FAU
FLORIDA ATLANTIC UNIVERSITY

NEW COURSE PROPOSAL
Undergraduate Programs

Department

College Honors College
(To obtain a course number, contact erudolph@fau.edu)

Prefix **BSC**	*(L = Lab Course; C = Combined Lecture/Lab; add if appropriate)*	**Type of Course**	**Course Title**
Number 4892	**Lab Code**	Lecture	Honors AI Applications in Biology

Credits *(See Definition of a Credit Hour)*	**Grading** *(Select One Option)*	**Course Description** *(Syllabus must be attached; see Template and Guidelines)*
3	**Regular** ⦿	This course explores the use of Artificial Intelligence (AI) and Machine Learning (ML) to solve biological challenges, including genomic analysis and neuroscience modeling. Students will gain hands-on experience with AI tools and programming to analyze biological data. The course emphasizes critical thinking about the potential and limitations of AI in biology, culminating in a final project applying these techniques to real-world problems.
Effective Date *(TERM & YEAR)* Spring 2026	**Sat/UnSat** ◯	

Prerequisites, with minimum grade* BSC 1010 or instructor permission	**Corequisites**	**Registration Controls** *(Major, College, Level)* Honors College

Default minimum passing grade is D-. Prereqs., Coreqs. & Reg. Controls are enforced for all sections of course

WAC/Gordon Rule Course ☐ Yes ☑ No WAC/Gordon Rule criteria must be indicated in syllabus and approval attached to proposal. See WAC Guidelines.	**Intellectual Foundations Program (General Education) Requirement** *(Select One Option)* None General Education criteria must be indicated in the syllabus and approval attached to the proposal. See Intellectual Foundations Guidelines.

Minimum qualifications to teach course
Terminal degree in the subject area (or a closely related field)

Faculty Contact/Email/Phone Rodrigo Pena/penar@fau.edu/6-8073	**List/Attach comments from departments affected by new course** Biology Department

Approved by		**Date**
Department Chair	*Tung Kuo*	11/21/2025
College Curriculum Chair	*Terje Hill*	11-21-2025
College Dean	*[signature]*	11-21-25
UUPC Chair	*Korey Sorge*	12/01/25
Undergraduate Studies Dean	*Dan Meeroff*	12/01/25
UFS President		
Provost		

Email this form and syllabus to mjenning@fau.edu seven business days before the UUPC meeting.

FLORIDA ATLANTIC UNIVERSITY

BSC 4892
Honors AI Applications in Biology
3 Credit(s)
Spring 2026 - 1 Full Term

Instructor Information

Rodrigo De Oliveira Pena
Email: penar@fau.edu

Office: Zoom Meetings, computer labs in the Boca campus and in the Jupiter campus TBD.
Office Hours: Monday and Wednesday from 9 AM - 11 AM.
Please note you can email me at any time with your questions, comments, and concerns, or use CANVAS.
Additional times/days are available to meet through Zoom.
Phone: 561-799-8514

Honors Distinction

This course differs substantially from the non-Honors version. First, and most importantly, the course is an agreement between the student and instructor that they will work together collaboratively to ensure a significantly enriched learning experience in a manner consistent with other Honors-designated courses at FAU. This means the course will produce substantive work that reflects interdisciplinarity and connections among academic fields, research and direct access to sources of knowledge pertinent to the field, leadership, creative and critical thinking, and engagement with the world outside the university. Secondly, the writing component of the course will be much more demanding, and will prepare students for upper-division college writing and for work on the Honors Thesis.

Course Description

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Instructional Method

Online Live Lecture
100% of the course is delivered online, with synchronous meeting times. (The course will meet live on the specified meeting days and times.)
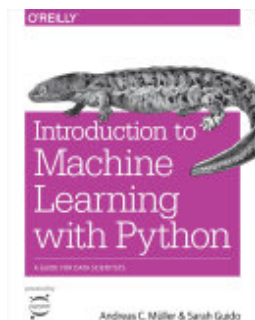
Required Texts/Materials
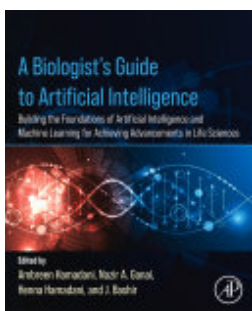
A Biologist's Guide to Artificial Intelligence
ISBN: 9780443240003
Authors: Ambreen Hamadani, Nazir A Ganai, Hamadani Henna, J Bashir
Publisher: Elsevier
Publication Date: 2024-03-15

Introduction to Machine Learning with Python
ISBN: 9781449369897
Authors: Andreas C. Müller, Sarah Guido
Publisher: "O'Reilly Media, Inc."
Publication Date: 2016-09-26
This book is just a suggestion and not mandatory. Materials will be provided through the slides.

Prerequisites

BSC 1010 Honors Biological Principles or instructor permission.

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/.

