COURSE CHANGE REQUEST
Graduate Programs

FLORIDA ATLANTIC UNIVERSITY

UGPC Approval _____
UFS Approval _____
SCNS Submittal _____
Confirmed _____
Banner _____
Catalog _____

Department

College Engineering and Computer Science

Current Course **Prefix and Number** CAP 5625	*Current* Course Title Computational Foundations of Artificial Intelligence

*Syllabus must be attached for **ANY** changes to current course details. See Template. Please consult and list departments that may be affected by the changes; attach documentation.*

Change title to:

Change prefix
>   From: To:

Change course number
>   From: To:

Change credits*
>   From: To:

Change grading
>   From: To:

Academic Service Learning (ASL) **

>   Add [ ]   Remove [ ]

* See Definition of a Credit Hour.
** Academic Service Learning statement must be indicated in syllabus and approval attached to this form.

Change description to:
This course covers the mathematical and algorithmic foundations of artificial intelligence (AI) and machine learning (ML). As a result, students develop familiarity with mathematical methods, associated notation, and computational frameworks that are widely used in AI and ML projects and literature. It is expected that students are proficient in a high level programming language.

Change prerequisites/minimum grades to:

Change corequisites to:

Change registration controls to:

Please list existing and new pre/corequisites, specify AND or OR and include minimum passing grade.

Effective Term/Year for Changes: Summer 2025	**Terminate course? Effective Term/Year for Termination:**

Faculty Contact/Email/Phone Dr. Masoud Jahandar Lashaki, Graduate Program Director mjahandarlashaki@fau.e

Approved by		*Date*
Department Chair	*HaiKalva*	1/21/2025
College Curriculum Chair	*Francisco Presuel-Moreno*	1/21/2025
College Dean	*Raquel Assis*	1/21/2025
UGPC Chair		03/14/2025
UGC Chair		03/14/2025
Graduate College Dean		03/15/2025
UFS President		
Provost		

Email this form and syllabus to UGPC@fau.edu 10 days before the UGPC meeting.

ChangeCourseGR, revised Summer 2024

CAP 5625-001 14091

Computational Foundations of Artificial Intelligence

Date: Wednesday 4:00 PM - 6:50 PM **Building:**
Computing Bldg Boca **Room:** 130 **3 Credit(s)**
Fall 2024 - 1 Full Term

Instructor Information

Michael DeGiorgio
Email: mdegiorg@fau.edu
Office: Engineering East room 418
Office Hours: Wednesday 1:00pm - 3:00pm
Phone: 561-297-0003

TA Name: Gayathri Chilukala
Office: Zoom
Office Hours: Thursday and Friday 11:00am - 1:00pm
Telephone: N/A
Email: gchilukala2023@fau.edu

Course Description

Computational Foundations of Artificial Intelligence
Prerequisite: COP 2220 or COP 3035 or permission of instructor
This course covers the mathematical and programming foundations of artificial intelligence (AI) and machine learning (ML) using contemporary programming languages and tools. As a result, students develop familiarity with mathematical methods (and associated notation, software packages and libraries) that are widely used in AI and ML projects and literature.

Prerequisites/Corequisites

Prerequisite(s): One of the following:

- COP 2034 Graduate / Undergraduate (Minimum Grade of C)
- COP 3035 Graduate / Undergraduate (Minimum Grade of C)
- COP 2220 Graduate / Undergraduate (Minimum Grade of C)

Students should be proficient in a programming language of their choice, and should be comfortable with mathematics.

Instructional Method

In-Person w/Recorded Lecture
In-person class. Instructor will record the course for asynchronous viewing. Synchronous viewing may be an option at the discretion of the instructor. In-person attendance not required.

Required Texts/Materials

The Elements of Statistical Learning: Data Mining, Inference, and Prediction
ISBN: ISBN-13: 978-0-3878-4857-0
Authors: Trevor Hastie, Robert Tibshirani, and Jerome Friedman
Publisher: Springer
Publication Date: 2009
Edition: 2nd
** **Free ebook** from author website https://web.stanford.edu/~hastie/ElemStatLearn/

Elements of Statistical Learning
ISBN: 9780387848570
Publisher: Springer Nature
Edition: 2nd

The Elements of Statistical Learning
ISBN: 9780387848587
Publisher: Springer Nature
Edition: 2nd

Recommended Readings and Materials

An Introduction to Statistical Learning: with Applications in R
ISBN: ISBN-13: 978-1-4614-7137-0
Authors: Gareth James, Daniela Witten, Trevor Hastie, and Robert Tibshirani
Publisher: Springer
Publication Date: 2017
Edition: 1st
** **Free ebook** from author website https://statlearning.com/

Pattern Recognition and Machine Learning
ISBN: ISBN-13: 978-0-3873-1073-2
Authors: Christopher M. Bishop
Publisher: Springer
Publication Date: 2006
** **Free ebook** from author website

https://www.microsoft.com/en-us/research/people/cmbishop/prml-book

Course Objectives/Student Learning Outcomes

By the end of the course, students will be able to:

1. Understand the mathematical foundations of machine learning.

2. Demonstrate proficiency in solving machine learning problems.

3. Identify and apply statistical and computational models to machine learning problems.

4. Analyze the performance of particular machine learning models, and justify their use and limitations.

Faculty Rights and Responsibilities

Florida Atlantic University respects the rights of instructors to teach and students to learn. Maintenance of these rights requires classroom conditions that do not impede their exercise. To ensure these rights, faculty members have the prerogative to:

• Establish and implement academic standards.

• Establish and enforce reasonable behavior standards in each class.

• Recommend disciplinary action for students whose behavior may be judged as disruptive under the Student Code of Conduct University Regulation 4.007.

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/.

