Rotman Commerce
UNIVERSITY OF TORONTO

Course Outline

RSM434H1-F
Financial Trading Strategies
Fall 2019

Course Meets:

L0101	Mondays	11am – 1pm	Finance Lab (RT 290)
L0201	Mondays	1pm – 3pm	Finance Lab (RT 290)

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Office Hours:	Tuesdays 11am – 1pm, by appointment

Course Scope and Mission

At the conclusion of the course, I want students to <u>understand</u> what is happening in capital markets by experiencing decision-making in the Rotman Interactive Trader (RIT) simulated market. This is a learn-by-doing course where students will develop their understanding experientially via trial and error (trading in the simulated market) – you will be actively participating in the learning process each class.

The competitive nature of markets distills the decision-making process down to a series of tradeoffs that balance liquidity, time, and risk. By experiencing these tradeoffs in a simulated market, students will gain a better sense of the constraints imposed by liquidity (how much can I trade?), the relationship between time and uncertainty (do I trade now or wait for a better/worse price?), and the necessity of taking on risk (if I don't make any trades, how can I make any money?).

These tradeoffs will be explored through topic coverage that broadly falls under market microstructure branch of finance, with some supporting case material from the M&A and investing fields.

We will start off by looking at market structure through the eyes of Agency and Proprietary traders to introduce the mechanics of trading and fundamental issues when trading in markets (liquidity, risk, behavior) and then progress to (arguably) the most important function of a market, price

discovery (how prices are formed by impounding information). In combination with the content in the videos and quizzes, students will then have a solid background that can be applied to specific types of trading strategies (arbitrage, private information, market-making) both manually and through the creation of algorithmic trading programs.

The learning outcomes can be summarized as follows:

1. **Introduction to Market Microstructure**
   Students will develop a fundamental understanding of the roles of market makers, agency traders and liability traders, and will be able to analyze the risks and the opportunities involved with each role

2. **Introduction to Price Discovery**
   Students will discover how prices are formed by market participants incorporating public and private information into their trading decisions, and how to incorporate information in market prices in their own decision-making process

3. **Introduction to Arbitrage**
   Students will be introduced to the unique market dynamics of commodities trading and develop trading strategies by identifying mispricing opportunities and analyzing profitability across different opportunities

4. **Introduction to Algorithmic Trading**
   Students will learn to create algorithms that automatically follow trading instructions to capture various profit opportunities while managing their positions and order flow to avoid taking unnecessary risks

Rotman Interactive Trader
The Rotman Interactive Trader is a market-simulator that provides students with a hands-on approach to learning finance. It allows students to practice decision making under uncertainty in a controlled environment where they can immediately observe the outcomes of their decisions. By being able to analyze the consequences of their decisions in different situations, students are able to learn how to make good decisions when the future is uncertain. More information can be found at http://rit.rotman.utoronto.ca.

Course Prerequisite: RSM332
Course Exclusions: RSM412 – Financial Trading Strategies

Required Readings
There is no textbook for this course. Slides, videos, RIT Case Briefs, Excel support templates, help files, and any other materials will be posted on the course webpage. It is required that students read the case studies prior to attending each class.

Weekly Schedule

Class Date	Topic	Cases	Due
9-Sep	Intro to RIT and Python		
16-Sep	Agency Trading (order entry, manage liquidity)	AT1 and AT2	Quiz 1
23-Sep	Liability Trading (PnL motive, behavior)	LT2 and LT3	Quiz 2
30-Sep	Algorithmic Trading (Arbitrage and Market Making)	ALGO1 and ALGO2	Quiz 3
7-Oct	Price Discovery (Private Information)	**LT3 Evaluation;** PD0/PD2	Quiz 4
14-Oct	Thanksgiving - No Class		
21-Oct	Price Discovery + Arbitrage	**ALGO1 Evaluation**; PD3	News Item
28-Oct	Mergers and Acquisitions Arbitrage (Pricing)	**ALGO2 Practice Run**; MA1	Quiz 5
4-Nov	Reading Week - No Class		
11-Nov	Mergers and Acquisitions Arbitrage (Probability)	**PD3 Evaluation**; MANew	
18-Nov	Equity Valuation (Multiples and DDM)	**PD3 ALGO Practice Run**; EV1/EV2	Quiz 6
25-Nov	Equity Valuation + Price Discovery	**MANew Evaluation**; EVNew	
2-Dec		**EVNew Evaluation; Open**	
5-Dec	**ALGO SUPERDAY! ---- ALGO2 Evaluation, PD3 ALGO Evaluation; Results Discussion, Course wrap-up**		

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 he or she has command of the course materials.

