Cover Sheet: Request 14112

EEE3XXX- Introduction to Machine Learning

Info

Process	Course New Ugrad/Pro	
Status	Pending at PV - University Curriculum Committee (UCC)	
Submitter	Shannon Chillingworth schill@ece.ufl.edu	
Created	8/8/2019 2:17:04 PM	
Updated	1/31/2020 4:19:55 PM	
Description of	New course request.	
request		

Actions

Actions Step	Status	Group	User	Comment	Undated
Department	Status Approved	Group ENG - Electrical	Robert Fox	Comment	Updated 8/14/2019
Department	Approved	and Computer	Robert Fox		0/14/2019
		Engineering			
		011905000			
No document of	hanges				
College	Recycled	ENG - College of	Heidi Dublin	Tabled. Issues with	9/5/2019
		Engineering		request/syllabus. ABET 3 & 4	
No de sumo ente	h - n - n - n			outcomes/4 credits	
No document of Department	Approved	ENG - Electrical	Robert Fox	Syllabus updated to address	10/9/2019
Department	Approved	and Computer	Robert Fox	committee concerns	10/9/2019
		Engineering		Committee Concerns	
		011905000			
No document of	hanges				
College	Approved	ENG - College of	Heidi Dublin	Approved by the HWCOE	11/18/2019
		Engineering		Curriculum Committee and	
				Faculty Council	1010010010
EEE3XXX_Intr			L an Mauriana	Added to the December	10/28/2019
University Curriculum	Commented	PV - University Curriculum	Lee Morrison	Added to the December agenda.	12/10/2019
Committee		Committee		agenua.	
Committee		(UCC)			
No document of	hanges				
University	Conditionall		Casey Griffith	The UCC recommends	12/17/2019
Curriculum	Approved	Curriculum		adding a "C" designation for	
Committee		Committee		combined lecture/lab.	
No de sure sustant	h - n - n - n	(UCC)			
No document of College	changes Conditionall	ENG - College of	Heidi Dublin	See comments made by	12/20/2019
College	Approved	Engineering		UCC. When sending back up,	12/20/2019
	Approved	Linginicering		please note in comments that	
				concerns have been	
				addressed.	
No document of					
Department	Approved	ENG - Electrical	Robert Fox	The "lab" exercises are	1/29/2020
		and Computer		completed as workshop	
		Engineering 011905000		exercises in class. They do not require laboratory	
		011900000		resources, so the department	
				prefers to not give this course	
				a "C" designation. This is	
				consistent with other courses	
				offered by the ECE	
				department.	

Step	Status	Group	User	Comment	Updated
No document changes					
College	Approved	ENG - College of Engineering	Heidi Dublin	Department indicates that concerns have been addressed.	1/31/2020
No document of	hanges				
University Curriculum Committee	Pending	PV - University Curriculum Committee (UCC)			1/31/2020
No document of	hanges				
Statewide Course Numbering System					
No document of	hanges				
Office of the Registrar					
No document of	hanges				
Student Academic Support System					
No document of	hanges				
Catalog No document of	hanges				
College Notified					
No document of	nanges				

Course|New for request 14112

Info

Request: EEE3XXX- Introduction to Machine Learning

Description of request: New course request.

Submitter: Shannon Chillingworth schill@ece.ufl.edu

Created: 10/28/2019 2:05:17 PM

Form version: 3

Responses

Recommended Prefix

Enter the three letter code indicating placement of course within the discipline (e.g., POS, ATR, ENC). Note that for new course proposals, the State Common Numbering System (SCNS) may assign a different prefix.

Response:

EEE

Course Level

Select the one digit code preceding the course number that indicates the course level at which the course is taught (e.g., 1=freshman, 2=sophomore, etc.).

Response:

3

Course Number

Enter the three digit code indicating the specific content of the course based on the SCNS taxonomy and course equivalency profiles. For new course requests, this may be XXX until SCNS assigns an appropriate number.

