COURSE SYLLABUS
COM212: Machine Learning Foundation

Concepts Course Description

Machine learning is the science of getting computers to act without being explicitly programmed. In the past decade, machine learning has given us self-driving cars, practical speech recognition, effective web search, and the list goes on. Machine learning is everywhere and more companies are using this type of technology in their practice. Many researchers also think it is the best way to make progress towards human-level AI.

In this course, you will learn about the most effective machine learning techniques, and gain practice implementing them and getting them to work for you. More importantly, you'll learn about not only the theoretical underpinnings of learning, but also gain the practical know-how needed to quickly and powerfully apply these techniques to new problems.

General Course Information

Number of Units/Weeks	4/10
#Hours Lecture/#Hours Laboratory/#Hours HW*	40/00/80
Prerequisite(s)	None
Co-requisites (s)	N/A
Course Developer(s)	Leticia Rabor, M.S. Sisinio Baldis, M.S.
Date Approved / Last Review	December 2017 / December 2017

* Homework

Learning Outcomes

- (CLO1) Describe the fundamental issues and challenges in machine learning algorithms that arise in practical applications
- (CLO2) Define the commonly used machine learning algorithms that solve problems of moderate complexity.
- (CLO3) Represent your data as features to serve as input to machine learning models
- (CLO4) Utilize a dataset to fit a model to analyze new data in order to solve real-world problems.
- (CLO5) Implement the various machine learning algorithms in a range of real-world applications

Instructional Methods Employed in this Course

Lecture and reading assignments
Hands-on exercises
Research
Practical application of theory and skills in authentic projects
Build on prior knowledge and experience of students to enhance richness of class activities

Information Resources for this Course

Textbook

A. Geron. (2017). Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems. Boston, MA: O'Reilly Media. ISBN: 978-1491962299

Recommended Readings

Brink, H. (2016). Real-World Machine Learning (1st Ed). Boston, MA: Manning Publications. ISBN: 978-1617291920

S. Raschka. (2015). Python Machine Learning. Boston, MA: Packt Publishing. ISBN: 978-1783555130

J. Bell. (2014). Machine Learning: Hands-On for Developers and Technical Professionals (1st Ed.). Indianapolis, IN: John Wiley & Sons, Inc. ISBN: 978-1118889060

Web Site Readings

Machine Learning Basics for a Newbie . Retrieved from https://www.analyticsvidhya.com/blog/2015/06/machine-learning-basics/

A Gentle Guide to Machine Learning. Retrieved from https://monkeylearn.com/blog/gentle-guide-to-machine-learning/

Everyday Examples of Machine Learning. Retrieved from https://www.techemergence.com/everyday-examples-of-artificial-intelligence-and-machine-learning/

Table/Topics & Assignments

Types of Assignments:

Lecture -
Considered Lecture Hours

Classroom Discussion -
Considered Lecture Hours

In Class Critique -
Considered Lecture Hours

In Class (IC) Exercise -
Considered Lecture Hours

Reading -
Considered Homework (HW), work done outside of class

WebClass lesson (non-online courses) -
Considered Homework (HW), work done outside of class

Projects –
Considered Homework (HW), work done outside of class

Lab Work –
Considered Lab Hours
Quiz, Midterm or Final -
Considered Lecture Hours

Course Structure

Week 1						
Type	**Topic/Description**	**LEC Hours**	**LAB Hours**	**HW Hours**	**Point Value**	**Due**
LEC 1A	Introduction to Course, Introduction to Machine Learning, Python review	3				
IC EX 1A	In-Class Exercise	1			5	
HW 1A	Read Chapter 1 (29 pages) Evaluated by HW 1B			2.9		
HW 1B	Review Questions: 10 Questions			1.5	10	Week 2
Total Week 1		4	0	4.4	15	
Week 2						
Type	**Topic/Description**	**LEC Hours**	**LAB Hours**	**HW Hours**	**Point Value**	**Due**
LEC 2A	Machine Learning Process, End to end project example	3				
IC EX 2A	In-Class Exercise	1			5	
HW 2A	Project 1			6	70	Week 4
HW 2B	Read Chapter 2 (45 pages). Evaluated by HW 2C			4.5		
HW 2C	Review Questions, 10 Questions			1.5	10	Week 3
Total Week 2		4	0	12	85	
Week 3						
Type	**Topic/Description**	**LEC Hours**	**LAB Hours**	**HW Hours**	**Point Value**	**Due**
LEC 3A	Classification	3				
IC EX 3A	In-Class Exercise	1			5	
HW 3B	Read Chapter 3 (24 pages) Evaluated by HW 3C			2.4		
HW 3C	Review Questions, 10 Questions			1.5	10	Week 4
Total Week 3		4	0	3.9	15	

