

ISyE 4311 • Capital Investment Analysis
Fall 2025 • Time: 8-9:15am MW • Location: IC 215

Instructor: Ying (Laura) Li, Ph.D. (laura.li@gatech.edu)
Office – Groseclose 310
Office Hours: 9:30 – 10:30am MW
TA: Rajiv Lade (rlade@gatech.edu)
TA Office Hours: TBD

Overview

Course description: Students learn core concepts and techniques for economic decision and analysis of complex capital investment problems that involve dimensions of time, uncertainty and strategy.

Course outcomes: Upon successful completion of this course, you will be able to:

- 1) Calculate present values, future values, continuation values and account balances given a cash flow stream
- 2) Evaluate perpetuities and annuities
- 3) Compute effective interest rates and develop amortized loan schedules
- 4) Price risk-free assets
- 5) Estimate after-tax free cash flows
- 6) Evaluate embedded project options in an uncertain market
- 7) Understand the fundamentals of portfolio management
- 8) Construct minimum-variance portfolios, mean-variance efficient frontiers, and efficient portfolios
- 9) Calculate the required risk-adjusted expected return and apply it in portfolio management
- 10) Apply the Capital Asset Pricing Model and estimate the weighted average cost of capital

Modality: This is an in-person course. It has been shown that for most students, in-person attendance provides the best learning experience.

Pre-requisites: ISYE 3025 – Engineering Economy; ISYE 3232 – Stochastic Manufacturing & Service Systems; ISYE 3133 – Engineering Optimization

Course Materials and Resources

There is no required textbook. Lecture slides will be posted regularly and represent an integral part of the course.

Reference materials: The following sources may be useful as references. Earlier editions of the books are fine.

- *Corporate Finance*, 6th edition by J. Berk and P. DeMarzo. Pearson, 2023.
- *Investment Science*, by Luenberger, Oxford University Press, 1998.

Course Website: The course website on Canvas will be used extensively throughout the semester for distributions of various materials that will include the syllabus, lecture slides,

assignments, and announcements. This site will be continually updated, so make sure you check it frequently.

Sharing course information with anyone not currently enrolled in this class is strictly prohibited.

Grading

Grade components: Each student will have an opportunity to earn a total of 400 points towards their final course grade (if grade components are added, deleted, or modified, the points will be adjusted accordingly). The final course grade will be computed based on the following components:

Component	Total Points	Percentage
Midterm Exams (2x100)	200	50%
Final Exam	100	25%
Review Exercises (4x20)	80	20%
Participation Quizzes (10x2)	20	5%
	400	100%

Grade/minimum points required: A/360; B/320; C/280; D/240

Midterms (200 points) and the final exam (100 points): Exams are individual efforts. There will be three exams: two midterms (each worth 100 points) and a final exam (worth 100 points). The midterms are not designed to be cumulative, but it should be clear that the materials covered later in the semester rely on materials covered earlier in the semester. The two midterms are in-class tests during the semester. The comprehensive final exam is 2.5 hours long and it is conducted during the institute's final exam period. There will be no makeup for any exams, except for institute approved absences.

All exams are closed-books, closed-notes, paper-based exams. One standard-size (A4) handwritten crib sheet (single-sided) is allowed at each exam.

Students are responsible for bringing a calculator with power functions and storage registers to all exams. Calculators must be computation-only devices with no internet capability. Cell phones may not be used as calculators.

Review exercises (80 points): Review exercises are designated as individual work. Students are allowed to discuss them with friends, colleagues, and the instructor. However, when preparing the submission of review exercises, students must do their own work. This means:

- Students may ask the instructor or TA for clarifications and guidance
- Students may discuss problems with one another
- Students may help one another through difficulties and rough spots
- Students may compare solutions with one another
- Students may not copy work from one another
- Students may not share computer files

The general purpose of the review exercises is to strengthen and evaluate students' skills, and to serve as preparation for the exams. There will be four review exercises. Each is worth twenty points and covers multiple classes of course materials.

Review exercises should be submitted electronically on the course website via file uploads in PDF and Excel format. A link to a document on a third-party platform is not an acceptable submission. The due dates are specified in the class schedule. Late submissions are acceptable before 11pm on the last day of classes for this course (**December 1, 2025**). An accepted late submission will be penalized by a seven-point grade deduction for the assignment.

Participation quizzes (20 points): Ten participation quizzes, each worth two points, will be given in class on random dates, and they are due at the end of those classes. Their purpose is to encourage active learning and enhance problem solving skills. These quizzes are graded based on participation, not accuracy. Late submissions will not be accepted, except for institute approved absences.

