

## INFO 6105 Data Science Engineering Methods and Tools

### Course Information

Course Title: Data Science Engineering Methods and Tools

Course Number: INFO 6105

Term and Year: Fall 2024

Credit Hour: 4

CRN: 16535

Course Format: On-Ground

### Instructor Information

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### Course Prerequisites

Undergraduate level INFO 5100 Minimum Grade of B- or Graduate level INFO 5100 Minimum Grade of B- or Graduate level CSYE 6200 Minimum Grade of B-

### Course Description

Introduces the fundamental techniques for machine learning and data science engineering. Discusses a variety of machine learning algorithms, along with examples of their implementation, evaluation, and best practices. Lays the foundation of how learning models are derived from complex data pipelines, both algorithmically and practically. Topics include supervised learning (parametric/nonparametric algorithms, support vector machines, kernels, neural networks, deep learning) and unsupervised learning (clustering, dimensionality reduction, recommender systems). Based on numerous real-world case studies.

### Textbook (Optional)

- Introduction to Machine Learning with Python - A Guide for Data Scientists, by Andreas C. Müller, Sarah Guido (9781449369415), 2016.
- Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems by Geron, Aurelien (9781492032649) – 2<sup>nd</sup> Edition 2019.
- Machine Learning, By Tom Michael Mitchell (9780070428072), McGraw-Hill, pages 414, 1997.

### Standard Learning Outcomes

*Learning outcomes common to all College of Engineering Graduate programs:*

1. *An ability to identify, formulate, and solve complex engineering problems.*
2. *An ability to explain and apply engineering design principles, as appropriate to the program's educational objectives.*
3. *An ability to produce solutions that meet specified end-user needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.*

*The Information Systems Program accepts students of different engineering backgrounds with minimum programming skills and produces first class Information Systems engineers that operate at the intersection of real-world complexity, software development, and IT management. Graduating students will be able to construct*

*end-to-end advanced software applications that meet business needs.*

*Specific Learning Outcomes for the Information Systems program:*

1. *Create a strong technical foundation through diverse, high-level courses*
2. *Built crucial interpersonal skills needed to succeed in any industry*
3. *Foster a deep level of applied learning through project-based case studies*

### **Grading/Evaluation Standards**

#### **Grade Scale**

<b>95-100%</b>	<b>A</b>	<b>87-89.9%</b>	<b>B+</b>	<b>77-79.9%</b>	<b>C+</b>	<b>69.9% or below</b>	<b>F</b>
		<b>84-86.9%</b>	<b>B</b>	<b>74-76.9%</b>	<b>C</b>		
<b>90-94.9%</b>	<b>A-</b>	<b>80-83.9%</b>	<b>B-</b>	<b>70-73.9%</b>	<b>C-</b>		

### **Attendance/Late Work Policy.**

- Attendance Policy

Students are expected to attend all lectures in person. The attendance sheet must be signed by each student in person. Online/Virtual attendance is granted to students with special needs and is granted on a case by case. In-person attendance will be considered at the end of the class when students' grade border the line of Grade Scale above.

- Late Work Policy

Students must submit assignments by the deadline in the time zone noted in the syllabus. Students must communicate with the faculty prior to the deadline if they anticipate work will be submitted late. Work submitted late without prior communication with faculty will **not** be graded.

### **Grade Breakdown:**

This course consists of 4 homework assignments, 1 mid-term milestone project and a final project.

- 4 homework assignments: 40%, 10% for each homework.

Homework is finished in one week after assigned.

- A mid-term milestone project: 25%

The mid-term project is still homework. The content is a mini project. Professor will spend time to explain and analyze the mini project to help you understand how to complete the final project, which is more advanced.

- Final Project: 35%

The final project is built on top of the mid-term milestone project. The details will be explained when students start projects.

Examples of projects and ideas can be found at: <https://cs229.stanford.edu/projects2016.html>

### **End-of-Course Evaluation Surveys**



Your feedback regarding your educational experience in this class is very important to the College of Professional Studies. Your comments will make a difference in the future planning and presentation of our curriculum.

