



THE OHIO STATE UNIVERSITY  
FISHER COLLEGE OF BUSINESS

## BUSFIN 4410 Real Estate Finance

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**Instructor:** Prof. Itzhak Ben-David      **E-mail:** ben-david.1@osu.edu

**Teaching assistant:** Cynthia Yin      **E-mail:** yin.708@osu.edu

**Office hours:** Mon 1:00–2:00, **by appointment only**

**Section 1:** Mon/Wed 2:20pm–3:40pm Mason Hall 405

**Section 2:** Mon/Wed 3:55pm–5:15pm Mason Hall 405

Zoom/video links will be available on CarmenCanvas where applicable

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### Course Description

This course covers advanced topics in real estate finance. We will cover three topics in depth. First, we will examine several valuation techniques used in practice and explore their underlying assumptions. These methods include cap rates, cash flow discounting, simulation techniques, and real options. We will discuss the financing of real estate properties through debt and equity. Second, we will discuss how real-estate assets are integrated into capital markets through Real-Estate Investment Trusts (REITs), private equity, and securitization vehicles. Third, we will discuss the role of the real estate market in the macroeconomy, and in particular, in the Global Financial Crisis (2008).

### Course Objectives

At the end of the course, students are expected to:

1. Master the assumptions, principles, and methodologies of valuation and financing assets in general, and real estate assets specifically.
2. Demonstrate competency in integrating tools and methods to analyze new transaction-level problems related to real estate properties and real estate financing.
3. Demonstrate competency in analyzing new economic problems related to real estate assets, the real estate asset class, and real estate in financial markets.



## Prerequisites

This is a quantitative finance class, and as such, students are expected to have prior knowledge of finance, microeconomics, statistics, and math. The instructor will review finance principles in the first few classes. Students must be either Finance majors or have completed BUSFIN 3400. Students are expected to have a solid knowledge of finance basics, including valuation and debt financing. Students will need to use a calculator that has a  $x^y$  function, but a financial calculator is not required. **Students will need a good command of Microsoft Excel.**

## Instructor

Professor Itzhak (Zahi) Ben-David is the Neil Klatskin Chair in Finance and Real Estate at the Finance Department, Fisher College of Business, The Ohio State University. In addition, he is the Academic Director of the Ohio State University Center for Real Estate and a Research Associate at the National Bureau of Economic Research (NBER). Ben-David's research spans several finance areas, including real estate, financial intermediation, financial markets, behavioral finance, and household finance. Before joining academia, Ben-David worked in consulting and real estate investments. Professor Ben-David holds Ph.D. in Finance and MBA from the University of Chicago and B.Sc. and M.Sc. in Industrial Engineering and B.A. in Accounting from Tel-Aviv University, and M.S. in Finance from London Business School. Professor Ben-David served as an expert witness in several mortgage-related court cases.

URL: <http://u.osu.edu/ben-david.1/>



## Grading and Evaluation

Course grade scale matches the OSU standard grade scheme. Grades of C and higher reflect mastery of the material. Grades in this course will be based on the following components:

| Item            |  | Weight |
|-----------------|--|--------|
| Individual work | 5 Problem sets (collaboration allowed)                 | 35%    |
|                 | Summaries of other groups' projects (no collaboration) | 10%    |
|                 | Attendance and participation                           | 5%     |
| Group projects  | REITs assignment                                       | 7%     |
|                 | Interview project                                      | 10%    |
|                 | Final project: Proposal                                | 5%     |
|                 | Final project: Memo                                    | 15%    |
|                 | Final project: Presentation                            | 8%     |
| Total           |  | 100%   |

- There will be no quizzes, midterms, or exams in this class.
- To receive the full 5% for attendance you must attend each class and be actively engaged in the discussion. Attendance without thoughtful participation will result in a maximum of 2 out of 5 points.
- Problem sets: Group discussion is encouraged; however, individual writeup and submissions are required. Text should not be shared among individuals, i.e., “copy-and-paste” is not allowed. Each person writes her/his own writeup.
- Group projects should be submitted by groups of up to 4 students.
- Grades of late submissions will be penalized by a reduction of 10% per day of delay.

## Course Format

**Mode of delivery** This course is an in-person course. However, due to COVID-19 conditions, we may need to switch to online/hybrid format, and will follow the university's guidelines.



**Electronic devices policy** The use of electronic devices is prohibited in the classroom. If you wish to take notes on an electronic device (not recommended), you will need to send me a statement committing for no-personal use and require my approval. All electronic devices should be silenced, and cell phones should be put away; I recommend that you power them down. If there is a severe need to leave your cell phone on, such as a family emergency, please put it in silent mode and let me know in advance. If you leave the classroom to take a call, I will understand why.

**Course communication** CarmenCanvas will be used for all announcements and messages to students; please ensure that you receive messages sent through Canvas's email system.

