

Syllabus

RSM 313 H1 F

Foundations of Artificial Intelligence for Management

Fall 2020

Course Meets: Tuesday, 11am-1pm – RT L1060

Course Delivery:

Section L0101 will be offered in person during the appointed time.

Section L9101 will be offered online synchronously at the same time as the in-person section.

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Course Scope and Mission

Artificial intelligence — the application of machine-learning techniques to prediction problems historically performed by humans— is transforming business and society. This course provides a hands-on introduction to the wide variety of algorithms used in applications of machine-learning. The technical topics will include linear and non-linear regression models, classification algorithms, and more recent machine-learning techniques rooted in neuroscience like reinforcement learning and deep learning. Application topics will include predicting consumer choices, MLB salaries, and Super Mario Bros. There will be an emphasis on conceptual understanding, so that students can interpret the results of these techniques to support effective decision-making. The course will be complemented by many hands-on exercises using the R programming language.

Course Prerequisites

ECO 220 or ECO 227 (fas.calendar.utoronto.ca/section/Rotman-Commerce).

Statement on Equity, Diversity and Inclusion

The University of Toronto is committed to equity, human rights and respect for diversity. All members of the learning environment in this course should strive to create an atmosphere of mutual respect where all members of our community can express themselves, engage with each other, and respect one another's differences. U of T does not condone discrimination or harassment against any persons or communities.

Required Technology

For Fall-Winter 2020-21, this course may be conducted entirely online. To participate fully and to complete the course successfully, you must ensure you have a computer with a working webcam, microphone and reliable access to an internet connection. For further details, please visit this link: [Recommended Technology Requirements for Remote/Online Learning](#)

Required Readings

Item	Title	Required	Instructions
Text	An Introduction to Statistical Learning By James, Witten, Hastie, Tibshirani	Yes	This will be the main text for the course
Text	Reinforcement Learning By Sutton and Barto	No	Some material will be drawn from this textbook, but it is not mandatory reading

Evaluation and Grades

Grades are a measure of the performance of a student in individual courses. Each student shall be judged on the basis of how well they have command of the course materials.

Work

Class Participation/Attendance	10%
Assignments	30%
Mid-Term Test	20%
Final Term Test	40%

Due Date

Ongoing
See Quercus
October 27
Date To Be Determined

Final grades in the course are given as letter grades. They reflect your overall performance in achieving the stated Course Learning Outcomes. Assessment on interim deliverables can take many forms and they are intended to give you an indication where you stand relative to others. This will allow you to make adjustments to your approach, your expectations, and your performance. In this class, each student will receive a numerical raw score for their individual/group work. At the end of the course, the raw scores will be scaled, and then weighted according to the table above. The overall weighted average scaled score is then converted to a letter grade that reflects the student's performance in the entire course. Please contact the instructor if you would like more guidance on your individual course performance.

Course Format and Expectations

All assignment will be submitted via Quercus. Students are expected to complete the assignments individually and be familiar with the University of Toronto standards of Academic Integrity (see below). The midterm and final assessments will be proctored online. Given the online format of the synchronous section, class participation will be assessed both during the lecture as well as during interactions on Quercus. Students are encouraged to post course-content related questions to the "Discussion" section of Quercus BEFORE emailing the professor. Participation in the Discussion forum on Quercus will comprise part of the class participation mark.

Credit/No-Credit Option in Rotman Commerce

You may request to Credit/No-Credit (CR/NCR) an RSM course in the following cases only:

- The course will not be used for any specialist or focus, including the 8.0 RSM FCE requirement.
- The course does not have a group work component.

If you wish to request CR/NCR for an RSM course, you must contact a Rotman Commerce academic advisor by the drop deadline for the current term. **The deadline for this term is November 9, 2020.**

Final approval is on a case-by-case basis with the permission of the Director, Rotman Commerce.

Online Proctoring / ProctorU®: Online exam(s) within this course [may] use online invigilation provided by ProctorU, an online proctoring service that allows completion of the assessment from an off-campus location. In all cases, remote recordings and desktop monitoring of the exam will be made and reviewed and held for a limited period of time in order to ensure academic integrity is maintained. With live proctoring, the remote recordings and desktop monitoring are overseen by a highly-trained human proctor who closely monitors students during the entire exam. The University of Toronto has an institutionally endorsed agreement with ProctorU that protects the privacy of the recordings, and other personal information.

