Ryerson University

Data Science and Analytics Program

Course Outline
Winter 2022

DS8015 – Practical Machine Learning for Non-Data Science Students

Instructor	Dr Roy Kucukates Email: roy.kucukates@ryerson.ca Office Hours: Appointment based
Prerequisites	None
Compulsory Textbook	None
Additional References	W. McKinney. *Python for Data Analysis*. 2nd Edition. O'Reilly Media, 2017 A Geron. *Hands-on Machine Learning with Scikit-Learn, Keras & TensorFlow*. 2nd Edition. O'Reilly Media, 2019. Additional references may be provided during the lectures.
Course Description	To introduce students to the theory and design of machine learning algorithms using Python. The course will cover the following topics: Python Fundamentals, Data Structures, Functions and Functional Programming, Python Libraries, Exploratory Data Analysis, Introduction to Machine Learning, Unsupervised Learning, Supervised Learning: Regression & Classification, Dimensionality Reduction, Neural Networks
Learning Objectives	At the end of this course the successful students will be able to:

<table>
<tr><td></td><td>1. Write a Python program to solve a problem with supervised, or unsupervised machine learning algorithms
2. Have a high-level understanding about the machine learning and what can be achieved using the methodology</td></tr>
<tr><td>Course Organization</td><td>Video lectures, and Q&A live Zoom sessions per week for 12 weeks</td></tr>
<tr><td>Course Evaluation</td><td>• Labs (11) 0%
• Assignments (3) 60%
• Final Project (Group) 40%
Total 100%

Late submissions of assignments will not be accepted.</td></tr>
<tr><td>Assignments</td><td>There will be 3 assignments throughout the academic term. The assignments will be based on the topics learned during the lectures, labs, and additional reading materials</td></tr>
<tr><td>Final Project</td><td>There will be a group project evaluated as a final. The project teams are supposed to provide the following:
- Project proposal document (content and rubric will be announced)
- Project report document (content and rubric will be announced)
- Project presentation where the team presents the work done and the results (content and rubric will be announced)</td></tr>
<tr><td>Grading Scale</td><td>
<table>
<tr><th>Letter Grades</th><th>Grade Points</th><th>Conversion Range, % Scale to Letter Grades</th></tr>
<tr><td>A+</td><td>4.33</td><td>90-100%</td></tr>
<tr><td>A</td><td>4.00</td><td>85-89%</td></tr>
<tr><td>A-</td><td>3.67</td><td>80-84%</td></tr>
<tr><td>B+</td><td>3.33</td><td>77-79%</td></tr>
<tr><td>B *</td><td>3.00</td><td>73-76%</td></tr>
<tr><td>B- **</td><td>2.67</td><td>70-72%</td></tr>
<tr><td>F</td><td>0</td><td>0-69%</td></tr>
<tr><td>FNA</td><td>0</td><td>NIL</td></tr>
</table>
* B is satisfactory performance level for Doctoral study
** B- is satisfactory performance level for Master's study
</td></tr>
<tr><td>Faculty Course Survey</td><td>Students will be required to complete this survey in either week 10, 11, or 12 of the term</td></tr>
</table>

Important Notes	1. Committing academic misconduct, such as plagiarism and cheating, will trigger academic penalties, including failing grades, suspension and possibly expulsion from the University. As a Ryerson student, you are responsible for familiarizing yourself with the Student Code of Academic Conduct, which can be found online at http://www.ryerson.ca/senate/policies/pol60.pdf 2. All of the required course-specific written reports will be assessed not only on their technical/academic merit, but also on the communication skills exhibited through these reports. 3. Should a student miss a mid-term test or equivalent (e.g. studio or presentation), with appropriate documentation, normally a make-up will be scheduled as soon as possible in the same semester, and, where possible, before the last date to drop the course. Where a missed mid-term, assignment or other assessment is one of only two assessments in a course (e.g. there is one mid-term and a final), or when the assessment is worth more than 30% of the final course grade, the provision of a make-up is required. Where a missed mid-term, assignment or other assessment is part of a number of assessments given throughout the term, and when it can be shown that the objective of the missed work is assessed in some other way, then the instructor and student may agree, in writing, to distribute the weight of the missed work to the final exam, or other assessment or group of assessments. The redistribution of the weight of missed work may not cause the final exam or any single assessment to be worth more than 70% of the student's final grade. Where there is no agreement, the student may consult the Chair or Director for assistance. Where it is not possible to schedule the missed work or mid-term because, for example, it was presented in a group, it requires that a lab studio or other set-up be recreated; the weight may be distributed to the final exam or other assessment or group of assessments. In this case, the redistribution of the weight of missed work should normally not cause the final exam or any single assessment to be worth more than 70% of the student's final grade. If it will, an alternate assignment should be considered on a case by case basis. 4. Make-up of final exams: Students who miss a final exam for a verifiable reason and who cannot be given a make-