Response:

XXX

Category of Instruction

Indicate whether the course is introductory, intermediate or advanced. Introductory courses are those that require no prerequisites and are general in nature. Intermediate courses require some prior preparation in a related area. Advanced courses require specific competencies or knowledge relevant to the topic prior to enrollment.

Response:

Intermediate

- 1000 level = Introductory undergraduate
- 2000 level = Introductory undergraduate
- 3000 level = Intermediate undergraduate
- 4000 level = Advanced undergraduate
- 5000 level = Introductory graduate
- 6000 level = Intermediate graduate
- 7000 level = Advanced graduate
- 4000/5000= Joint undergraduate/graduate
- 4000/6000= Joint undergraduate/graduate

^{*}Joint undergraduate/graduate courses must be approved by the UCC and the Graduate Council)

Lab Code Enter the lab code to indicate whether the course is lecture only (None), lab only (L), or a combined lecture and lab (C). Response: None **Course Title** Enter the title of the course as it should appear in the Academic Catalog. Introduction to Machine Learning **Transcript Title** Enter the title that will appear in the transcript and the schedule of courses. Note that this must be limited to 21 characters (including spaces and punctuation). Response: Intro Machine Learn **Degree Type** Select the type of degree program for which this course is intended. Response: Baccalaureate **Delivery Method(s)** Indicate all platforms through which the course is currently planned to be delivered. Response: On-Campus

Co-Listing

Will this course be jointly taught to undergraduate, graduate, and/or professional students?

Response:

No

Effective Term

Select the requested term that the course will first be offered. Selecting "Earliest" will allow the course to be active in the earliest term after SCNS approval. If a specific term and year are selected, this should reflect the department's best projection. Courses cannot be implemented retroactively, and therefore the actual effective term cannot be prior to SCNS approval, which must be obtained prior to the first day of classes for the effective term. SCNS approval typically requires 2 to 6 weeks after approval of the course at UF.

Response:

Earliest Available

Effective Year

Select the requested year that the course will first be offered. See preceding item for further information.

Response:

Earliest Available

Rotating Topic?

Select "Yes" if the course can have rotating (varying) topics. These course titles can vary by topic in the Schedule of Courses.

Response:

No

Repeatable Credit?

Select "Yes" if the course may be repeated for credit. If the course will also have rotating topics, be sure to indicate this in the question above.

Response:

No

Amount of Credit

Select the number of credits awarded to the student upon successful completion, or select "Variable" if the course will be offered with variable credit and then indicate the minimum and maximum credits per section. Note that credit hours are regulated by Rule 6A-10.033, FAC. If you select "Variable" for the amount of credit, additional fields will appear in which to indicate the minimum and maximum number of total credits.

Response:

4

S/U Only?

Select "Yes" if all students should be graded as S/U in the course. Note that each course must be entered into the UF curriculum inventory as either letter-graded or S/U. A course may not have both options. However, letter-graded courses allow students to take the course S/U with instructor permission.

Response:

No

Contact Type

Select the best option to describe course contact type. This selection determines whether base hours or headcount hours will be used to determine the total contact hours per credit hour. Note that the headcount hour options are for courses that involve contact between the student and the professor on an individual basis.

Response:

Regularly Scheduled

- Regularly Scheduled [base hr]
- Thesis/Dissertation Supervision [1.0 headcount hr]
- Directed Individual Studies [0.5 headcount hr]
- Supervision of Student Interns [0.8 headcount hr]
- Supervision of Teaching/Research [0.5 headcount hr]
- Supervision of Cooperative Education [0.8 headcount hr]

Contact the Office of Institutional Planning and Research (352-392-0456) with questions regarding contact type.

Weekly Contact Hours

Indicate the number of hours instructors will have contact with students each week on average throughout the duration of the course.

Response:

4

Course Description

Provide a brief narrative description of the course content. This description will be published in the Academic Catalog and is limited to 50 words or fewer. See course description guidelines.

Response:

Covers introductory topics in pattern recognition and machine learning and use of these methods towards a variety of real world applications. The focus of this course is to be introduced to basic machine learning concepts and how to use associated state-of-the-art machine learning tools.

