Instructor:
Prof. Lu Zhang
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Office Hours: By appointment, Zoom/in-person

Class Meeting Schedule:
Session (2813): TuTh, 1:00--2:30pm, in-person, Gerlach 355
Session (2129): TuTh, 4:30--6:00pm, in-person, Gerlach 305
Session (2377): Th,   6:15--9:30pm, Online via CarmenZoom

Course Materials:
Required: **Bodie, Kane, and Marcus, 2024, *Investments*, 13e, McGraw-Hill**. This book (BKM) is the standard Investments text for all top business schools. Earlier versions of the textbook are likely cheaper. Please feel free to use earlier versions for our class if you wish. The course Web site in Carmen contains: (i) lecture notes; (ii) some additional readings in pdf; (iii) suggested questions for case studies; and (iv) quizzes. Students are responsible for obtaining these essential course materials from the Carmen course Web site.

Course Description: This course studies the theory and practice of investment management. The course is applied and quantitative as we apply concepts and empirical methods to the real data.

Prerequisites: Students are required to have completed an introductory finance course and **statistics**. Our field is inherently quantitative. Familiarity with matrix algebra will be useful but not required. Basic statistics is more essential because statistical tools are used in virtually all lectures throughout the course (stock returns are random). Statistics should extend through multiple regression, covariance, and hypothesis testing.

Course Learning Outcomes:
By the end of this course, students should gain expertise to:

- Explain risk aversion and utility; implement the concept of risk aversion in measuring a utility function and summarize how risk aversion affects allocation; work with a portfolio that allocates funds between a risky asset and a risk-free asset; and interpret how leverage could be used in allocation

- Calculate standard deviation and return for two-security portfolios and find the minimum variance combinations of the two securities; explain systematic and firm-specific risk; demonstrate how diversification can reduce the amount of firm-specific risk in the portfolio by combining securities with differing patterns of returns; quantify this risk-reduction concept by calculating and interpreting covariance and correlation coefficients; and conceptualize the importance of diversification

- Explain systematic and firm-specific risk and how one can reduce the amount of firm-specific risk in the portfolio by combining securities with differing patterns of returns; if the portfolio is adequately diversified and firm-specific (or nonsystematic) risk is virtually eliminated, beta (or systematic risk) becomes the relevant risk measure for the portfolio; identify inputs required to use index models and interpret the security characteristic line

- Explain the Capital Asset Pricing Model (CAPM) and construct and use the security market line

- Summarize how to structure asset pricing tests; identify major anomalies in returns on securities; explain the role of microcap stocks and related measurement problems in asset pricing tests

- Explain factor models and the arbitrage pricing theory (APT); use APT to identify mispriced securities; interpret the similarities and differences between the CAPM and APT and the limitations of each; have the knowledge of and be able to implement the state-of-the-art multifactor models on real data

- Calculate risk-adjusted return measures and to evaluate investment performance; implement a style analysis; decompose excess returns into components attributable to asset allocation choices

- Explain market efficiency and how to make rational decisions based on efficient markets; summarize the basic models of behavioral finance; summarize the basic ideas behind the investment, return on equity, and expected growth factors in the investment CAPM and use the *q*-factor model

How This Course Works:

Mode of delivery: The online session is 100% online. You will find a sequence of materials and activities each week in Carmen. We will meet for weekly Zoom sessions via CarmenCanvas during our scheduled class meeting time. The course delivery is **synchronous**.

The day sessions are in-person.

Pace of activities: This course is divided into **modules** that are released at least one week ahead of time. I reserve the right to modify the materials after they are posted online to better adapt to changing classroom dynamics. Apart from our meetings, you can schedule your effort freely throughout the week as you keep pace with our weekly progress.

Credit hours and work expectations: This is a **1.5-credit-hour course**. According to Ohio State policy, students should expect around an average of 1.5 hours per week spent on direct instruction (instructor content and Carmen activities) in addition to 3 hours of homework (reading and quiz preparation).

Attendance and participation requirements: For the online sessions, your attendance is based on your online activities and participation. You are expected to log in to the course in Carmen every week. During most weeks you will probably log in many times. The following is a summary of expected participation:

- **Participating in online activities for attendance**. **Weekly CarmenZoom sessions at scheduled class times are required.** All live, scheduled class sessions are required.
- **For the in-person session, participating in in-person classes at scheduled class times are required**.

Discussion expectations: For the online session, a significant component of our interactions will occur via Zoom in CarmenCanvas. Because this mode of discussion has benefits and challenges that differ from in-person sessions, I wish to share my expectations for how we will meet and communicate:

- Complete pre-work and ready to have open, civil, and supportive discussions in-class.
- Be present (in video) during the entire class session.
- I kindly request that you update your Zoom profile with your name with a picture of your face.
- I kindly request that you share your faces on camera so we can communicate nonverbally as well.
- Please mute your microphone when others are talking to minimize background noise.

Our goal is to create a safe environment where we can benefit from seeing each other and connecting.

Recordings: I will be recording our online Zoom classes for the benefit of students who might need to be absent due to unforeseen contingencies.

Course Technology:

For help with your password, university email, Carmen, or any other technology issues, questions, or requests, contact the Ohio State IT Service Desk. Standard support hours are available at ocio.osu.edu/help/hours, and support for urgent issues is available 24/7.

