

# DSBA 6156: Applied Machine Learning

## Contact Information:

**Faculty:** Dr. Depeng Xu

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**Office:** Woodward Hall 333D

**Office Hours:** In-Person or zoom

**Zoom:** <https://charlotte-edu.zoom.us/j/8285295595>

**Mondays** 4:30 – 5:30 pm Dubois Center 1101

**Tuesdays** 4:30 – 5:30 pm Woodward Hall 333D

You can also make an appointment by email if you cannot make the hours above.

## Course Description:

Machine learning, also known as predictive modeling in statistics, is a research field and a collection of techniques to extract knowledge from data, often used to automate decision-making processes. Applications of machine learning are pervasive in technology, in particular in complex websites such as facebook, Amazon, youtube or Google. This class offers a hands-on approach to machine learning and data science. The class discusses the application of machine learning methods like SVMs, Random Forests, Gradient Boosting and neural networks on real world dataset, including data preparation, model selection and evaluation.

## Prerequisites:

Full graduate standing and enrollment in the DSBA PSM or Graduate Certificate program. All active DSBA/HIA students and those who are enrolled in your DSBA/HIA courses can sign up for these courses at <https://dsba.charlotte.edu/current-students/sds-bootcamp-courses>

- Introduction to Python For Data Science

## Meeting Times:

5:30 pm - 8:15 pm Monday Center City 1101

## Objectives of the Course:

Upon completion of this course, students should be able to:

- Tackle practical programming issues underlying storing, retrieving, accessing, and processing large datasets.
- Implement machine learning methods and apply them to large scale datasets.
- Analyze real-world datasets to develop predictive and descriptive applications.

## Reference Textbooks (Not Required):

1. Aurelien Geron. Hands-On Machine Learning with Scikit-Learn & TensorFlow. 2nd Ed. O'Reilly, 2019. GitHub
2. Ethem Alpaydin, Introduction to Machine Learning, 3rd edition, MIT Press, 2014. ebook from Atkins Library
3. Ian Goodfellow, Yoshua Bengio, and Aaron Courville, Deep Learning, MIT Press, 2015.
4. Introduction to Machine Learning with Python, [https://github.com/amueller/introduction\\_to\\_ml\\_with\\_python](https://github.com/amueller/introduction_to_ml_with_python)
5. Book: Machine Learning with PyTorch and Scikit-Learn, <https://github.com/rasbt/machine-learning-book>

## Topics to be Covered:

1. introduction
2. supervised learning
3. regression
4. classification
5. trees-based models
6. model evaluation
7. feature selection
8. parameter tuning
9. unsupervised learning
10. clustering
11. dimensionality reduction
12. neural networks
13. time series
14. others

## Grading Criteria:

Course Element	Percentage
Participation	10%
Homework	30%
First exam	15%
Second exam	15%
Final project	30%
Total	100%

## Grading Scale:

- A 100 % to 90.0%
- B <90.0 % to 80.0%
- C <80.0 % to 70.0%
- D <70.0 % to 60.0%
- F <60.0 % to 0.0%
- D & F will be 'U' (Unsatisfactory) grade.

## **Participation:**

In order for this to be effective, students are expected to do the assigned class preparation (readings, assignments, etc) on time, and participate in lab sessions and the discussion board.

## **Late Submission Policy:**

Your assignments are considered late if they are not completed by the stated due date and time. If your assignment is late, you will have two additional days to complete it for late credit (depending on whether anything contrary has been stated in the syllabus or assignment instructions). Late credit equals a 20% reduction per day to the grade you would have received. For example, if you would have received a grade of 90% for completing a particular assignment, you will receive a grade of 70%, if it was one day late.

## **Academic Integrity (Plagiarism)**

All students are required to read and abide by the Code of Student Academic Integrity. Violations of the Code of Student Academic Integrity, including plagiarism, will result in disciplinary action as provided in the Code. Definitions and examples of plagiarism are set forth in the Code. The Code is available from the Dean of Students Office or online (<http://legal.uncc.edu/policies/up-407>).

Faculty may ask students to produce identification at examinations and may require students to demonstrate that graded assignments completed outside of class are their own work. While some work maybe done in groups, students should pay close attention to any assignments/exams/work that need to be submitted as individual work. Plagiarism extends to groups who submit work written as a group as individual work. Ask for clarity, do not make assumptions. A helpful self-check resource is this online Plagiarism Quiz. (<https://www.turnitin.com/static/plagiarism-quiz/>)

## **Disability Accommodations**

The Office of Disability Services works with current undergraduate and graduate students along with prospective students to ensure equal access to UNC Charlotte's campus and educational programs. All services are dependent upon verification of eligibility. Once approved for services, students receive accommodations which are based upon the nature of an individual's disability and documented needs. Students are strongly encouraged to register or check-in for their accommodations with a Disability

Services counselor as soon as they have registered for classes. Accommodations are not retroactive and will not begin until the student notifies his or her faculty by providing the Letter of Accommodation.

Please visit the Office of Disability Services. for additional resources, email questions to [disability@uncc.edu](mailto:disability@uncc.edu) or call 704-687-0040 for more information. In this course all effort has been made to use accessible software and materials.

## Religious Accommodations for Absences

In accordance with University Policy 409 (<https://legal.uncc.edu/policies/up-409>), students must submit a formal request (<https://legal.uncc.edu/sites/legal.uncc.edu/files/media/UP409-ReligiousAccommodationForStudents.pdf>) for absences that are the result of a religious observance. Per the policy, these requests must be submitted before the census date (typically within the first few classes of the semester). The accommodation only covers penalties because of attendance, they do not absolve the students from the work that was due during class.