Prerequisites

Indicate all requirements that must be satisfied prior to enrollment in the course. Prerequisites will be automatically checked for each student attempting to register for the course. The prerequisite will be published in the Academic Catalog and must be formulated so that it can be enforced in the registration system. Please note that upper division courses (i.e., intermediate or advanced level of instruction) must have proper prerequisites to target the appropriate audience for the course.

Courses level 3000 and above must have a prerequisite.

Response:

EEL3135

Completing Prerequisites on UCC forms:

- Use "&" and "or" to conjoin multiple requirements; do not used commas, semicolons, etc.
- Use parentheses to specify groupings in multiple requirements.
- Specifying a course prerequisite (without specifying a grade) assumes the required passing grade is D-. In order to specify a different grade, include the grade in parentheses immediately after the course number. For example, "MAC 2311(B)" indicates that students are required to obtain a grade of B in Calculus I. MAC2311 by itself would only require a grade of D-.
- Specify all majors or minors included (if all majors in a college are acceptable the college code is sufficient).
- "Permission of department" is always an option so it should not be included in any prerequisite or co-requisite.

Example: A grade of C in HSC 3502, passing grades in HSC 3057 or HSC 4558, and major/minor in PHHP should be written as follows:

HSC 3502(C) & (HSC 3057 or HSC 4558) & (HP college or (HS or CMS or DSC or HP or RS minor)

Co-requisites

Indicate all requirements that must be taken concurrently with the course. Co-requisites are not checked by the registration system. If there are none please enter N/A.

Response:

N/A

Rationale and Placement in Curriculum

Explain the rationale for offering the course and its place in the curriculum.

Response:

This course provides students with an introduction to topics in pattern recognition and machine learning and use of these methods towards a variety of real world applications. After completing this course, students will be able to take advanced machine learning courses.

Course Objectives

Describe the core knowledge and skills that student should derive from the course. The objectives should be both observable and measurable.

Response:

Course Objectives

Understand and use the concepts of machine learning for data science. Focus on tools for application of deep learning and multivariate data analysis to real world data and problems.

These objectives will be accomplished through:

- 1. Semester-long group project that involves implementing a deep learning system
- 2. Discussion of pattern recognition and machine learning methods
- 3. Implementation of a variety of machine learning methods in code

Course Textbook(s) and/or Other Assigned Reading

Enter the title, author(s) and publication date of textbooks and/or readings that will be assigned. Please provide specific examples to evaluate the course.

Response:

Required Textbooks and Software

- Title: Python Machine Learning
- · Author: S. Raschka
- ISBN number: 978-1-78355-513-0
 Title: Deep learning with Pytorch
 Author: Eli Stevens and Luca Antiga
 ISBN number: 978-1-61729-526-3
- · Software: Python 3+, Git, Pytorch

Weekly Schedule of Topics

Provide a projected weekly schedule of topics. This should have sufficient detail to evaluate how the course would meet current curricular needs and the extent to which it overlaps with existing courses at UF.

Response:

Course Schedule

- Weeks 1-3: Introduction to Machine Learning and Evaluation of Methods: What is Machine Learning? Error and Accuracy Metrics, Machine Learning Terminology, Introduction to Git (Assignment 1-3 due)
- Weeks 4-6: Introduction to Supervised Classification: K-Nearest Neighbors, Decision Trees,

Random Forests, and Linear Classifiers; Experimental Design and Hyperparameter Tuning Strategies ?(Assignments 4-6 due)

- Weeks 7-9, Introduction to Neural Networks: The Perceptron and Brief history of Neural Networks; Multi-layer Perceptron; Introduction to Pytorch ?(Assignments 7-8 due)
- Mid-Term Exam: During Week 9?
- Weeks 10-12: Introduction to Deep Learning: Deep Learning Fundamentals and Applications; Introduction to Convolutional Neural Networks: Applications and Implementation in Pytorch (Assignment 10 due)
- Weeks 13-15: Project Teams:?Completion of Project: In Class Project Focus, Project Presentations?(Project due)

Grading Scheme

List the types of assessments, assignments and other activities that will be used to determine the course grade, and the percentage contribution from each. This list should have sufficient detail to evaluate the course rigor and grade integrity. Include details about the grading rubric and percentage breakdowns for determining grades.