Week 4						
Type	**Topic/Description**	**LEC Hours**	**LAB Hours**	**HW Hours**	**Point Value**	**Due**
LEC 4A	Regression	3				
IC EX 4A	In-Class Exercise	1			5	
HW 4A	Project 2			6	70	Week 6
HW 4B	Read Chapter 4 (38 pages) Evaluated by HW 4C			3.8		
HW 4C	Review Questions, 10 Questions			1.5	10	Week 5
Total Week 4		4	0	11.3	85	

Week 5						
Type	**Topic/Description**	**LEC Hours**	**LAB Hours**	**HW Hours**	**Point Value**	**Due**
LEC 5A	Midterm					
IC EX 5A	Midterm Practical	3			100	Week 5
EXAM 5A	Midterm Exam (Chapters 1-4)	1			150	Week 5
HW 5A	Read Chapter 5 (21 pages) Evaluated by HW 5B			2.1		
HW 5B	Review Questions, 10 Questions			1.5		Week 6
HW 5C	Introduction to Final Project			18	200	Week 10
Total Week 5		4	0	21.6	450	

Week 6						
Type	**Topic/Description**	**LEC Hours**	**LAB Hours**	**HW Hours**	**Point Value**	**Due**
LEC 6A	Support Vector Machines	3				
IC EX 6A	In-Class Exercise	1			5	
HW 6A	Project 3			6	70	Week 8
HW 6B	Read Chapters 6, 7 (36 pages) Evaluated by HW 6C			3.6		
HW 6C	Review Questions, 10 Questions			1.5	10	Week 7
Total Week 6		4	0	11.1	85	

Week 7						
Type	**Topic/Description**	**LEC Hours**	**LAB Hours**	**HW Hours**	**Point Value**	**Due**

LEC 7A	Decision Trees, Ensemble Learning, Random Forests	3				
IC EX 7A	In-Class Exercise	1			5	
HW 7B	Read Chapter 8 (20 pages) Evaluated by HW 7C			2		
HW 7C	Review Questions, 10 Questions			1.5	10	Week 8
Total Week 7		4	0	3.5	15	

Week 8

Type	Topic/Description	LEC Hours	LAB Hours	HW Hours	Point Value	Due
LEC 8A	Dimensionality Reduction	3				
IC EX 8A	In-Class Exercise	1			5	
HW 8A	Project 4			6	70	Week 10
HW 8B	Read Chapter 9 (22 pages) Evaluated by HW 8C			2.2		
HW 8C	Review Questions, 10 Questions			1.5	10	Week 9
Total Week 8		4	0	9.7	85	

Week 9

Type	Topic/Description	LEC Hours	LAB Hours	HW Hours	Point Value	Due
LEC 9A	Introduction to TensorFlow	3				
IC EX 9A	In-Class Exercise	1			5	
HW 9B	Read Chapter 10 (21 pages). Evaluated by HW 9C			2.1		
HW 9C	Review Questions, 10 Questions			1.5	10	Week 10
Total Week 9		4	0	3.6	15	

Week 10

Type	Topic/Description	LEC Hours	LAB Hours	HW Hours	Point Value	Due
LEC 10A	Introduction to Artificial Neural Networks, Final	1				
LEC 10B	Final Project Due	1				Week 10
EXAM 10A	Final Exam (Chapters 5-10)	2			150	Week 10
Total Week 10		4	0	0	150	