## Non-Discrimination

All students and the instructor are expected to engage with each other respectfully. Unwelcome conduct directed toward another person based upon that person's actual or perceived race, actual or perceived gender, color, religion, age, national origin, ethnicity, disability, or veteran status, or for any other reason, may constitute a violation of University Policy 406, The Code of Student Responsibility. Any student suspected of engaging in such conduct will be referred to the Office of Student Conduct.

## Title IX Reporting

Charlotte is committed to providing an environment free of all forms of discrimination and sexual harassment, including sexual assault, domestic violence, dating violence, and stalking. If you (or someone you know) has experienced or experiences any of these incidents, know that you are not alone. Charlotte has staff members trained to support you in navigating campus life, accessing health and counseling services, providing academic and housing accommodations, helping with legal protective orders, and more.

Please be aware that many Charlotte employees, including all faculty members, are considered Responsible Employees (<https://titleix.uncc.edu/node/43>) who are required to relay any information or reports of sexual misconduct they receive to the Title IX Coordinator. This means that if you tell me about a situation involving sexual harassment, sexual assault, dating violence, domestic violence, or stalking, I must report the information to the Title IX Coordinator (<https://cm.maxient.com/reportingform.php?UNCCCharlotte>). Although I have to report the situation, you will still have options about how your case will be handled, including whether or not you wish to pursue a formal complaint. Our goal is to make sure you are aware of the range of options available to you and have access to the resources you need.

If you wish to speak to someone confidentially, you can contact any of the following on-campus resources, who are not required to report the incident to the Title IX Coordinator: (1) University Counseling Center ([counselingcenter.uncc.edu](http://counselingcenter.uncc.edu) (<http://counselingcenter.uncc.edu/>), 7-0311); (2) Student Health Center ([studenthealth.uncc.edu](http://studenthealth.uncc.edu) (<http://studenthealth.uncc.edu/>), 7-7400); or (3) Center for Wellness Promotion ([wellness.uncc.edu](http://wellness.uncc.edu) (<http://wellness.uncc.edu/>), 7-7407). Additional information about your options is also available at [titleix.uncc.edu](http://titleix.uncc.edu) (<http://titleix.uncc.edu/>) under the "Students" tab.

## **Support and Student Services**

For other help, be sure to take advantage of the wealth of resources and support available at UNC Charlotte. Some of the resources available to you include the University Writing Resource Center, University Counseling Center, and the J. Murrey Atkins Library. The Student Services Online Backpack will help connect you to these resources: <http://distanceed.uncc.edu/student-services/online-backpack>.

## **Food and Shelter Insecurity**

Any student who has difficulty affording groceries or accessing sufficient food to eat every day, or who lacks a safe and stable place to live, and believes this may affect their performance in the course, is urged to contact Student Assistance and Support Services (SASS) under the Dean of Students Office for support. Furthermore, please notify the professor if you are comfortable in doing so. This will enable her to provide any resources that she may possess.

## **Inclusivity**

**Preferred Gender Pronoun:** This course affirms people of all gender expressions and gender identities. If you prefer to be called a different name than what is indicated on the class roster, please let me know. Feel free to correct me on your preferred gender pronoun. If you have any questions or concerns, please do not hesitate to contact me.

**Non-Discrimination:** All students and the instructional team are expected to engage with each other respectfully. Unwelcome conduct directed toward another person based upon that person's actual or perceived race, actual or perceived gender, color, religion, age, national origin, ethnicity, disability, or veteran status, or for any other reason, may constitute a violation of University Policy 406, The Code of Student Responsibility. Any student suspected of engaging in such conduct will be referred to the Office of Student Conduct for possible conduct action or the Title IX Office. Based on such referral, the Director or designee will determine whether a Formal Charge(s) shall be pursued and whether the Formal Charge(s) constitutes a Minor Violation or a Serious Violation, based on the Student's prior record or facts and circumstances related to the case.

## ***Guidelines on the Use of AI Tools***

While the use of AI is not mandatory in this course, I encourage you to consider utilizing AI as a tool to enhance your learning experience. I suggest the use of ChatGPT as your AI tool, though there are other options available. Here are some guidelines to help you make the most out of AI, particularly ChatGPT, while ensuring ethical usage:

1. **Understand the limitations of ChatGPT:** Recognize that ChatGPT has its constraints and may not always provide accurate information or answers. It requires thoughtful and well-crafted prompts to yield quality results.
2. **Verify information independently:** If ChatGPT presents a number or fact, assume it is incorrect unless you have reliable knowledge or can cross-reference it with other credible sources. Ultimately, you are responsible for the accuracy of information used in your work. Similar to Wikipedia, ChatGPT

- can be a good sounding board or beginning place for information, but frequently provides inaccurate information mixed in with true content.
3. Treat AI as a tool: When employing AI in your assignments, explicitly acknowledge its use. Include a paragraph at the end of any AI-assisted work, explaining the purpose of using AI, the specific prompts used, and how it contributed to your results. Failure to do so would be a violation of academic honesty policies.
  4. Exercise ethical judgment: Be discerning about when it is appropriate to use AI as a tool. Consider the context and requirements of each task, ensuring that AI aligns with the assignment's objectives and guidelines.
  5. Information Responsibility: You are responsible for any errors or omissions provided by the tool. It works best for topics you understand.

## **Police and Public Safety**

Campus security is provided for all students (this includes providing escorts to parking lots). For emergencies call college security at (704) 687-2200. For non-emergencies call 704-687-8300 (Police and Public Safety)

## **Syllabus Revisions**

The standards and requirements set forth in this syllabus may be modified at any time by the course instructor. Notice of such changes will be by announcement in Canvas and any changes to this syllabus posted in the Canvas course. Students are encouraged to work directly with the instructional team regarding their absence(s).