

University of Illinois at Urbana-Champaign

ASRM 533 Risk Management and Regulations

Fall 2020 Course Outline

**Instructor:**

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**Teaching Assistant**

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**Online Learning**

- Learning will be conducted completely online.
- Material will be uploaded to the Illinois Compass 2g Learning Management System (LMS) using the following course space name: Fall 2020-ASRM 533-Risk Management and Regulations-(add section), with the following link: (to be added) †
- The course is constituted of 15 modules (Each module is 1 week of instruction) subdivided as follows: (Detailed in Course Calendar)

Module	Dates	Material Uploaded on LMS
Module 0	Tuesday Aug. 25	1-Course outline 2- Welcoming Video explaining the outline 3- Pre-recorded lecture video covering the learning outcomes of the course.
	Thursday Aug. 27	Links to three synchronous zoom office hours to accommodate different time zones (Times to be determined the first week of instruction). Kindly use your real names when entering in the meeting as attendance will be taken.

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		Attendance of one of the above office hours is highly recommended, each according to his/her most convenient time zone.
Modules 1-14	Tuesdays: Sep. 1, Sep. 8, Sep. 15, Sep. 22, Sep. 29, Oct. 6, Oct. 13, Oct. 20, Oct. 27, Nov. 3, Nov. 10, Nov. 17, Dec 1, Dec. 8	<p>1- Lecture notes</p> <p>2- Set of 20 minute pre-recorded videos covering the materials in the lecture notes</p> <p>3- HW on the material covered (always due by next Monday at 12:00 pm (CT) except when quizzes and midterms are scheduled. <i>(Please check detailed Calendar at the end of this outline)</i>)</p>
	Thursday Sep. 3, Sep. 10, Sep. 17, Sep. 24, Oct. 1, Oct. 8, Oct. 15, Oct. 22, Oct. 29, Nov. 5, Nov. 12, Nov. 19, Dec 3, Dec. 9	<p>Links to three synchronous zoom office hours to accommodate different time zones (Times to be determined).</p> <p>Attendance of one of the above office hours is highly recommended, each according to his/her most convenient time zone. Kindly use your real names when entering in the meeting as attendance will be taken.</p>

### Notes on Videos and Slides

- The above learning material will be uploaded in the content area, listed in the left hand panel of the Compass course space.
- All videos will be uploaded to the Illinois Media Space and embedded into the Compass course space;
- Office hour zoom meetings will be scheduled and accessible under the zoom meeting button in the left hand panel of the Compass course space.
- All zoom meetings will be recorded live and embedded into Cloud Recordings. However, they won't be uploaded to the Illinois Media Space and hence they are not publicly accessible.

## Additional Engagement Activities

To ensure efficient and timely engagement in the online learning experience students are encouraged to participate and effectively use the following:

1- **Discussion Board:** (Found on the left hand panel of the Compass course space)

In this space, students may ask questions to fellow colleagues and benefit from each other's help. The TA will check the questions weekdays and respond to any unanswered question. The instructor will double check every Monday and provide clarifications either through the forum or by addressing the questions in the next week's lecture.

2- **Announcements:** (Found on the left hand panel of the Compass course space).

Students are encouraged to regularly check the announcements related to uploading new lectures, videos, reminders of exam dates, assignment due dates, changes in scheduled zoom sessions, etc. Note that when announcements are posted, students receive immediately an email notifying them of a new announcement.

3- **Email and Zoom Appointment:** Emails and Zoom appointments are reserved for private and feedback matters. Teaching assistant checks and replies emails on every weekday, while the instructor checks and replies emails on Fridays, Mondays, and Wednesdays evenings. Zoom appointments may be scheduled to discuss private matters and they have to be scheduled by email.