Title IX Statement

In any case involving allegations of sexual misconduct, you are encouraged to report the matter to the University Title IX Coordinator in the Office of Civil Rights and Title IX (OCR9). If University faculty become aware of an allegation of sexual misconduct, they are expected to report it to OCR9. If a report is made, someone from OCR9 and/or Campus Victim Services will contact you to make you aware of available resources including support services, supportive measures, and the University's grievance procedures. More information, including contact information for OCR9, is available at **https://www.fau.edu/ocr9/title-ix/**. You may also contact Victim Services at **victimservices@fau.edu** or 561-297-0500 (ask to speak to an Advocate) or schedule an appointment with a counselor at Counseling and Psychological Services (CAPS) by calling 561-297-CAPS.

Course Evaluation Method

- Homework Assignments (40%): Regular homework assignments will be given throughout the course. The approximate number and frequency will be communicated in class.

- Proposal of Final Project (20%): Students are required to submit a proposal for their final project, which will count towards a midterm grade. The proposal format and specific requirements will be provided by the instructor.

- Final Project (40%): The final project is an individual effort. Clear guidelines for the project will be provided, and it will be evaluated for the final grading.

- **Participation: Why is attendance mandatory?**
  Since this course focuses on practical skills and applications, attending and actively participating is essential. If your attendance falls below 70%, your final grade will be reduced by 20%; if it falls below 50%, the reduction will be 30%. Any absences must be reported with proper documentation (e.g., a doctor's note) during the semester, not at the end.

- Assignments and Lab Days: Assignments from the computational lab day can be submitted after class. Please follow the specified submission format, which will be communicated in class.

- Project Selection: Students are expected to select a project from a list provided by the instructor. Alternatively, they may propose their own ideas for approval.

- Group Work: Undergraduates are allowed to work on the final project in groups of two.

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.

Course Objectives/Student Learning Outcomes

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

- Select, reproduce, and code Python for a variety of applications.
- Understand the fundamental concepts of artificial intelligence and machine learning, including supervised and unsupervised learning.
- Identify and apply appropriate AI and ML models and computational tools to specific problems in biology.
- Analyze the performance of specific AI and machine learning models as applied to biological problems and justify their use and limitations.

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	94 - 100%
A-	90 - 93%
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

Students are expected to attend all scheduled classes and arrive on time. If you miss a class you are responsible for ALL the material covered during that class, including lecture material and rules and regulations about the course (such as penalties for late assignments, etc.). If you miss an entire or a part of a class, you are still expected to submit assignments for that week.

Assignments: The assignments are due on the dates assigned. These will be accepted up to 1 week late, but they will be penalized 10%/day. **None will be accepted over 1 week late.**

Project proposal: The project is due on the date assigned. It will be accepted up to 1 week late, but penalized 10%/day. **No submission will be accepted over 1 week late.**

Final project: The final project has to be presented on the assigned date. Appropriate documentation must be presented for justifiable absence from the final project delivery.

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**

Special Course Requirements

Access to Google Colab: https://colab.research.google.com. Alternatively, students can develop projects on the FAU computers or their own personal computers.

AI Language Specific To This Course

AI Encouraged: The use of AI to assist in work assigned in this specific course is encouraged for various purposes. The instructor hereby permits the use of AI to assist in work assigned for this

course, unless the instructor expressly indicates AI is not permitted on a particular assignment. Use must be properly documented and cited per instructor guidelines (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

This preliminary course schedule is subject to changes announced in class or on Canvas.

Week	Topic(s)	Assignment(s)
Week 1	Introduction to the course content and tools + What is AI (history, scope, definitions, concepts, applications, limitations, implications) + Neuroscience history (cell, synapses, networks)	
Week 2	Python programming BootCamp with packages used in biology (Pydeseq, brian2, sbi, etc)	Assignment 1 - Python programming
Week 3	Continuation Python programming BootCamp	Assignment 2 - Python programming
Week 4	Biological Exploratory Data Analysis (EDA) + data visualization + unique characteristics and challenges in biological data	Assignment 3 - Data Exploration
Week 5	Exploratory neuroscience imaging data - Fish data - Marine biology data - RNAseq data (guest lecture Max Planck Florida Institute, local companies and researchers).	
Week 6	Fundamentals of Machine Learning and Model Thinking in Biology + The ML Workflow	Assignment 4 - ML fundamentals
Week 7	Supervised Learning + Linear Models for Regression and Classification + Nearest-Neighbor Methods - Practical applications	Assignment 5 - Regression and classification, applications to disease models
Week 8	Trees, Forest, and Ensembles	Assignment 6 - Random forests, Cancer characteristics, and dataset study
Week 9	Unsupervised Learning, Principal Component Analysis	Assignment 7 - Cluster analysis and PCA

	(PCA) + Clustering, genomic applications, RNA analysis	
Week 10	Model Evaluation, Calibration, Imbalanced Data + Model Interpretation / Reviewing proposals for the final project	Midterm- Review of proposals
Week 11	Feature Selection and Feature Engineering	
Week 12	Parameter Tuning, Neuroscience models + Experiment management + Automatic Machine Learning	
Week 13	Neural Networks and Deep Learning and applications to neuroscience	
Week 14	Neural Networks and Deep Learning and applications to neuroscience	Assignment 9 - Deep learning
Week 15	Project presentation and final evaluation	Projects