Evaluation	Grade	Due Date
Quercus Quizzes	15 Marks	Throughout the Term
In-Class Participation	5 Marks	Throughout the Term
RIT Performance	45 Marks	LT3 (Oct 7) - 10 Marks
		ALGO1 (Oct 21) - 5 Marks
		PD3 (Nov 4) - 10 Marks
		MA2 (Nov 25) - 10 Marks
		EVNEW (Dec 2) - 10 Marks
ALGO2 Project	17.5 Marks	ALGO2 Practice Run (Oct 28) - 2.5 Marks
		ALGO2 Video (Nov 1) - 5 Marks
		ALGO2 Performance (Dec 5) - 10 Marks
PD3 ALGO Project	17.5 Marks	PD3 ALGO Practice Run (Nov 18) - 2.5 Marks
		PD3 ALGO Video Submission (Nov 22) - 5 Marks
		PD3 ALGO Performance Evaluation (Dec 5) - 10 Marks

EVALUATION EXPECTATIONS

Quercus Quizzes

I want class time to focus on work that requires the lab (i.e. trading), as opposed to lecturing in the lab. To accomplish this, I am pushing the former lecture component outside of class time and offering the following Faustian Bargain: as compensation for spending added time outside of class watching videos on your own (instead of me reading the slides to you during class), we will have no final exam.

Part of this bargain is a "trust but verify" regime that requires you to complete a series of quizzes that are tied to the videos. Quizzes are available to be completed at any time, with deadlines spaced throughout the term. Each Quiz is worth 3 Marks, and a late penalty of 0.5 marks is applied for each day after the deadline that elapses.

To be effective, the quiz deadlines are set to be the day BEFORE we cover each video's material with the in-class RIT cases (the Faustian part of the Bargain). Yes, this means the first quiz is due in the FIRST week of classes.

The final quiz, "News Item", will be about a news article that I will post a week prior to the News Item quiz deadline, and is really meant to be fun for me.

In-Class Participation

My primary goal in assigning participation marks is to encourage students to share their experience as we go through the cases. It is helpful for other students to hear what worked or didn't work well for you as you are trading, and vice versa. As such, grades are not assigned based on "correctness", but on "helpfulness". In-class questions about video content or quizzes will also count as participation.

As an added bonus, students who share in at least one class will be allowed to substitute their own personally selected login for their Student ID in RIT. Instead of 123456789 you could be Ragnarok (actually no, as I have already taken this name for one of my algorithms, but you get the idea) or something equally entertaining (all logins must be approved by the instructor). This becomes more meaningful when we get into the algorithmic cases and performance is displayed real-time.

My secondary goals reflect the idea that generally, comfort with public speaking translates to comfort in a job interview (and perceived confidence from the point of view of the recruiter) and trading floors are traditionally loud places filled with people who don't shut-up, so a little class participation now can payoff in your future.

RIT Performance Evaluations

You will be graded on 5 RIT cases outside of the ALGO projects (see "RIT Performance" in the Evaluations table). Grading for these cases will be based strictly on your performance trading these cases during class. The cases are designed such that students who understand and apply the learning objectives better will perform better.

We will run each case 5 times, with the final grade being based on the performance across all 5 runs. Students will be ranked by two metrics: Profit/Loss and Semi-Standard Deviation

Profit/Loss Ranking: students are ranked by Profit/Loss (highest to lowest) in each run with an average of the ranks computed at the end of the last run. For example, if a student ranked 1st, 8th, 12th, 3rd, and 40th, their average rank would be 12.80.

Semi-Standard Deviation Ranking: a semi-standard deviation will be computed for each student's Profit/Loss using 0 as a hurdle (i.e. only losses will be included), with this semi-standard deviation being ranked by student (lowest to highest). For example, if a student's Profit/Loss is $100, -$1,000, -$500, $400, -$600, their semi-standard deviation would be computed using 0, -1,000, -500, 0, and -600 as inputs, resulting in a semi-standard deviation of 382, which ranked 25th in the class (a student with only profits would have only 0's and therefore a semi-standard deviation of 0).

Final Ranking: the rank of the student's average Profit/Loss rank is averaged with the student's semi-standard deviation rank to compute an overall score. This score is then ranked to produce the student's final ranking for the case.