## Course Syllabus

**Description:** This course starts with defining risk for corporations and financial institutions; the concept of risk pooling and the relationship between risk and return; we explore the key risks faced by financial institutions from banks, insurance companies, mutual funds, hedge funds and Exchange traded funds (ETF) and tackle methods used to assess and mitigate them; we look at market risk mitigation using delta, gamma and vega hedging; we then discuss interest rate risk management with duration convexity and interest rate swaps; we then discuss (VAR) value at risk and (ES) expected shortfall. Finally, we discuss international regulations governing bank operations from Basel I, Basel II and Basel III and regulations governing insurance companies such as Solvency II.

**Textbook:** Risk Management and Financial Institutions 5<sup>th</sup> edition, John C. Hull.

**Prerequisite:** ASRM 401 or MATH 461 or STAT 400

### Course Learning outcomes

#### I- Risk and Return

- a) Define risk as the standard deviation and how pooling reduces risk.
- b) Describe the relation between risk and return and the effect of diversification on the overall risk. Construct the efficient frontier for multiple risky assets, the Capital Market Line (CML) as well as the Security Market Line (SML).
- c) Develop the CAPM Theory and extend it to multi factor model leading to Arbitrage Pricing Theory (APT)
- d) Use Excel to construct the efficient frontier and the CML

#### II- Financial Institutions

- a) Define the different types of Banks (commercial vs investment), distinguish between their capital requirements, their functions and the risks involved in their operations.
- b) Define the different types of Insurance companies (Life, Property/Casualty/ Health, Reinsurance and Pension Funds). Assess the risks embedded in their products. Evaluate their capital requirements and the regulations governing them.
- c) Define financial institutions other than Banks and Insurance companies such as Mutual Funds, ETF and Hedge Funds. Distinguish between their products, fees and their regulatory framework. Decipher the risks involved in their operations.

#### III- Risk Management Techniques for:

- a) Market Risk:
  - Distinguish the characteristics of the following market products: Stocks, futures, forwards, options, swaps
  - Evaluate asset prices using risk neutral evaluation
  - Evaluate option pricing using one period binomial models, multi-period binomial method and the continuous time Black Sholes Merton formula.
  - Compute the Greeks: Delta, Gamma, Theta and Vega and learn how they can be used to establish Delta and Gamma hedging of a portfolio
- b) Interest Rate Risk:
  - Define net interest income, net interest margin
  - Evaluate asset/liability mismatch risk and devise methods to address it.
  - Calculate the Macaulay/ Modified duration for Assets and Liabilities (The equivalent of delta of the portfolio)
  - Calculate the Convexity of the Assets and Liability. (The equivalent of gamma of the portfolio)
  - Devise an immunization strategy when the yield curve has parallel shifts
- c) Value at Risk (VaR) and Expected Shortfall (ES)
  - Define and calculate VaR as an attempt to summarize total risk of a portfolio in one single number

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- Calculate the conditional value at risk or conditional tail expectation denoted by expected shortfall.
- Determine the parameters for the VaR and ES

### **VI- Regulation**

- a) Describe the reasons behind the need for international financial regulatory agreement.
- b) Learn the Bank Regulations prior to 1988, the 1988 Basil I, 1996 Amendments
- c) Define and describe the three pillars under Basel II
  - Calculate the Minimum Capital requirements for credit risk reflecting the creditworthiness of counterparties using the Standardized approach, the Internal Ratings Based (IRB) approach and the advanced IRB approach.
  - Supervisory Review
  - Market Discipline
- d) Define and describe the international standards for the regulation on insurance companies by Solvency II.
- e) Define and describe the amendments under Basel III and post crisis changes
- f) Define and describe Regulations of the Off the Counter Derivative Markets (Only if time permits)

### **Online Assessment tools:**

The following table itemizes the assessment tools and their contribution to the final grade of the course:

