

Course Description

This course teaches students basic concepts of data mining and machine learning. The class covers major topics including data preprocessing, dimensionality reduction, model evaluation/hyper tuning, association, classification and prediction methods, ensemble, unsupervised learning.

Instructional Method

This class is designated as "In-Person w/ Recorded/Zoom Lecture".

Prerequisites/Corequisites

This course requires basic programing skills in Python.

Course Objectives/Student Learning Outcomes

The goal of this class is for students to gain theoretical foundation and hands-on experiences on data mining and machine learning. At the end of the class, students should be able to understand the fundamentals of data mining/machine learning algorithmic and implementation details.

Homework/Assignments

- 1) Each student will be given 5 assignments during the semester. These assignments include programming-oriented tasks as well as theoretical/technical questions.
- 2) Students need to have basic knowledge of Python programming.

Course Evaluation Method

There are five homework each of which accounts for 20% of the total grade. Assignments 5x20%=100%

Course Grading Scale

Each homework, midterm, and final will be graded on a standard scale: 90-100 for "A" and "A-"

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80-89 for "B+", "B", or "B-"
70-79 for "C+", "C", or "C-"
60-69 for "D+", "D", or "D-"
50 and below: "F"
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Policy on Makeup Tests, Late Work, and Incompletes (if applicable)

Assignments are to be submitted by 11:59PM on the due date. There are 15% penalties per day for late submissions. However, appropriate accommodations will be made for students having a valid medical excuse for being unable to work on an assignment during its period.

Special Course Requirements (if applicable)

None

Classroom Etiquette Policy (if applicable)

University policy requires that to enhance and maintain a productive atmosphere for education, personal communication devices, such as cellular phones and laptops, are to be disabled in-class sessions

Policy on the Recording of Lectures (optional)

Students enrolled in this course may record video or audio of class lectures for their own personal educational use. A class lecture is defined as a formal or methodical oral presentation as part of a university course intended to present information or teach students about a particular subject. Recording class activities other than class lectures, including but not limited to student presentations (whether individually or as part of a group), class discussion (except when incidental to and incorporated within a class lecture), labs, clinical presentations such as patient history, academic exercises involving student participation, test or examination administrations, field trips, and private conversations between students in the class or between a student and the lecturer, is prohibited. Recordings may not be used as a substitute for class participation or class attendance and may not be published or shared without the written consent of the faculty member. Failure to adhere to these requirements may constitute a violation of the University's Student Code of Conduct and/or the Code of Academic Integrity.

Attendance Policy

Students are expected to attend all of their scheduled University classes and to satisfy all academic objectives as outlined by the instructor. The effect of absences upon grades is determined by the instructor, and the University reserves the right to deal at any time with individual cases of non-attendance. Students are responsible for arranging to make up work missed because of legitimate class absence, such as illness, family emergencies, military obligation, court-imposed legal obligations or participation in University-approved activities. Examples of University-approved reasons for absences include participating on an athletic or scholastic team, musical and theatrical performances and debate activities. It is the student's responsibility to give the instructor notice prior to any anticipated absences and within a reasonable amount of time after an unanticipated absence, ordinarily by the next scheduled class meeting. Instructors must allow each student who is absent for a University-approved reason the

opportunity to make up work missed without any reduction in the student's final course grade as a direct result of such absence.

Counseling and Psychological Services (CAPS) Center

Life as a university student can be challenging physically, mentally and emotionally. Students who find stress negatively affecting their ability to achieve academic or personal goals may wish to consider utilizing FAU's Counseling and Psychological Services (CAPS) Center. CAPS provides FAU students a range of services – individual counseling, support meetings, and psychiatric services, to name a few – offered to help improve and maintain emotional well-being. For more information, go to http://www.fau.edu/counseling/

Disability Policy

In compliance with the Americans with Disabilities Act Amendments Act (ADAAA), students who require reasonable accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS) and follow all SAS procedures. SAS has offices across three of FAU's campuses – Boca Raton, Davie and Jupiter – however disability services are available for students on all campuses. For more information, please visit the SAS website at www.fau.edu/sas/.

Code of Academic Integrity

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high-quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see <u>University Regulation 4.001</u>.

If your college has particular policies relating to cheating and plagiarism, state so here or provide a link to the full policy—but be sure the college policy does not conflict with the University Regulation.

Textbook/Readings (optional)

No official textbooks. Some chapters may be from the following book.

1) Mohammed J. Zaki and Wagner Meira, Jr, "Data Mining and Machine Learning: Fundamental Concepts and Algorithms" 2nd Edition, Cambridge University Press, 2020

Supplementary/Recommended Readings

- 1) Aurélien Géron, "Hands-On Machine Learning with Scikit-Learn, Keras and TensorFlow" O'Reily Media Press, 2019
- 2) Pattern Recognition and Machine Learning, by Christopher M. Bishop. Springer, 2006, ISBN-13: 978-0-3873-1073-2.
- ** Free ebook from author website

Course Topical Outline

Introduction of DM/ML

Data preprocess

Association

Linear regression

Logistic regression

Kernel methods

Feature select

PCA

Decision tree

Neural Network

Performance evaluation

Hyperparameter tuning

Bias variance

SVM

knn

Gradient descent

Overfitting + regularization

Bagging/boosting

Random forest

k means

Agglomerative + EM (if time permits)

Reinforcement learning (if time permits)

^{*}Instructor reserves the right to adjust this syllabus as necessary*