Response:

Assignment Percentage of Final Grade

Assignments 40% Midterm Exam 20%

Semester-long Project 20%

Final Exam 20% TOTAL 100%

Instructor(s)

Enter the name of the planned instructor or instructors, or "to be determined" if instructors are not yet identified.

Response: Alina Glenn Zare

Attendance & Make-up

Attendance & Make-up

Please confirm that you have read and understand the University of Florida Attendance policy.

A required statement statement related to class attendance, make-up exams and other work will be included in the syllabus and adhered to in the course. Courses may not have any policies which conflict with the University of Florida policy. The following statement may be used directly in the syllabus.

• "Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx."

Response:

Yes

Accomodations

Accommodations for Students with Disabilities

Please confirm that you have read and understand the University of Florida Accommodations policy.

A statement related to accommodations for students with disabilities will be included in the syllabus and adhered to in the course. The following statement may be used directly in the syllabus:

"Students with disabilities requesting accommodations should first register with the Disability Resource Center

Introduction to Machine Learning

Course Number: 3XXX
Class Periods: T 4, R 4-5
Location: Lar 310
Academic Term: Spring 2019

Instructor

• Name: Alina Zare

• Email Address: azare@ufl.edu

• Office Phone Number: 352-273-2604

• Office Hours: TBD

Teaching Assistants

• TBD

Course Description

4 credits. Covers introductory topics in pattern recognition and machine learning and use of these methods towards a variety of real world applications. The focus of this course is to be introduced to basic machine learning concepts and how to use associated state-of-the-art machine learning tools. Topics covered include: deep learning, linear and non-linear classifiers

Course Pre-Requisites / Co-Requisites

EEL 3135

Course Objectives

Understand and use the concepts of machine learning for data science. Focus on tools for application of deep learning and multivariate data analysis to real world data and problems.

These objectives will be accomplished through:

- 1. Semester-long group project that involves implementing a deep learning system
- 2. Discussion of pattern recognition and machine learning methods
- 3. Implementation of a variety of machine learning methods in code in assignments and lab activities

Professional Component (ABET)

This course consists of 1.5 credits of Engineering Design and 1.5 credits of Engineering Science

Relation to Program Outcomes (ABET)

Ou	tcome	Coverage*
1.	An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.	High
2.	An ability to apply both analysis and synthesis in the engineering design process, resulting in designs that meet desired needs.	High
3.	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.	High
4.	An ability to communicate effectively with a range of audiences	
5.	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must	

	consider the impact of engineering solutions in global, economic, environmental, and societal contexts.	
6.	An ability to recognize the ongoing need for additional knowledge and locate, evaluate, integrate, and apply this knowledge appropriately.	
7.	An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty	

Required Textbooks and Software

• Title: Python Machine Learning

• Author: S. Raschka

ISBN number: 978-1-78355-513-0
Title: Deep learning with Pytorch
Author: Eli Stevens and Luca Antiga
ISBN number: 978-1-61729-526-3

Software: Python 3+, Git, Pytorch

Course Schedule

- Weeks 1-3: Introduction to Machine Learning and Evaluation of Methods: What is Machine Learning? Error and Accuracy Metrics, Machine Learning Terminology, Introduction to Git (Assignment 1-2 due, Lab Assignment
 1)
- Weeks 4-6: Introduction to Supervised Classification: K-Nearest Neighbors, Decision Trees, Random Forests, and Linear Classifiers; Experimental Design and Hyperparameter Tuning Strategies (Assignments 4-5 due, Lab Assignment 2)
- Weeks 7-9, Introduction to Neural Networks: The Perceptron and Brief history of Neural Networks; Multi-layer Perceptron; Introduction to Pytorch (Assignments 7-8 due, Lab Assignment 3)
- Mid-Term Exam: During Week 9
- Weeks 10-12: Introduction to Deep Learning: Deep Learning Fundamentals and Applications; Introduction to Convolutional Neural Networks: Applications and Implementation in Pytorch (Assignment 10 due, Lab Assignment 4)
- Weeks 13-15: Project Teams: Completion of Project: In Class Project Focus, Project Presentations (Project due)