Type	Format	Due Dates*	Correction Due	% of final Grade
6 Assignments	PrairieLearn/ exel/R/other	Mondays noon on:  Sep. 08, Sep. 14, Sep. 28, Oct 05, Oct. 19, Nov. 02	Friday Evening	6% each, drop lowest  Total grade 30%
4 Quizzes (15-20 min)	PrairieLearn/Proctorio	Tuesdays:  Sep. 22, Oct. 27, Nov. 10, Dec. 08	Instantaneous	6% each, drop lowest  Total grade 18%
Midterm 1 (1 hour) (closed book, closed notes)	PrairieLearn/Proctorio	Tuesday, October 13, 2020	Tuesday, October 20, 2020	10%

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Midterm 2 (closed book, closed notes)	PrairieLearn/Proctorio	Tuesday. November 17, 2020	Monday, November 30, 2020	10%
Final (closed book, closed notes)	PrairieLearn/Proctorio	TBA		20%
Attendance				12%
Total				100%

***Kindly check the detailed calendar at the end of this outline***

### **Notes on Assessment tools:**

- The sample solution of assignments will be uploaded after the due date.
- Any queries of assignment grading are forwarded to the grader.
- There is a 2-day late submission window on assignments with 30% penalty on the final grade of that assignment.
- Discussion is encouraged on assignments but plagiarism is strictly prohibited.
- Makeup quizzes/midterms are not stipulated except in the very rare event of having a major inevitable circumstance hindering the scheduled exam. A written permission must be granted by the instructor for that purpose.
- The coverage of each examination is announced two weeks before the examination.
- Sample solutions of midterms are uploaded after the examination.
- Graded examinations are returned within a week after the examination.
- Queries on exam grading are forwarded to the teaching assistant.

**Final Grade and Letter Grading Scale**

After calculating your grade using the above percentages, the letter grade is obtained according the following mapping:

Final Score	Letter Grade
A+	98% - 100%
A	92% - < 98%
A-	90% - < 92%
B+	88% - < 90%
B	82% - < 88%
B-	80% - < 82%
C+	75% - < 80%
C	70% - < 75%
C-	65% - < 70%
D+	60% - < 65%
D	55% - < 60%
D-	50% - < 55%
F	Below 50

**Academic Integrity Statement**

The University has the responsibility for maintaining academic integrity so as to protect the quality of education and research on our campus and to protect those who depend upon our integrity.

1. Expectations of Students. It is the responsibility of each student to refrain from infractions of academic integrity, from conduct that may lead to suspicion of such infractions, and from conduct that aids others in such infractions. Students have been given notice of this Part by virtue of its publication. Regardless of whether a student has actually

read this Part, a student is charged with knowledge of it. Ignorance is not a defense.

2. Expectations of Instructors. It is the responsibility of each Instructor to establish and maintain an environment that supports academic integrity. An essential part of each Instructors responsibility is the enforcement of existing standards of academic integrity. If Instructors do not discourage and act upon violations of which they become aware, respect for those standards is undermined. Instructors should provide their students with a clear statement of their expectations concerning academic integrity.

Further details: <https://studentcode.illinois.edu/article1/part4/1-401/>

### **Accommodations Statement**

To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES, you may visit 1207 S. Oak St., Champaign, call 333-4603, e-mail [disability@illinois.edu](mailto:disability@illinois.edu) or go to the DRES website. If you are concerned you have a disability-related condition that is impacting your academic progress, there are academic screening appointments available on campus that can help diagnosis a previously undiagnosed disability by visiting the DRES website and selecting “Sign-Up for an Academic Screening” at the bottom of the page.

Further details: <https://www.disability.illinois.edu/>

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## Detailed Calendar for Fall 2020