At the end of this course, please take the time to complete the evaluation survey at <https://neu.evaluationkit.com>. Your survey responses are **completely anonymous and confidential**. For courses 6 weeks in length or shorter, surveys will be open one week prior to the end of the courses; for courses greater than 6 weeks in length, surveys will be open for two weeks. An email will be sent to your Husky Mail account notifying you when surveys are available.

### **Academic Integrity**

A commitment to the principles of academic integrity is essential to the mission of Northeastern University. The promotion of independent and original scholarship ensures that students derive the most from their educational experience and their pursuit of knowledge. Academic dishonesty violates the most fundamental values of an intellectual community and undermines the achievements of the entire University.

As members of the academic community, students must become familiar with their rights and responsibilities. In each course, they are responsible for knowing the requirements and restrictions regarding research and writing, examinations of whatever kind, collaborative work, the use of study aids, the appropriateness of assistance, and other issues. Students are responsible for learning the conventions of documentation and acknowledgment of sources in their fields. Northeastern University expects students to complete all examinations, tests, papers, creative projects, and assignments of any kind according to the highest ethical standards, as set forth either explicitly or implicitly in this Code or by the direction of instructors.

Go to <http://www.northeastern.edu/osccr/academic-integrity-policy/> to access the full academic integrity policy.

### **University Health and Counseling Services**

As a student enrolled in this course, you are fully responsible for assignments, work, and course materials as outlined in this syllabus and in the classroom. Over the course of the semester if you experience any health issues, please contact UHCS.

For more information, visit <https://www.northeastern.edu/uahcs>.

### **Student Accommodations**

Northeastern University and the Disability Resource Center (DRC) are committed to providing disability services that enable students who qualify under Section 504 of the Rehabilitation Act and the Americans with Disabilities Act Amendments Act (ADAAA) to participate fully in the activities of the university. To receive accommodations through the DRC, students must provide appropriate documentation that demonstrates a current substantially limiting disability.

For more information, visit <http://www.northeastern.edu/drc/getting-started-with-the-drc/>.

### **Library Services**


The Northeastern University Library is at the hub of campus intellectual life. Resources include over 900,000 print volumes, 206,500 e-books, and 70,225 electronic journals.



For more information and for Education specific resources, visit <http://subjectguides.lib.neu.edu/edresearch>.

### **24/7 Canvas Technical Help**

For immediate technical support for **Canvas**, call 1 (833) 450-3937.

Within Canvas, click  **Help** on the left panel and open up links for your specific cases including: [Canvas Readiness Checklist](#), [Chat with 24/7 Canvas Support \(Faculty\)](#), [Chat with 24/7 Canvas Support \(Students\)](#), [Call 24/7 Canvas Support: 1 \(833\) 450-3937](#), [Access Northeastern Tech Support](#), and many more options.

### **Diversity and Inclusion**

Northeastern University is committed to equal opportunity, affirmative action, diversity and social justice while building a climate of inclusion on and beyond campus. In the classroom, member of the University community work to cultivate an inclusive environment that denounces discrimination through innovation, collaboration and an awareness of global perspectives on social justice.

Please visit <http://www.northeastern.edu/oidi/> for complete information on Diversity and Inclusion

### **TITLE IX**

*Title IX of the Education Amendments of 1972 protects individuals from sex or gender-based discrimination, including discrimination based on gender-identity, in educational programs and activities that receive federal financial assistance.*

Northeastern's Title IX Policy prohibits Prohibited Offenses, which are defined as sexual harassment, sexual assault, relationship or domestic violence, and stalking. The Title IX Policy applies to the entire community, including male, female, transgender students, faculty and staff.

In case of an emergency, please call 911.

***Please visit [www.northeastern.edu/titleix](http://www.northeastern.edu/titleix) for a complete list of reporting options and resources both on- and off-campus.***