To continue with the above example, if the student's average Profit/Loss rank is 12.80 then the student's overall score would be the average of 12.80 and 25, or 18.90. This score of 18.90 would then be used to calculate the student's grade.

Overall scores are arranged from lowest to highest, with the lowest receiving a grade of 10 and the highest a grade of 5. Grades between the highest and the lowest are determined by the distance between scores. The range between the highest and lowest scores is divided by the range between the highest and lowest grades, giving us grade-per-score measure. The grade-per-score measure is used to determine the grade difference between scores.

For example, if the overall score ranges from 14 to 59 (a range of 45), the grade-per-score would be 5/45 = 0.1111. The highest score, 14, earned a grade of 10, which means that a score of 18.90 would earn a grade of 9.46 (the grade of 10 modified by difference between scores of 4.90 multiplied by the grade-per-score of 0.1111 or grade differential of 0.54)

If this grading scheme seems overly complex, you may be correct. It is designed to achieve two simultaneous goals: reward students who perform well (Profit/Loss ranking) while penalizing random luck (multiple runs of each case, semi-standard deviation ranking). If you remember your previous finance courses, I am effectively imposing a risk-aversion preference onto your grading scheme.

ALGO Projects

You are going to complete 2 algorithmic trading projects. Each of these projects requires you to build an algorithmic trading program in Python (yes, Python only, no VBA). These are projects instead of cases because the performance evaluation will your algorithms against the market – you are building a machine to trade for you. You can work individually or in a group of 2 people (must be in the same section).

Each project has 3 components you must complete. The first is to have a working algorithm submit trades during the Practice Run sessions. The second is to submit a brief video describing what improvements you think are needed to your algo, based on the results of the Practice Run. As part of the video, you must submit the trading report from one of the simulations completed in the Practice Run (don't forget to save it!).

At the end of the term, on ALGO SUPERDAY, your completed trading algorithms will compete in the performance evaluations for the algo cases.

Each ALGO Projects' 3 deliverables total 17.5 marks each:

Practice Run (2.5 marks) – a version of your algorithm must be run in Practice Run sessions. Your PnL is not evaluated – students earn full marks if the algorithm successfully executes multiple passive orders on both the buy and sell side of the market for ALGO2 and executes a trade triggered by parsed news for PD3 ALGO. This is intended to short-circuit the risk of last-minute project efforts that leave students (sadly) without a working algorithm on ALGO SUPERDAY.

Video Submission (5 marks) – students must submit video that is no longer than 1 minute in length for each of the Algo Projects (i.e. there are 2 videos to be recorded). The video will describe areas of improvement for your algo (i.e. what did your algo do wrong, or where did it fail to compete effectively) and possible fixes you will try, after seeing the results in the Practice Runs. You will submit the trading report from one of the runs as a reference for the grader. Video Submissions are due on the Friday of the week of each Practice Run, with a 1 mark deduction for each day late.

Hopefully, the Practice Runs and Video Submissions will give you a sense of good/best practices when developing an algorithmic tool – design, test, revise design based on testing, test again, revise, etc.

Performance Evaluation (10 marks) – the final versions of your algorithms will run in-class on Dec 5th. Grading will be according to the performance evaluation scheme used for the RIT cases.

To aid students with coding, tutorial sessions are scheduled during the term at which TAs will be in attendance to answer questions and help with coding issues.

Video Submission: The Communicado Platform

The Mind-Brain Hive within the Desautels Centre for Integrative Thinking has created a new platform – Communicado – that we will be piloting in RSM434. This platform allows students to submit recorded videos to posed questions. The platform produces a written transcript of the video recording, and allows the grader to provide time-stamped comments on the submission. The student will receive the comments, the transcript and his/her grade. The student will be able to download the video s/he submitted to review.

We will be using the Communicado platform for the video component of the Algo projects in **RSM434**. Please be sure to use the Chrome browser to access Communicado. Watch for an email from **admin@communicado.ca** with the Subject Line '**Communicado Account Activation**'. You do not need to register or create an account. An individual account has been created with your name and email. When you receive the account activation email, all that is required is that you create a password. Then go to **https://rotmancommerce.communicado.ca** and sign in.

If you do not activate your account within **7 days** of receiving the activation email, you will need to request that your password be re-set from the link on the sign-in page. You will then need to exit the site and return.

For all video submissions using Communicado, begin your video recording by holding your student ID card to your webcam so that the grader viewing your video submission can verify your identity.

