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

Marcus Birkenkrahe

January 3, 2023

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 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.

3 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

4 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

5 Grading system

REQUIREMENT	UNITS	PPU	TOTAL	% of TOTAL
Final exam	1	100	100	20.
Home 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.

6 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)

7 Standard Policies

7.1 Honor Code

All graded work in this class is to be pledged in accordance with the Lyon College Honor Code. The use of a phone for any reason during the course of an exam is considered an honor code violation.

7.2 Class Attendance Policy

Students are expected to attend all class periods for the courses in which they are enrolled. They are responsible for conferring with individual professors regarding any missed assignments. Faculty members are to notify the Registrar when a student misses the equivalent of one, two, three, and four weeks of class periods in a single course. Under this policy, there is no distinction between "excused" and "unexcused" absences, except that a student may make up work missed during an excused absence. A reminder of the college's attendance policy will be issued to the student at one week, a second reminder at two weeks, a warning at three weeks, and notification of administrative withdrawal and the assigning of an "F" grade at four weeks.

Students who are administratively withdrawn from more than one course will be placed on probation or suspended.

7.3 Academic Support

The Morrow Academic Center (MAC) helps students who want to improve grades by providing peer-led services including Supplemental Instruction (SI), tutoring, the Writing Center, and academic coaching as well providing 24-hour, online tutoring for all subjects through Tutor.com. A schedule of peer-led services is available at lyon.edu/mac and Tutor.com is accessed through courses in Schoology. Contact Donald Taylor, Director of Academic Support, at 870-307-7319 or donald.taylor@lyon.edu for more information about MAC services.

7.4 Technology Support

For general technology support, you can contact the IT department by emailing support@lyon.edu or by calling 870-307-7555. For assistance with classroom-related technologies, such as the learning management system (LMS), you can request support using the methods above, or you can contact sarah.williams@lyon.edu directly for assistance. Your course content will be accessible digitally using either the Schoology or Canvas LMS. Both LMS platforms will use your myLyon credentials for your student login.

- For Canvas, login at lyon.instructure.com
- For Schoology, login at lyon.schoology.com

7.5 Disabilities

Students seeking reasonable accommodations based on documented learning disabilities must contact Interim Director of Academic Support Donald Taylor in the Morrow Academic Center at (870) 307-7019 or at donald.taylor@lyon.edu.

7.6 Harassment, Discrimination, and Sexual Misconduct

Lyon College seeks to provide all members of the community with a safe and secure learning and work environment that is free of crime and/or policy violations motivated by discrimination, sexual and bias-related harassment, and other violations of rights. The College has a zero-tolerance policy against gender-based misconduct, sexual assault, and interpersonal violence toward

any member or guest of the Lyon College community. Any individual who has been the victim of an act of violence or intimidation is urged to make an official report by contacting a campus Title IX coordinator or by visiting www.lyon.edu/file-a-title-ix-report. A report of an act of violence or intimidation will be dealt with promptly. Confidentiality will be maintained to the greatest extent possible within the constraints of the law. For more information regarding the College's Title IX policies and procedures, visit www.lyon.edu/title-ix.

7.7 Mental & Behavioral Health

Lyon College is dedicated to ensuring each student has access to mental and behavioral health resources. The College's Mental and Behavioral Health Office is located in Edwards Commons and is partnered with White River Health System's Behavioral Health Clinic. The office is committed to helping the Lyon community achieve maximum mental and behavioral wellness through both preventative and reactive care. A full-time, licensed, professional counselor provides counseling, consultations, outreach, workshops, and many more mental and behavioral services to Lyon students, faculty, and staff at no cost. The Mental and Behavioral Health Office also provides access to White River Health System's services and facilities, including medication management and in-patient and out-patient care. To make an appointment, contact counseling@lyon.edu.

7.8 College-Wide COVID-19 Policies

The College does not require masks in instructional and meeting spaces inside academic buildings. However, if instructors require masks in their classroom, lab, or studio, then students and guests must comply with that requirement. Vaccines are strongly encouraged for all faculty, staff, and students. Vaccines are not mandated for Lyon College community members, although there may be specific courses involving interactions with vulnerable, external populations where a vaccine may be required. The College will continue to offer symptomatic testing for students, faculty and staff.

7.9 Details

Details specific to this course may be found in the subsequent pages of this syllabus. Those details will include at least the following:

- A description of the course consistent with the Lyon College catalog.