Course Hours Summary

Week	Topic	LEC Hours	LAB Hours	HW Hours
1	Introduction to Course, Introduction to Machine Learning, Python review	4	0	4.4
2	Machine Learning Process, End to end project example	4	0	12
3	Classification	4	0	3.9
4	Regression	4	0	11.3
5	Midterm	4	0	21.6
6	Support Vector Machines	4	0	11.1
7	Decision Trees, Ensemble Learning, Random Forests	4	0	3.5
8	Dimensionality Reduction	4	0	9.7
9	Introduction to TensorFlow	4	0	3.6
10	Introduction to Artificial Neural Networks, Final	4	0	0
Total		40	0	81.1

Table/Point Breakdown

Week	Assignment	Possible Points	Percent of Grade
1	IC EX 1A, In-Class Exercises	5	0.5%
1	HW 1B, Review Questions	10	1%
2	IC EX 2A, In-Class Exercises	5	0.5%
2	HW 2A, Project 1	70	7%
2	HW 2C, Review Questions	10	1%
3	IC EX 3A, In-Class Exercises	5	0.5%
3	HW 3B, Review Questions	10	1%
4	IC EX 4A, In-Class Exercises	5	0.5%
4	HW 4A, Project 2	70	7%
4	HW 4C, Review Questions	10	1%
5	IC EX 5A, Midterm Practical	100	10%
5	EXAM 5A, Midterm Exam	150	15%
6	IC EX 6A, In-Class Exercises	5	0.5%
6	HW 6A, Project 3	70	7%
6	HW 6C, Review Questions	10	1%
7	IC EX 7A, In-Class Exercises	5	0.5%
7	HW 7B, Review Questions	10	1%
8	IC EX 8A, In-Class Exercises	5	0.5%
8	HW 8A, Project 4	70	7%
8	HW 8C, Review Questions	10	1%
9	IC EX 9A, In-Class Exercises	5	0.5%
9	HW 9C, Review Questions	10	1%
10	LAB 10A, Final Project	200	20%
10	EXAM 10A, Final	150	15%
Total		1000	100%

Grades for this Course

Your final grade for this course will be based on an assessment by the Instructor of your performance on a number of course activities, which may include objective tests, classroom exercises, laboratory demonstrations, project papers, or other types of activities. The chart below indicates in what activities you will engage, how many possible points can be earned for each activity, and the percentage of your final grade that will be accounted for by each activity.

Students in this course should be graded following Coleman University assessment practices
Coleman University Grade Assignment Policy:

Percent	Letter Grade	Grade Points
94-100	A	4
90-93	A-	3.67
87-89	B+	3.33
84-86	B	3
80-83	B-	2.67
77-79	C+	2.33
74-76	C	2
70-73	C-	1.67
67-69	D+	1.33
64-66	D	1
60-63	D-	0.67
59 or below	F	0
N/A	INC	0
N/A	W	0
60 or above (only CR/NC courses)	CR	0
59 or below (only CR/NC courses)	NC	0
N/A	I	0
N/A	W	0
N/A	AU	0
N/A	TR	0
N/A	WV	0

Legend	
CR = Credit	NC = No Credit
I = Incomplete	Withdrawal
AU = Audit	TR = Transfer Credit
WV = Waiver	

Academic Accommodation / Adjustment Policy:

In accordance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA), Coleman University offers accommodations to students with documented physical, psychological, and/or cognitive disabilities. Coleman University will adhere to all applicable federal, state, and local laws, regulations, and guidelines with respect to providing reasonable accommodations as required to offer equal educational opportunities to qualified disabled individuals.

To qualify for an academic accommodation under ADA, the student must provide adequate documentation of a disability. Students seeking academic accommodations should contact the campus ADA Coordinator at 858-966-3953 or via email at ada@coleman.edu. The ADA Coordinator will review the documentation provided and verify ADA coverage. Students covered under ADA must meet with the ADA Coordinator at the beginning of every term to determine the appropriate academic accommodations. Failing to meet with the ADA Coordinator at the beginning of every term may impact the availability of accommodations.

After the academic accommodations have been determined, the students' instructors will be notified by the ADA Coordinator. If any problems or concerns regarding the provision of accommodations occur, the student must inform the ADA Coordinator. If the student feels accommodation is not being made appropriately, the student may follow the published Student Grievance Procedures.