DSC 305.01/CSC 482.01 - Machine Learning - Spring 2023 Syllabus

Marcus Birkenkrahe

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1 General Course Information

- Meeting Times: Tuesday/Thursday, 13:00-13:50 hrs
- Meeting place: Lyon Building Computer Lab 104
- Professor: Marcus Birkenkrahe
- Office: Derby Science Building 210
- Phone: (870) 307-7254 (Office) / (501 422-4725 (Private)
- Office Hours: Mon/Wed/Fri 16:15-16:45, Tue/Thu 16:00-16:30
- Textbook: Machine Learning With R (3e) by Brett Lantz, Packt Publishing (Online: packtpub.com, ebook US$5)

2 Standard and course policies

- **Standard Lyon College Policies** are incorporated into this syllabus and can be found at: lyon.edu/standard-course-policies.
- The **Assignments and Honor Code** and the **Attendance Policy** are incorporated into this syllabus also and can be found at: tinyurl.com/LyonPolicy.

3 Objectives

This course is concerned with algorithms that transform information into actionable intelligence using present-day computers and big data. We use R, a

cross-platform, zero-cost statistical programming environment that combines a wide range of functions, interfaces to common machine learning packages, and best-in-class visualization.

4 Student learning outcomes

Students who complete DSC 305, "Machine Learning" (ML), can:

- Apply un/supervised learning models to big data problems
- Understand neural networks and Support Vector Machine algorithms
- Distinguish different methods to make predictions with ML
- Work with open source libraries like `Keras` and `TensorFlow` by Google
- Master the whole infrastructure for advanced statistical computing
- Know how to effectively present assignment results
- Improve data literacy, research and present a project as a team

5 Course requirements

- Basic proficiency with R is useful (as taught in DSC 105 or obtained independently on DataCamp "Introduction to R", GitHub's "fasteR", or Part I of the Book of R by Davies)
- Imagination, creativity and a visual mind, enjoying finding patterns and spotting correlations
- Basic understanding of algorithms and data structures (in any programming language)
- Basic understanding of data science infrastructure especially literate programming methods

6 Grading system

REQUIREMENT	UNITS	PPU	TOTAL	% of TOTAL
Final exam	1	100	100	20.
DataCamp assignments	10	10	100	20.
Class assignments	10	10	100	20.
Project sprint reviews	5	20	100	20.
Multiple-choice tests	10	10	100	20.
TOTAL			500	100.

You should be able to see your current grade at any time using the Canvas gradebook for the course.

7 Grading table

This table is used to convert completion rates into letter grades. for the midterm results, letter grades still carry signs, while for the term results, only straight letters are given (by rounding up).

%	**MIDTERM GRADE**	**FINAL GRADE**
100-98	A+	
97-96	A	A (PASSED -
95-90	A-	VERY GOOD)
89-86	B+	
85-80	B	B (PASSED -
79-76	B-	GOOD)
75-70	C+	
69-66	C	C (PASSED -
65-60	C-	SATISFACTORY)
59-56	D+	
55-50	D	D (PASSED)
49-0	F	F (FAILED)

8 Schedule and session content

For **important dates**, see the 2022-2023 Academic Calendar at: catalog.lyon.edu/202223-academic-calendar

Lectures and lab sessions are aligned with the content of the 10 **DataCamp lessons** that need to be completed in the course of the term. The last four sessions are devoted to deep learning without (graded) assignments.

WEEK	DATE	TOPICS and **ASSIGNMENTS**	TEST
1	Jan 10,12	Introduction & R Review	
2	Jan 17,19	**What is Machine Learning?**	Test 1
3	Jan 24,26	**Machine Learning Models**	Test 2
4	Jan 31, Feb 2	**k-Nearest Neighbors (kNN)**	Test 3
5	Feb 7,9	**Naive Bayes**	
6	Feb 14,16	**Logistic Regression**	Test 4
7	Feb 21,23	**Classification Trees**	Test 5
8	Mar 2	**k-means clustering**	Test 6
9	Mar 7,9	**Hierarchical clustering**	
10	Mar 14,16	**Dimensionality reduction**	Test 7
11	Mar 28,30	**Cancer data case study**	Test 8
12	Apr 4,6	Artificial Neural Networks	Test 9
13	Apr 11,13	Modeling with ANNs	
14	Apr 18,20	Support Vector Machines	Test 10
15	Apr 25,27	Performing OCR with SVMs	
16	May 2	Review and projects	