together, we can ensure a safe and welcoming classroom for all. If you ever feel like this is not the case, please stop by my office and let me know. We are all learning together.

**UNT Policies**

**Academic Integrity Policy**

Academic Integrity Standards and Consequences. 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.

According to the UNT catalog, the term "cheating" includes, but is not limited to: a. use of any unauthorized assistance in taking quizzes, tests, or examinations; b. dependence upon the aid of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems, or carrying out other assignments; c. the acquisition, without permission, of tests or other academic material belonging to a faculty or staff member of the university; d. dual submission of a paper or project, or resubmission of a paper or project to a different class without express permission from the instructor(s); or e. any other act designed to give a student an unfair advantage. The term "plagiarism" includes, but is not limited to: a. the knowing or negligent use by paraphrase or direct quotation of the published or unpublished work of another person without full and clear acknowledgment; and b. the knowing or negligent unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic materials.

**Academic Misconduct: cheating, plagiarism, and other forms of dishonesty:**

Students are responsible for reading and understanding the academic honesty policy, learning to use materials ethically, asking for assistance when needed, reporting instances of academic dishonesty, and refusing to aid others in academic dishonesty. The University defines academic misconduct as any action or attempted action that may result in creating an unfair academic advantage for oneself or an unfair academic advantage or disadvantage for any other member or members of the academic community.

**Factors that Can Contribute to Academic Misconduct**

**Ineffective Study Habits**

One of the most common causes of academic misconduct is ineffective or inadequate study habits, for example superficial reading practices and last-minute cramming. Some students may need to enlarge their repertoire of academic strategies to cope with their courses’ intellectual demands. If students are not familiar with effective and legitimate strategies, they may be tempted to try dishonest ones.

**Ineffective Time Management Skills or Overload**

Assignments and test preparation are sometimes left to the last minute because a student has not yet worked out how to organize and prioritize the work, or how to handle multiple large course projects or exams simultaneously. Some students maintain high commitments to extracurricular activities, outside jobs, or family responsibilities in addition to their university studies. Under such circumstances a student may intentionally or unintentionally resort to dishonest practices in an attempt to raise their grade. Students need to understand that overloading themselves will inevitably affect their academic work and that they may need additional skills and resources to handle all that they're taking on.

**The Code of Student Conduct defines cheating**

Cheating is defined as fraud, deceit, or dishonesty in an academic assignment, or using or attempting to use materials, or assisting others in using materials, that are prohibited or inappropriate in the context of the academic assignment in question. Here are some examples:
[1] Copying or attempting to copy from others during an exam or on an assignment.
[3] Pre-programming a calculator or other personal electronic device to contain answers or using other unauthorized information for exams.
[5] Allowing others to do an assignment or a portion of an assignment for you, including the use of a commercial term-paper service.
[6] Submitting the same assignment for more than one course without prior approval of all the instructors involved.
[7] Collaborating on an exam or assignment with any other person without prior approval from an instructor.
[8] Taking an exam for another person or having someone take an exam for you.

Plagiarism

Plagiarism is defined as the use of intellectual material produced by another person without acknowledging its source. Some examples:

[1] Copying passages from works of others into one’s homework, essay, term paper, or dissertation, without acknowledgement. Use of the views, opinions, or insights of another, without acknowledgement.
[2] Paraphrasing another person’s characteristic or original phraseology, metaphor, or other literary device, without acknowledgement.
[3] An increasingly common form of plagiarism is copying and pasting papers or articles from the Internet, or simply purchasing prewritten papers from on-line paper mills. Hundreds of these sites have been identified. Fortunately, this sort of plagiarism is also increasingly easy to detect.

Solutions to Plagiarisms: Quoting, Paraphrasing, and Summarizing

[1] Quotations reproduce a passage word for word.
[2] Paraphrases rephrase a passage in one’s own words but retain all, or almost all, of the original ideas, structure, etc.
[3] Summaries also rephrase a passage in one’s own words but in briefer form and retaining only the main ideas of the original.

Why Use Quotations, Paraphrases, and Summaries?
Quotations, paraphrases, and summaries can all provide useful support for claims that you are making or can be used to give examples of other points of view or can provide background information that is relevant to your own ideas. Quotations are appropriate where the exact language of the original source is of interest for the student writer’s argument. A paraphrase is more appropriate than a quotation in cases where the original author’s ideas are more important than the manner in which they are expressed, and where the authority of the author is not an issue. Paraphrases and summaries can also serve a useful pedagogical function: it is only possible to give an accurate paraphrase or summary of an author’s ideas if you have a clear understanding of those ideas and the language that the author is using to express them.

Americans with Disabilities Act Compliance Statement
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 at disability.unt.edu.

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 Blackboard 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. The Code of Student Conduct can be found at deanofstudents.unt.edu/conduct.

**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: eagleconnect.unt.edu/.

**Sexual Assault Prevention**

UNT is committed to providing a safe learning environment free of all forms of sexual misconduct, including sexual harassment sexual assault, domestic violence, dating violence, and stalking. Federal laws (Title IX and the Violence Against Women Act) and UNT policies prohibit discrimination on the basis of sex, and therefore prohibit 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. UNT's Survivor Advocates can assist a student who has been impacted by violence by filing protective orders, completing crime victim's compensation applications, contacting professors for absences related to an assault, working with housing to facilitate a room change where appropriate, and connecting students to other resources available both on and off campus. The Survivor Advocates can be reached at SurvivorAdvocate@unt.edu or by calling the Dean of Students Office at 940-565-2648. Additionally, alleged sexual misconduct can be non-confidentially reported to the Title IX Coordinator at oeo@unt.edu or at (940) 565 2759.

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

**Federal Regulation**


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.

**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.