



# INFO6105 Data Science Engineering Methods and Tools

## Course Syllabus

### Course Information

Course Title: Data Science Engineering Methods and Tools

Course Number: INFO6105

Credit Hours: 4

Course Format: On-Ground

Course website: Canvas

Contact via **Teams** (Course Group)

### Instructor Information

Full name: Handan Liu

Email Address: [h.liu@northeastern.edu](mailto:h.liu@northeastern.edu)

### Course Prerequisite

Graduate level INFO 5100 Minimum Grade of B- or Graduate level CSYE 6200 Minimum Grade of B-  
The instructor's further advice is as follows:

- Understand Python programming (refer to DAMG 6105)

### Course Objective and 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) and unsupervised learning (clustering, dimensionality reduction, recommender systems). Based on numerous real-world case studies.

## Grading

- 3 Homework assignments: 30%
- 2 Quizzes: 24%
- Attendance and Participation: 10%
- Final Research Project: 36%

The final project will be completed by a team of 2 students. The final project provides students an opportunity to practice creativity in the application of knowledge gained in this course to real-world scenarios.

## Course Schedule

2 Lectures	Advanced NumPy for Numerical Analysis and Data Exploration
4 Lectures	Powerful Python Data Analysis Toolkit Pandas
2 Lectures	Data Visualization with Matplotlib and Seaborn
16~18 Lectures	Machine Learning Algorithms (Supervised and Unsupervised) with Hands-on Lab Examples and Exercises in Each Lecture
6 Lectures	Project Process

Note: This schedule is subject to change and will be adjusted as needed throughout the semester. The details are shown in the Syllabus on Canvas

## Course Materials

Students are expected to read the materials before and after class.

### List of Reference Books (Optional)

**[B1]** Hands-On Machine Learning with Scikit-Learn and TensorFlow, Book by Aurélien Géron, 1st version, 2017.

**[B2]** Introduction to Machine Learning with Python: A Guide for Data Scientists 1st Edition, Book by Andreas C. Müller, Sarah Guido

**[B3]** Mathematics for Machine Learning, Book by Marc Peter Deisenroth, A. Aldo Faisal, Cheng Soon Ong

## Others

For all further information, see *Syllabus@Canvas* for details.

## End-of-Course Evaluation Surveys

Your feedback regarding your educational experience in this class is particularly 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 <https://drc.sites.northeastern.edu>.

## 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 <https://library.northeastern.edu>.

## 24/7 Canvas Technical Help

For immediate technical support for Canvas, call 617-373-4357 or email [help@northeastern.edu](mailto:help@northeastern.edu)

Canvas Faculty Resources: <https://canvas.northeastern.edu/faculty-resources/>

Canvas Student Resources: <https://canvas.northeastern.edu/student-resources/>

For assistance with my Northeastern e-mail, and basic technical support:

Visit ITS at <https://its.northeastern.edu>

Email: [help@northeastern.edu](mailto:help@northeastern.edu)

ITS Customer Service Desk: 617-373-4357

## 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, members 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 <https://www.northeastern.edu/ouec> for a complete list of reporting options and resources both on- and off-campus.*