Excused Absences from Exams or Assignments

We only accept notifications from Dean's office or institute Approved Absences with the links to the on-line request forms below.

https://gatech-advocate.symplicity.com/care_report/index.php/pid167160
<https://registrar.gatech.edu/info/institute-approved-absence-form-for-students>

Please inform the instructor of your approved absences timely. If the notification from Dean's office is for instructor's discretion and your absence prevents you from completing assignments or tests, please discuss the accommodation with the instructor as soon as possible. Since it is difficult to create a different but fair test, and solutions to assignments may have already been published, the accommodation might not be a makeup test or assignment.

Grade appeals: Grade appeals should be presented in writing within one week after the grades are released. A grade appeal may result in the entire exam or assignment being reggraded.

Administrative Policies

General: The [Student-Faculty Expectations Agreement](#) provides a framework for creating an atmosphere of mutual respect in the classroom. You are encouraged to review it. The [Honor Code](#) is taken seriously in this class. You should familiarize yourself with its rules and procedures.

Attendance: You are expected to attend the classes. Feel free to ask questions in class. You will receive the benefit of answers to questions asked by others in class. Keep in mind that there will be graded class activities. You are responsible for all materials presented in class, plus class discussions thereof.

Classroom behavior: Cell phone, tablet and/or computer use is permitted in class only if you are using the device to take notes or participate in a class activity.

Communications: You should address all emails about the course to the instructor. Be sure to include the course number in the subject field (ISyE 4311). Many procedural questions are already answered in the syllabus, so please check the syllabus beforehand. Students are encouraged to utilize Ed Discussion, which is a forum for Q&A and discussions. You have the freedom to make your post public or private. The instructor will answer questions on Ed Discussion.

AI usage: The use of Generative AI tools (such as Copilot, ChatGPT, Perplexity, etc.) is not allowed in tests. If generative AI tools are used to facilitate your work on a review exercise, submit your answers with an AI Usage Statement (in pdf format) outlining:

- Which tools were used
- When they were used
- What prompts or questions were given
- How the AI output informed or shaped your final submission

Website outages: You should download the relevant course materials from Canvas well in advance of exams. OIT often does upgrades or service activities, and you do not want these items to be unavailable if you are looking for them the night before an exam.

Accommodation for individuals with disabilities: The [Office of Disability Services](#) assists with accommodation for individuals with disabilities. If you need accommodation, please contact the instructor as soon as possible to discuss your individual needs.

Academic resources: You are encouraged to use campus academic support resources for tutoring and coaching if needed. Resources include the [Center for Academic Success](#) and [OMED](#).

Non-academic resources: Your well-being is important. If you find yourself with a serious non-academic issue, campus resources include the [Center for Mental Health Care & Resources](#), [Health Services](#) and [Student Life](#).

Inclement conditions: Campus closures or opening delays may occur due to inclement conditions. Exam dates and assignment due dates may be modified if, in the instructor's judgment, conditions impair successful student learning and performance.

Course Schedules

Final exam schedule:

Final Exam
Dec. 10, Wednesday
8:20--10:50am

Class schedule:

(Life is uncertain, so is this schedule. Updated versions will be posted on Canvas if necessary.)

	Date	Topic	Content	Online Submission
1	8/18	Intro	Syl., Intro	
2	8/20	Valuation Basics	Module 1A	RE#1 due @11pm, 9/11
3	8/25		Module 1B	
4	8/27		Module 1C	
5	9/3		Module 1D	
6	9/8		Module 1E	
7	9/10	Wrapup + Q & A		
8	9/15	Review #1		
9	9/17	Midterm #1		
10	9/22	Cash Flow Estimations	Module 2A	RE#2 due @11pm, 10/9
11	9/24		Module 2B	
12	9/29		Module 2C	
13	10/1		Module 2D	
14	10/8	Project Options Analysis	Module 3A	RE#3 due @11pm, 10/23
15	10/13		Module 3B	
16	10/15		Module 3C,D	
17	10/20		Module 3D,E	
18	10/22	Wrapup + Q & A		
19	10/27	Review #2		
20	10/29	Midterm #2		
21	11/3	Risk vs. Return Analysis	Module 4A	RE#4 due @11pm, 11/20
22	11/5		Module 4B	
23	11/10		Module 4C	
24	11/12		Module 4D	
25	11/17		Module 4E	
26	11/19	Cost of Capital	Module 5	
27	11/24			
28	12/1	Review #3		