- **Self-Service and Chat support:** ocio.osu.edu/help
- **Phone:** 614-688-4357(HELP)
- **Email:** servicedesk@osu.edu
- **TDD:** 614-688-8743

Required equipment
- Computer: current Mac (OS X) or PC (Windows 7+) with high-speed internet connection
- Webcam: built-in or external webcam, fully installed and tested
- Microphone: built-in laptop or tablet mic or external microphone
- Other: a mobile device (smartphone or tablet) or landline to use for BuckeyePass authentication

Carmen access
You will need to use BuckeyePass multi-factor authentication to access your courses in Carmen. To ensure that you are able to connect to Carmen at all times, it is recommended that you take the following steps:
- Register multiple devices in case something happens to your primary device. Visit the BuckeyePass - Adding a Device help article for step-by-step instructions.
- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click **Enter a Passcode** and then click the **Text me new codes** button that appears. This will text you ten passcodes good for 365 days that can each be used once.
- Download the Duo Mobile application to all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service.

Grading and Evaluation:
Graded assignments may come in three forms, and students should note the expectations for each in the descriptions of our class assignments below.

- **Independent Work (I):** Strictly non-collaborative, original-individual work. Discussions with other individuals, either in person or electronically, are strictly prohibited.

- **Collaboration Required (C):** An explicit expectation for collaboration among students either in-class or outside (i.e. team/group work in case studies).

Assignment Name	Points / Weight	Assignment Type
In-class quiz 1	15	I
In-class quiz 2	15	I
In-class quiz 3	15	I
The Quant Meltdown Case	15	C
The AQR's Momentum Case	15	C
The Liquidating Harvard Case	15	C
Participation	10	I

Course Assignments:
In-class quizzes will be conducted online via CarmenCanvas **for both in-person and online sessions**.

Academic integrity and collaboration: The quizzes are open-book. Students are free to use any resources available. However, each individual student must complete the quizzes independently, and collaboration among students is strictly prohibited.

Case 1: The Quant Meltdown August 2007:
https://www.thecasecentre.org/products/view?id=132522

Case 2: AQR's Momentum Funds (A):
https://store.hbr.org/product/aqr-s-momentum-funds-a/211025?sku=211025-PDF-ENG

Case 3: Liquidating Harvard:
https://www.thecasecentre.org/products/view?id=132731

We will study cases during the last three Thursday meetings. Case 3 is a big case. Please pick at least 8 out of 34 questions in the case to answer. Answers to more questions are of course welcome.

Cases are for teams, with up to five members. If your team is interested in presenting the case, please email me as soon as possible. I will assign the case to a team via "first come first serve." The presenting team is responsible for preparing slides for a given case, presenting the case, and leading the case discussion in class. I will work with the presenting team prior to the class to ensure that its slides are of sufficiently high quality. During the in-class discussion, I will mostly mediate the discussion, correct factual misstatements, and summarize the case at the end. **To compensate for their work, all members of the presenting team will receive the full grade for the case that the team presents**.

If your team is not presenting a case, you are required to submit a case write-up that answers the suggested questions for the case in question. For the AQR case, the suggested questions are contained in CarmenCanvas [Assignment]. For the other two cases, the suggested questions are contained in the cases themselves. The write-up should be done by teams. Each team needs to submit only one write-up. The presenting team for a given case does not need to submit a write-up (the slides are required, of course).

I will grade your performance for a given case based on the write-up as well as the frequency and quality of your (individual) comments during the in-class discussion. High-quality comments during the in-class discussion are, naturally, a result from careful preparation prior to the class discussion.

TENTATIVE Course Schedule:
Please refer to the Carmen course Web site for up-to-date information on the modules.

Week	Topics, Readings, Quizzes
1	Introduction. Capital allocation: BKM Chapter 6
2	Efficient diversification: BKM Chapter 7.
3	Index models: BKM Chapter 8. The CAPM: BKM Chapter 9
4	Empirical evidence on equity returns: BKM Chapter 13.
5	Multifactor models: BKM Chapters 10 and 13; Hou, Xue, and Zhang (2015). Columbia Case on "The Quant Meltdown"
6	Performance evaluation: BKM Chapter 24. HBS case on "AQR's Momentum Funds (A)"
7	Efficient markets, behavioral finance, and the investment CAPM: BKM Chapters 11 and 12. Columbia Case on "Liquidating Harvard"

E

Absence and Makeup Policy:
I empathize that technical difficulties such as power outage and internet disconnect do occasionally occur. If a student misses a quiz due to unforeseen contingencies, please contact me to make alternative arrangements. I am committed to being very flexible to accommodate to students' needs.

Late Assignment Submissions:
No late submission for the case studies write-up will be accepted.

Instructor Feedback and Response Expectations:
- Email Response Times: I strive to reply to emails within 24 hours. Often sooner.
- Grade Return Times: The in-class quizzes will be graded immediately via CarmenCanvas. I will report your letter grades that include the case studies and participation within a few days after our last class.

Academic Integrity:
Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the University's Code of Student Conduct, and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the University's Code of Student Conduct (https://trustees.osu.edu/bylaws-and-rules/code) and this syllabus may constitute Academic Misconduct (https://oaa.osu.edu/academic-integrity-and-misconduct)

    The Ohio State University's Code of Student Conduct (Section 3335-23-04) defines academic misconduct as: Any activity that tends to compromise the academic integrity of the University, or subvert the educational process. Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the University's Code of Student Conduct is never considered an excuse for academic misconduct, so I recommend that you review the Code of Student Conduct and, specifically, the sections dealing with academic misconduct. If I suspect that a student has committed academic misconduct in this course, I am obligated by University Rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the University's Code of Student Conduct (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the University.

Disability Services:
The university strives to make all learning experiences as accessible as possible. In light of the current pandemic, students seeking to request COVID-related accommodations may do so through the university's request process, managed by Student Life Disability Services. If you anticipate or experience academic barriers based on your disability (including mental health, chronic, or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.