Fall 2020 Calendar	Monday	Tuesday	Wed.	Thursday	Friday
August	24	25 9:00 am CT: Posting on Compass - Course Outline - Welcome Video	26	27	28
September	Monday	Tuesday	Wed.	Thursday	Friday
		1 9:00 am CT: posting on compass - Lecture notes, -Videos on Lecture notes -HW1	2	3 Zoom office hours - to be determined - to be determined - to be determined	4
	7 Vacation	8 8:00 am CT <b>HW 1 Due</b> 9:00 am CT: posting on compass - Lecture notes, - Videos on Lecture notes -HW2	9	10 Zoom office hours - to be determined - to be determined <b>- to be determined</b>	11 8:00 pm CT Correction of HW1 by TA
	14 12:00 Noon CT <b>-HW 2 Due</b>	15 9:00 am CT: posting on compass - Lecture notes, - Videos on Lecture notes	16	17 Zoom office hours - to be determined - to be determined - to be determined	18 8:00 pm CT Correction of HW2 by TA
	21	22 9:00 am CT: posting on compass - Lecture notes, - Videos on Lecture notes -HW3 <b>Quiz 1 (time to be determined)</b>	23	24 Zoom office hours - to be determined - to be determined - to be determined	25 8:00 pm CT Correction of Quiz 1 by TA
	28 12:00 Noon CT <b>-HW 3 Due</b>	29 9:00 am CT: posting on compass - Lecture notes, - Videos on Lecture notes -HW4	30		

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	Monday	Tuesday	Wed.	Thursday	Friday
<b>October</b>				1 Zoom office hours - to be determined - to be determined - to be determined	2 8:00 pm CT Correction of HW3 by TA
	5 12:00 Noon CT <b>-HW 4 Due</b>	6 9:00 am CT: posting on compass -Lecture notes, - Videos on Lecture notes - Revision for Midterm 1	7	8 Zoom office hours - to be determined - to be determined - to be determined	9 8:00 pm CT Correction of HW4 by TA
	12	13 9:00 am CT: posting on compass - Lecture notes, - Videos on Lecture notes - HW 5 <b>Midterm 1 (time to be determined)</b>	14	15 Zoom office hours - to be determined - to be determined - to be determined	16
	19 12:00 Noon CT <b>-HW 5 Due</b>	20 9:00 am CT: posting on compass - Lecture notes, - Videos on Lecture notes 8:00 pm CT Correction of Midterm 1	21	22 Zoom office hours - to be determined - to be determined - to be determined	23 8:00 pm CT Correction of HW5 by TA
	26	27 9:00 am CT: posting on compass - Lecture notes, - Videos on Lecture notes - HW 6 <b>Quiz 2 (time to be determined)</b>	28	29 Zoom office hours - to be determined - to be determined - to be determined	30 8:00 pm CT Correction of Quiz 2 by TA

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	Monday	Tuesday	Wed.	Thursday	Friday
<b>November</b>	2 12:00 Noon CT <b>-HW 6 Due</b>	3 9:00 am CT: posting on compass - Lecture notes, - Videos on Lecture notes	4	5 Zoom office hours - to be determined - to be determined - to be determined	6 8:00 pm CT Correction of HW6 by TA
	9	10 9:00 am CT: posting on compass - Lecture notes, - Videos on Lecture notes - Revision for Midterm2 <b>Quiz 3 (time to be determined)</b>	11	12 Zoom office hours - to be determined - to be determined - to be determined	13 8:00 pm CT Correction of Quiz3 by TA
	16	17 9:00 am CT: posting on compass - Lecture notes, - Videos on Lecture notes <b>Midterm 2 (time to be determined)</b>	18	19 Zoom office hours - to be determined - to be determined - to be determined	20
	23 Vacation	24 Vacation	25 Vacat ion	26 Vacation	27 Vacation
	30 8:00 pm CT Correction of Midterm 2				

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	Monday	Tuesday	Wed.	Thursday	Friday
<b>December</b>		1 9:00 am CT: posting on compass - Lecture notes, - Videos on Lecture notes	2	3 Zoom office hours - to be determined - to be determined - to be determined	4
	7	8 9:00 am CT: posting on compass - Lecture notes, - Videos on Lecture notes Revision for Final Quiz 4 (time to be determined)	9	10 Reading Day	11 Final Examination period
	14 Final Examination period	15 Final Examination period	16 Final Examination period	17 Final Examination period	18 Final Examination period