- **Set-up requirements:** Access to a computer that can support remote recording is your responsibility as a student. You will need to ensure that you can complete the exam using a reliable computer (tablets are not supported) with a webcam and microphone available, as well as a high-speed internet connection. Please note that you will be required to show your TCard prior to beginning to write the exam. Detailed information is provided [here](#) and will be provided prior to the exam date and an opportunity to test your set up will be provided.
- **Academic integrity and requirements during the exam:** Students taking their examinations online must agree to be proctored by ProctorU throughout the duration of the exam. **All components** of the online proctoring service must be maintained for the duration of the exam. With live proctoring, the human proctor may reach out to the student if they lose the ability to proctor the exam (camera view obstructed/loss of remote desktop view etc). If the proctor contacts the student during the exam through a pop-up message, voice, or a loud beep, the student is expected to respond to the proctor. **Failure to respond to the proctor and/or failure to maintain all components of the online proctoring service during the exam threatens the integrity of the exam** and will be investigated to determine whether an academic offence has been committed as per the [Code of Behaviour on Academic Matters](#). At the completion of the exam, a report of student exam-taking behaviours is generated. Exam grades will NOT be released to students until the integrity of the exam has been verified through ProctorU, the instructor and Rotman IT staff.

For additional information about online proctoring please see course information in Quercus, or visit [U of T Online Proctoring Guidelines](#). For more information on the University of Toronto's *Code of Behaviour on Academic Matters*, see the section on Academic Integrity below.

Weekly Schedule

Week	Topic	Readings
1	Course Overview and Introduction – Assessing Model Accuracy	ISL: 2.1-2.2 Prediction Machines, Ch 1-2
2	Linear Regression Review	ISL: 3.1-3.5
3	Classification – Logistic Regression	ISL: 4.1-4.3
4	Resampling – Cross-Validation and Bootstrapping	ISL: 5
5	Model Selection – Subset and Shrinkage Methods	ISL: 6.1, 6.2

6	Non-Linearities – Polynomial Regression, Splines, and Local Regression	ISL: 7.1 - 7.6
7	Midterm	
8	Trees – Pruning, Bagging, Random Forests, Boosting	ISL: 8
9	Support Vector Machines – Separating Hyperplanes and Maximal Margin Classifier	ISL: 9.1 – 9.3, 9.4
10	Reinforcement Learning – Multi-Armed Bandits and Value Function Methods, Markov Decision Problems and TD Learning	S&B: 2.1-2.5
11	Deep Reinforcement Learning - AlphaGo	S&B: 16
12	Review Lecture	

Please note that the last day you can drop this course without academic penalty is November 9, 2020.

Policies and Procedures

Missed Tests and Assignments (including mid-term and final-term examinations)

Students who miss a test or assignment for reasons entirely beyond their control (e.g. illness) may request special consideration.

In such cases, students must:

1. Notify the instructor AND the Rotman Commerce Program Office **on the date** of the missed course deliverable, e.g. missed test, final assessments, assignment or class (in the case of participation marks).
2. Complete a [Request for Special Consideration Form](#) and submit it along with supporting documentation this may include either your Self-Declaration of Absence on ACORN, or [Verification of Student Illness or Injury form](#) to the Rotman Commerce Office within **2 business days** of the originally scheduled course deliverable.

The mark for the final exam will be re-weighted mark to account for the missed test or assignment. Students who do not provide appropriate or sufficient supporting documentation will be given a grade of 0 (zero) for the missed course deliverable.

Note that documentation must clearly establish that you were ill or had other circumstances that prevented you from attending on the date in question. After-the-fact reports are not sufficient.

Late Assignments

All assignments are due on the date and at the time specified in Quercus. Late submissions will normally be penalized by 25% if the assignment is not received on the specified date, at the specified time. A further penalty of 25% will be applied to each subsequent day. Students who, for reasons beyond their control, are unable to submit an assignment by its deadline must

obtain approval from the instructor for an extension. Supporting documentation will be required as per the policy on missed tests and assignments.

Accessibility Needs

The University of Toronto is committed to accessibility. If you require accommodations for a temporary or ongoing disability or health concern, or have any accessibility concerns about the course, the classroom or course materials, please contact Accessibility Services as soon as possible at accessibility.services@utoronto.ca or studentlife.utoronto.ca/as.

For courses with deliverables that require you to work in teams, please note the following. If you are a student registered with Accessibility Services, and extensions are one of your academic accommodations, requests for extensions impact everyone in the group. As a result, requests for late submissions of any component of teamwork will require compelling reasons, advance notice, and must work for everyone in the team. You are encouraged to discuss with your course instructor, Accessibility Advisor, and other team members what you need in order to successfully complete your coursework. Additionally, the Rotman Commerce Centre for Professional Skills offers Teamwork Mentors (see section above) who can help you and your team discuss how to support you effectively and how to develop a work plan that meets the needs and constraints of all team members.