- A list of student learning outcomes for the course.
- A summary of all course requirements.
- An explanation of the grading system to be used in the course.
- Any course-specific attendance policies that go beyond the College policy.
- Details about what constitutes acceptable and unacceptable student collaboration on graded work.
- A clear statement about which LMS is being used for the course.

7.10 Learning Management System (LMS)

We will use Canvas in this course.

8 Assignments and Honor Code

There will be several assignments during the summer school, including programming assignments and multiple-choice tests. They are due at the beginning of the class period on the due date. Once class begins, the assigment will be considered one day late if it has not been turned in. Late programs will not be accepted without an extension. Extensions will **not** be granted for reasons such as:

- You could not get to a computer
- You could not get a computer to do what you wanted it to do
- The network was down
- The printer was out of paper or toner
- You erased your files, lost your homework, or misplaced your flash drive
- You had other coursework or family commitments that interfered with your work in this course

Put "Pledged" and a note of any collaboration in the comments of any program you turn in. Programming assignments are individual efforts, but you may seek assistance from another student or the course instructor. You may not copy someone else's solution. If you are having trouble finishing an

assignment, it is far better to do your own work and receive a low score than to go through an honor trial and suffer the penalties that may be involved.

What is cheating on an assignment? Here are a few examples:

- Having someone else write your assignment, in whole or in part
- Copying an assignment someone else wrote, in whole or in part
- Collaborating with someone else to the extent that your submissions are identifiably very similar, in whole or in part
- Turning in a submission with the wrong name on it

What is not cheating? Here are some examples:

- Talking to someone in general terms about concepts involved in an assignment
- Asking someone for help with a specific error message or bug in your program
- Getting help with the specifics of language syntax or citation style
- Utilizing information given to you by the instructor

Any assistance must be clearly explained in the comments at the beginning of your submission. If you have any questions about this, please ask or review the policies relating to the Honor Code.

Absences on Days of Exams: Test "make-ups" will only be allowed if arrangements have been made prior to the scheduled time. If you are sick the day of the test, please e-mail me or leave a message on my phone before the scheduled time, and we can make arrangements when you return.

9 Attendance policy

In accordance with college policy, if you miss 4 weeks of class, you fail the course automatically. Any missed meetings result in an "Early Alert" report.

You should take care not to miss consecutive sessions if at all possible - otherwise you risk losing touch with the class and falling behind.

10 Important Dates

DATE	DAY	DESCRIPTION
3 January	Tuesday	Last day to deposit for '22 spring semester
10 January	Tuesday	Classes begin
16 January	Monday	MLK Day - no classes
17 January	Tuesday	Last day to add a class
24 January	Tuesday	Last day to drop without record of course
		Last day to declare a course pass-fail
		Deadline for removal of incompletes
25-28 February	Saturday-Tuesday	Mental-Health break (no classes)
1 March	Wednesday	Mid-term grades available by noon
8 March	Wednesday	Lst day to drop a course with a "W"
18-26 March	Saturday-Sunday	Spring break
7-9 April	Friday-Sunday	Easter break
18 April	Tuesday	Honors Convocation
4 May	Wednesday	Last day of spring classes
4-7 May	Thursday-Sunday	Final exams for graduating seniors
		(start 6pm Thu, no exams before 1pm Sun)
5-10 May	Thursday-Tuesday	Final exams for non-graduating students
		(no exams before 1pm on Sunday)
9 May	Tuesday	Senior grades due by noon
12 May	Friday	Baccalaureate
13 May	Saturday	Spring commencement
17 May	Wednesday	All final grades due by noon

11 Schedule and session content

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.

WEEK	DATE	DATACAMP ASSIGNMENT	TESTS
1	Jan 10,12		
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	**Sprint review 1: literature review**	
6	Feb 14,16	Naive Bayes	Test 4
7	Feb 21,23	Logistic Regression	Test 5
8	Mar 2	Classification Trees	Test 6
9	Mar 7,9	**Sprint review 2: methodology**	
10	Mar 14,16	Unsupervised learning: clustering	Test 7
11	Mar 28,30	Hierarchical clustering	Test 8
12	Apr 4,6	Dimensionality reduction	Test 9
13	Apr 11,13	**Sprint review 3: abstract**	
14	Apr 18,20	Unsupervised learning case study	Test 10
15	Apr 25,27	**Sprint review 4: final presentation**	
16	May 2		