Attendance Policy, Class Expectations, and Make-Up Policy

While attendance is not graded, lectures will include regular homework help and in-class discussions and in-class lab assignments.

Excused absences are consistent with university policies in the undergraduate catalog (https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx) and require appropriate documentation.

Evaluation of Grades:

Assignment	Percentage of Final Grade
Assignments	40%
Lab Assignments and	20%
Semester-long Project	
Midterm Exam	20%
Final Exam	20%
TOTAL	100%

Lab and Project Assignments:

- Lab 1 (2.5%): The objective of Lab 1 is to introduce students to the experimental design process for machine learning. Students will develop a project proposal that includes identification of a data set with discussion as to whether the data is easily available, the amount of data available, whether ground truth is available or can be generated. The proposal will also discuss a set of appropriate error metrics for the proposed project, methods for cross-validation and blind test set generation appropriate for the proposed problem, a set of experiments to be conducted and the proposed experimental design.
- Lab 2 (2.5%): The objective of Lab 2 is to introduce the students to the importance of pre-processing, normalization, feature extraction and feature selection. Students will develop, implement and compare several pre-processing pipelines on their approved project data sets. Students will also implement feature visualization scripts and cluster validity-type metrics to aid in their pre-processing evaluation and visualization.
- Lab 3 (2.5%): The objective in Lab 3 is to compile an initial end-to-end machine learning pipeline for provided data sets that include pre-processing, classification and evaluation on their approved project data sets. Students will compare classifiers implemented and provide discussion as to why some out-perform others given the properties of their data set and the classifiers used.
- Lab 4 (2.5%): The objective of Lab 4 is to finalize their choice of pre-processing pipeline and classifier selection, provide discussion and motivation for their chosen approach based on outcomes from Labs 1-3 and any additional experiments required
- Final Project (10%): In their final project, students will carry out their full experimental design, run and evaluate their performance on a hold-out blind test set, and provide extensive comparisons and discussions to alternative approaches.

Grading Policy:

Percent	Grade	Grade Points
93.0 - 100	A	4.00
90.0 - 92.9	A-	3.67
87.0 - 89.9	B+	3.33
83.0 - 86.9	В	3.00
80.0 - 82.9	B-	2.67
77.0 – 79.9	C+	2.33
73.0 - 76.9	С	2.00
70.0 – 72.9	C-	1.67
67.0 – 69.9	D+	1.33
63.0 - 66.9	D	1.00

60.0 - 62.9	D-	0.67
0 - 59.9	E	0.00

A "C-" will not be a qualifying grade for critical tracking courses. In order to graduate, students must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). Note: A "C-" average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement.

More information on UF grading policy may be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, https://www.dso.ufl.edu/drc) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Commitment to a Safe and Inclusive Learning Environment

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Graduate Program Coordinator
- Robin Bielling, Director of Human Resources, 352-392-0903, rbielling@eng.ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: https://registrar.ufl.edu/ferpa.html

Campus Resources:

Health and Wellness

U Matter, We Care:

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: http://www.counseling.ufl.edu/cwc, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the Office of Title IX Compliance, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or http://www.police.ufl.edu/.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. https://www.crc.ufl.edu/.

Library Support, http://cms.uflib.ufl.edu/ask. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. https://teachingcenter.ufl.edu/.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. https://writing.ufl.edu/writing-studio/.

Student Complaints Campus: https://www.dso.ufl.edu/documents/UF Complaints policy.pdf.

On-Line Students Complaints: http://www.distance.ufl.edu/student-complaint-process.