	up exam prior to the submission of final course grades, must be given a grade of INC (as outlined in the Grading Promotion and Academic Standing Policy) and a make-up exam (normally within 2 weeks of the beginning of the next semester) that carries the same weight and measures the same knowledge, must be scheduled. 5. Provision of a second make-up: On a case by case basis, a second make-up may be scheduled at the discretion of the instructor. The student may be required to provide a detailed rationale supported by appropriate documentation for consideration. If a student misses a scheduled make-up of a mid-term, assignment or other assessment for verifiable reasons, the grade may be distributed over other course assessments even if that makes the grade on the final exam worth more than 70% of the final grade in the course. If a student misses a scheduled mid-term make-up test or assignment, without a verifiable reason, a grade of "0" may be assigned. Final Exam: Except where there are verifiable reasons, and the student and instructor have agreed to a rescheduled make-up exam, students who miss a scheduled make-up of a final exam will receive a "0" for that exam. 6. Medical or Compassionate documents for the missing of an exam must be submitted within 3 working days of the exam. Students are responsible for notifying the instructor that they will be missing an exam as soon as possible. Documentation must clearly and unequivocally demonstrate that the student was unable to meet his/her academic obligations. 7. Requests for accommodation of specific religious or spiritual observance must be presented to the instructor no later than two weeks prior to the conflict in question (in the case of final examinations within two weeks of the release of the examination schedule). In extenuating circumstances this deadline may be extended. If the dates are not known well in advance because they are linked to other conditions, requests should be submitted as soon as possible in advance of the required observance. Given that timely requests will prevent difficulties with arranging constructive accommodations, students are strongly encouraged to notify the instructor of an observance accommodation issue within the first two weeks of classes. 8. The results of the first regularly scheduled test or mid-term exam will be returned to students before the

	deadline to drop an undergraduate course in good Academic Standing. 9. Students are required to adhere to all relevant University policies including: Graduate Grading, Promotion and Academic Standing, http://www.ryerson.ca/senate/policies/pol46.pdf Student Code of Academic Conduct, http://www.ryerson.ca/senate/policies/pol60.pdf Student Code of Non-Academic Conduct, http://www.ryerson.ca/senate/policies/pol61.pdf Academic Integrity Office website for additional policy information, http://www.ryerson.ca/academicintegrity/ Undergraduate Academic Consideration and Appeals, http://www.ryerson.ca/senate/policies/pol134.pdf Examination Policy, http://www.ryerson.ca/senate/policies/pol135.pdf Accommodation of Student Religious., Aboriginal and Spiritual Observance, http://www.ryerson.ca/senate/policies/pol150.pdf Establishment of Student Email Accounts for Official University Communication, Academic Accommodation of Students with Disabilities, http://www.ryerson.ca/senate/policies/pol159.pdf 10. Students are required to obtain and maintain a Ryerson e-mail account for timely communications between the instructor and the students. 11. Any changes in the course outline, test dates, marking or evaluation will be discussed in class prior to being implemented. 12. Students in this course may be required to submit electronic file versions of their work to an electronic plagiarism detection service at https://www.turnitin.com Students who do not want their work submitted to this plagiarism detection service must, by the end of the second week of class, consult with the instructor to make alternate arrangements. Please note: Even when an instructor has not indicated that a plagiarism detection service will be used, or when a student has opted out of the plagiarism detection service, if instructor has reason to suspect that an individual piece of work has been plagiarized, the instructor is permitted to submit that work in a non-identifying way to any plagiarism detection service. 13. Attendance at scheduled Laboratory sessions is compulsory. Laboratory marks will only be recorded for students in attendance. Lab marks will be added to a

	student's course grade in accordance with conditions specified in the Course Evaluation section. 14. Posting of grades for projects, labs, tests, and exam is normally done using Desire 2 Learn (D2L) Gradebook. However, your final grade (numerical or letter) will not be posted. In some cases grades may be posted by hardcopy in a non-identifying way. Students who wish not to have their grades posted in hardcopy format must inform the instructor in writing.

Tentative Schedule:

Week	Lecture #	Date	Lecture Topic	Lab	Assignment	Project
1	1	2021-01-17	Python Fundamentals	Lab 1		
2	2	2021-01-24	Data Structures	Lab 2		
3	3	2021-01-31	Functions, Functional Programming	Lab 3	Python Assignment #1	
4	4	2021-02-07	Python Libraries	Lab 4		
5	5	2021-02-14	Exploratory Data Analysis	Lab 5		Project Topics Published
6	-	2021-02-21	Family Day & Reading Week	-		
7	-	2021-02-28	Introduction to Machine Learning	Lab 6	ML Assignment #2	Project Groups and Topics Selected
8	6	2021-03-07	End to End Machine Learning Project	Lab 7		Project Proposals Submitted
9	7	2021-03-14	Unsupervised learning	Lab 8		
10	8	2021-03-21	Supervised Learning: Regression	Lab 9		
11	9	2021-03-28	Supervised Learning: Classification	Lab 10	ML Assignment #3	
12	10	2021-04-04	Dimensionality Reduction	Lab 11		
13	11	2021-04-11	Neural Networks	-		
14	-	2021-04-18	Final Presentations	-		Project Presentations
15	-	2021-04-25	Final Presentations & Project Report Submission	-		Project Presentations & Reports