Course Evaluation Method

Four programming assignments	25% each
Total	100%

Homework assignments will consist of programming from scratch machine learning algorithms, training and testing them on example datasets, and visualization of the parameter behavior during training.

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 University Regulation 4.001.

Attendance Policy Statement

Students are expected to attend all 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.

Religious Accommodation Policy Statement

In accordance with the rules of the Florida Board of Education and Florida law, students have the right to reasonable accommodations from the University in order to observe religious practices and beliefs regarding admissions, registration, class attendance, and the scheduling of examinations and work assignments. University Regulation 2.007, Religious Observances, sets forth this policy for FAU and may be accessed on the FAU website at www.fau.edu/regulations.

Any student who feels aggrieved regarding religious accommodations may present a grievance to the executive director of The Office of Civil Rights and Title IX. Any such grievances will follow Florida Atlantic University's established grievance procedure regarding alleged discrimination.

Time Commitment Per Credit Hour

For traditionally delivered courses, not less than one (1) hour of classroom or direct faculty instruction each week for fifteen (15) weeks per Fall or Spring semester, and a minimum of two (2) hours of out-of-class student work for each credit hour. Equivalent time and effort are required for Summer Semesters, which usually have a shortened timeframe. Fully Online courses, hybrid, shortened, intensive format courses, and other non-traditional modes of delivery will demonstrate equivalent time and effort.

Course Grading Scale

Letter Grade	Letter Grade
A	93 - 100%
A-	90 - 92%
B+	87 - 89%
B	83 - 86%
B-	80 - 82%
C+	77 - 79%
C	73 - 76%
C-	70 - 72%
D+	67 - 69%
D	63 - 66%
D-	60 - 62%
F	Below 60

Grade Appeal Process

You may request a review of the final course grade when you believe that one of the following conditions apply:

• There was a computational or recording error in the grading.

• The grading process used non-academic criteria.

• There was a gross violation of the instructor's own grading system.

[University Regulation 4.002](#) of the University Regulations contains information on the grade appeals process

Policy on Make-up Tests, Late work, and Incompletes

There will be no exams, and therefore no makeup exams, in this course.

Late work will not be accepted. All assignments will be posted well in advance, and students may submit assignments early. Any assignment not turned in by the due date will result in a zero.

Incomplete grades are against the policy of the department, and they will only be assigned if there is solid evidence of medical or otherwise serious emergency situation.

Policy on the Recording of Lectures

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.

Artificial Intelligence Preamble

FAU recognizes the value of generative AI in facilitating learning. However, output generated by artificial intelligence (AI), such as written words, computations, code, artwork, images, music, etc., for example, is drawn from previously published materials and is not your own original work.

FAU students are not permitted to use AI for any course work unless explicitly allowed to do so by the instructor of the class for a specific assignment. **[Policy 12.16 Artificial Intelligence]**

Class policies related to AI use are decided by the individual faculty. Some faculty may permit the use of AI in some assignments but not others, and some faculty may prohibit the use of AI in their course entirely. In the case that an instructor permits the use of AI for some assignments, the assignment instructions will indicate when and how the use of AI is permitted in that specific assignment. It is the student's responsibility to comply with the instructor's expectations for each assignment in each course. When AI is authorized, the student is also responsible and accountable for the content of the work. AI may generate inaccurate, false, or exaggerated information. Users should approach any generated content with skepticism and review any information generated by AI before using generated content as-is.

If you are unclear about whether or not the use of AI is permitted, ask your instructor before starting the assignment.

Failure to comply with the requirements related to the use of AI may constitute a violation of the **Florida Atlantic Code of Academic Integrity, Regulation 4.001.**

Proper Citation: If the use of AI is permitted for a specific assignment, then use of the AI tool must be properly documented and cited. For more information on how to properly cite the use of AI tools, visit **https://fau.edu/ai/citation**

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 therapy, group therapy, and crisis services, to name a few - offered to help improve and maintain emotional well-being. For more information, go to http://www.fau.edu/counseling/

Student Support Services and Online Resources

- Center for Learning and Student Success (CLASS)
- Counseling and Psychological Services (CAPS)
- FAU Libraries

- [Math Learning Center](#)
- [Office of Information Technology Helpdesk](#)
- [Center for Global Engagement](#)
- [Office of Undergraduate Research and Inquiry (OURI)](#)
- [Science Learning Center](#)
- [Speaking Center](#)
- [Student Accessibility Services](#)
- [Student Athlete Success Center (SASC)](#)
- [Testing and Certification](#)
- [Test Preparation](#)
- [University Academic Advising Services](#)
- [University Center for Excellence in Writing (UCEW)](#)
- [Writing Across the Curriculum (WAC)](#)

Course Topical Outline

Topic 1: Introduction

Topic 2: Introduction to regression

Topic 3: Linear and non-linear regression and model selection

Topic 4: Feature selection and regularization

Topic 5: Discriminant analysis

Topic 6: Logistic regression

Topic 7: Support vector machines

Topic 8: Neural networks

Topic 9: Random forests and boosting

Topic 10: Unsupervised learning

Topic 11: Advanced topics if time permits

 Instructor reserves the right to adjust this syllabus as necessary

Computational Foundations of Artificial Intelligence (CAP 5625) 3 credits

Prerequisite: ~~COP 2220 or COP 3035 or permission of instructor~~Graduate standing or senior standing

This course covers the mathematical and ~~programming~~ algorithmic foundations of artificial intelligence (AI) and machine learning (ML) ~~using contemporary programming languages and tools~~. As a result, students develop familiarity with mathematical methods, ~~(and~~ associated notation, ~~software packages and libraries)~~and computational frameworks that are widely used in AI and ML projects and literature. It is expected that students are proficient in a high level programming language.