Volunteer Notetaking

If you're interested in helping to make our classroom more accessible, volunteer to be a notetaker!

Accessibility Services needs dependable volunteer notetakers to assist students living with a disability to achieve academic success. All you have to do is attend classes regularly and submit your notes consistently.

1. Register online as a Volunteer Note-Taker at:
<https://clockwork.studentlife.utoronto.ca/custom/misc/home.aspx>
2. Follow the link that says "Volunteer Notetakers"
3. Select your course and upload a sample of your notes
4. Once you have been selected as a notetaker, you'll get an email notifying you to upload your Notes.

If you have any questions or require assistance, please email as.notetaking@utoronto.ca or call 416-978-6186.

Volunteers may receive co-curricular credit or a certificate of appreciation.

Academic Integrity

Academic Integrity is a fundamental value essential to the pursuit of learning and scholarship at the University of Toronto. Participating honestly, respectfully, responsibly and fairly in this academic community ensures that the U of T degree that you earn will continue to be valued and respected as a true signifier of a student's individual work and academic achievement. As a result, the University treats cases of academic misconduct very seriously.

[The University of Toronto's Code of Behaviour on Academic Matters](#) outlines the behaviours that constitute academic misconduct, the process for addressing academic offences and the penalties that may be imposed. You are expected to be familiar with the contents of this document. Potential offences include, but are not limited to:

In papers and assignments:

- Using someone else's ideas or words without appropriate acknowledgement.
- Submitting your own work in more than one course without the permission of the instructor.
- Making up sources or facts.
- Obtaining or providing unauthorized assistance on any assignment (this includes collaborating with others on assignments that are supposed to be completed individually).

On test and exams:

- Using or possessing any unauthorized aid, including a cell phone.
- Looking at someone else's answers
- Misrepresenting your identity.
- Submitting an altered test for re-grading.

Misrepresentation:

- Falsifying institutional documents or grades.
- Falsifying or altering any documentation required by the University, including (but not limited to) medical notes.

All suspected cases of academic dishonesty will be investigated by the following procedures outlined in the *Code of Behaviour on Academic Matters*. If you have any question about what is or is not permitted in the course, please do not hesitate to contact the course instructor. If you have any questions about appropriate research and citation methods, you are expected to seek out additional information from the instructor or other U of T resources such as College Writing Centres or the Academic Success Centre.

Email

At times, the course instructor may decide to communicate important course information by email. As such, all U of T students are required to have a valid UTmail+ email address. You are responsible for ensuring that your UTmail+ email address is set up and properly entered on ACORN. For more information visit help.ic.utoronto.ca/category/3/utmail.html.

Forwarding your utoronto.ca email to a Gmail or other type of email account is not advisable. In some cases, messages from utoronto.ca addresses sent to Gmail accounts are filtered as junk mail, which means that important messages from your course instructor may end up in your spam or junk mail folder.

Quercus and the Course Page

The online course page for this course is accessed through Quercus. To access the course page, go to q.utoronto.ca and log in using your UTORid and password. Once you have logged in, you will be at the Quercus Dashboard. On this page you will see all of the courses you are presently enrolled in. If you don't see the course listed here but you are properly registered for the course in ACORN, wait 48 hours.

Recording Lectures

Lectures and course materials prepared by the instructor are considered by the University to be an instructor's intellectual property covered by the Canadian Copyright Act. Students wishing to record a lecture or other course material in any way are required to ask the instructor's explicit permission, and may not do so unless permission is granted. Students who have been previously granted permission to record lectures as an accommodation for a disability are excepted. This includes tape recording, filming, photographing PowerPoint slides, Quercus materials, etc.

If permission for recording is granted by the instructor (or via Accessibility Services), it is intended for the individual student's own study purposes and does not include permission to "publish" them in any way. It is forbidden for a student to publish an instructor's notes to a website or sell them in any other form without formal permission.

FIPPA Language

This course, including your participation, will be recorded on video and will be available to students in the course for viewing remotely and after each session. Course videos and materials belong to your instructor, the University, and/or other sources depending on the specific facts of each situation, and are protected by copyright. Do not download, copy, or share any course or student materials or videos without the explicit permission of the instructor. For questions about recording and use of videos in which you appear please contact your instructor.