For each assignment, grades are assigned based on the sophistication of the insights in the video assignment and the clarity of your explanation. The rubric for the video assignment will be posted on Quercus. The question is the same for each video for all students, and you will be allowed to record 3 videos and select which one to submit.

For All Submissions:

Please note that clear, concise, and correct communication will be considered in the evaluation of your work in the Video assignments. That is, you may lose points for: poor organization, weak argument development, excessive wordiness, hard-to-follow sentence structure, and grammatical errors. Students who require additional support and/or tutoring with respect to their communication skills are encouraged to visit the Academic Success Centre (http://www.studentlife.utoronto.ca/asc) or one of the College Writing Centres (www.writing.utoronto.ca/writing-centres). These centres are teaching facilities – not editing services, where trained staff can assist students in developing their academic writing skills. There is no charge for the instruction and support.

Group Work (ALGO Projects):

Learning to work together in teams is an important aspect of your education and preparation for your future careers. That said, project-based teamwork is often new to students; to work well in teams, it helps to follow a set of core expectations to best succeed at your team projects.

1. Read the document entitled, "Working in Teams: Guidelines for Rotman Commerce Students" which is available on the RC portal under the Academic Services tab.

2. When working in a team, Rotman Commerce students are expected to:
- Treat other members with courtesy and respect;
- Honour the ground rules established by the team;
- Contribute substantially and proportionally to the final project;
- Ensure enough familiarity with the entire contents of the group project/assignment so as to be able to sign off on it as original work;
- Meet the project timeline as established by the team.

3. Resolving conflicts:
Conflicts are part of the team's process of learning how to work together. When handled well, it can generate creativity and bring-multiple perspectives to the solution.

Student teams are expected to work through their misunderstandings as soon as they arise (and prior to submission of the final project). When teams are unable to arrive at a solution that works for all members, the team must meet with the Rotman Commerce Team Coach as soon as possible. The Coach will listen to the team and help develop options for improving the team process. All members of the project team must commit to, and, utilize their action plans.

Electronic Course Materials
This course will be using the following electronic course materials:

Rotman Interactive Trader (RIT)

RIT is offered at a university-level on-site license so students are not required to make any purchase.

POLICY AND PROCEDURE

Missed Tests and Assignments (including midterm examinations)
Students who miss a test or assignment for reasons entirely beyond their control (e.g. illness) may submit a request for special consideration. The Request for Special Consideration Form and supporting documentation must be submitted in a timely manner in order for the request to be reviewed.

In such cases, students must notify the Rotman Commerce Program Office on the date of the course deliverable such as a missed test, or assignment missed class (in the case of participation marks), or due date. They must then complete a Request for Special Consideration Form and submit it along with supporting documentation (e.g. Verification of Student Illness or Injury form) to the Rotman Commerce Office within **2 business days** of the originally scheduled course deliverable. Students who do not provide appropriate or sufficient supporting documentation will be given a grade of 0 (zero) for the missed course deliverable.

Documentation submitted in support of petitions for missing tests and assignments must be original; no faxed or scanned copies will be accepted.

Note that the physician's report must establish that the patient was examined and diagnosed at the time of illness, not after the fact. Rotman Commerce will not accept a statement that merely confirms a later report of illness made by the student to a physician.

Due to the nature of the evaluations (in-class simulations), missed evaluations will be reweighted to the remaining cases.

Late Assignments
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 disability, or have any accessibility concerns about the course, the classroom or course materials, please contact Accessibility Services as soon as possible: accessibility.services@utoronto.ca or http://www.studentlife.utoronto.ca/as.

Academic Integrity
Academic Integrity is a fundamental value essential to the pursuit of learning and scholarships at the University of Toronto. Participating honestly, respectively, responsibly, and fairly in this academic community ensures that the UofT 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 http://www.governingcouncil.utoronto.ca/policies/behaveac.htm 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 UofT 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 UofT 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 the ROSI system. For more information please visit http://help.ic.utoronto.ca/category/3/utmail.html

Forwarding your utoronto.ca email to a Hotmail, Gmail, Yahoo or other type of email account is not advisable. In some cases, messages from utoronto.ca addresses sent to Hotmail, Gmail or Yahoo 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 ROSI, 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 (note: students who have been previously granted permission to record lectures as an accommodation for a disability are, of course, excepted). This includes tape recording, filming, photographing PowerPoint slides, Quercus materials, etc.

If permission 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 anyway. It is absolutely forbidden for a student to publish an instructor's notes to a website or sell them in any other form without formal permission.