**Pace of online activities** This course is divided into modules that are released ahead of time. Students are expected to keep pace with assignment deadlines but may schedule their efforts freely within that time frame.

**Credit hours and work expectations** This is a 3 credit-hour course. According to Ohio State bylaws on instruction ([go.osu.edu/credithours](http://go.osu.edu/credithours)), students should expect around 3 hours per week spent on direct instruction (instructor content and CarmenCanvas activities, for example) in addition to 6 hours of homework (reading and assignment preparation, for example) to receive a grade of C average.

**Sections** The class has two sections. Students can attend either section. Also, students from both sections can be part of the same groups.

**Attendance policy** Research shows regular participation is one of the highest predictors of success. With that in mind, I have the following expectations for everyone's participation:

- **In-person sessions, zoom meetings, and office hours** Except for classes in the first two weeks of the semester, all events for the course, including my office hours, are optional. In some cases, I will post recordings of synchronous sessions for those who cannot attend.
- **Attendance and participation** I expect students to be engaged in the class activities. Per university rules, attendance is mandatory in the first two weeks. After the first two weeks, attendance is encouraged and rewarded (see Evaluation and Grading).



**Preferred contact method** If you have a question, please contact me first through my Ohio State email address (ben-david.1@osu.edu). I typically reply to emails within 24 hours.

**Class announcements** I will send all important class-wide messages through Canvas. Please check your notification preferences ([go.osu.edu/canvas-notifications](https://go.osu.edu/canvas-notifications)) to ensure you receive these messages.

**Discussion board** Discussion board will not be used in this course.

**Grading and feedback** For assignments submitted by the due date, I will try to provide feedback and grades within ten days. Assignments submitted after the due date may have reduced feedback, and grades may take longer to be posted.

**Course technology** For help with your password, university email, Canvas, 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](https://ocio.osu.edu/help/hours), and support for urgent issues is available 24/7.

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

#### **Baseline technical skills for online courses**

- Basic computer, Word, Excel, PowerPoint
- Navigating Canvas: for questions about a specific functionality, see the CarmenCanvas Student Guide (<https://community.canvaslms.com/docs/DOC-10701>).

**CarmenCanvas access** You will need to use BuckeyePass (<https://buckeyepass.osu.edu/>) multi-factor authentication to access your courses in Canvas. To ensure that you can connect to CarmenCanvas at all times, you take the following steps:



- Register multiple devices in case something happens to your primary device. Visit the BuckeyePass: Adding a Device ([https://osuitsm.service-now.com/selfservice/kb\\_view.do?sysparm\\_article=kb05025](https://osuitsm.service-now.com/selfservice/kb_view.do?sysparm_article=kb05025)) help article for step-by-step instructions.
- Download the Duo Mobile application ([https://osuitsm.service-now.com/selfservice/kb\\_view.do?sysparm\\_article=kb05026](https://osuitsm.service-now.com/selfservice/kb_view.do?sysparm_article=kb05026)) to all of your registered devices for the ability to generate one-time codes if you lose cell, data, or Wi-Fi service.

If none of these options will meet your situation's needs, you can contact the IT Service Desk at 614-688-4357 (HELP), and IT support staff will work out a solution with you.

## Academic Integrity

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect all students to read and understand the University's Code of Student Conduct. 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>), this syllabus, instructions posted in Canvas, and instructions given in class/lectures, including any sharing, posting, or distribution of any assignment, assessment activity, or solution via any method 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. If



you have any concerns or questions about the above policy or what constitutes academic misconduct in this course, please contact me before taking individual action.

Other sources of information on academic misconduct (integrity) to which you can refer include:

- Committee on Academic Misconduct ([go.osu.edu/coam](https://go.osu.edu/coam))
- Ten Suggestions for Preserving Academic Integrity ([go.osu.edu/ten-suggestions](https://go.osu.edu/ten-suggestions))
- Eight Cardinal Rules of Academic Integrity ([go.osu.edu/cardinal-rules](https://go.osu.edu/cardinal-rules))

## 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 to discuss options privately. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, please 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](mailto:slds@osu.edu); 614-292-3307; [slds.osu.edu](https://slds.osu.edu); 098 Baker Hall, 113 W. 12th Avenue.

## Student COVID-related Accommodation Process

The university is committed to supporting students and program participants with COVID-19 based risk factors. Student Life Disability Services, in conjunction with the Office of Institutional Equity, will work with students who are vulnerable to complications from COVID-19 to ensure that they have the necessary resources to participate in university life as safely as possible. Ohio State students from any campus may submit a COVID-related accommodation request (<https://slds.osu.edu/covid-19-info/covid-related-accommodation-requests/>). Students registered with Student Life Disability Services can work directly with their assigned Access Specialist (<https://slds.osu.edu/registered-students/contact-my-access-specialist/>) to modify their accommodations or make additional COVID-based accommodation requests.



## Accessibility of Course Technology

This course requires the use of CarmenCanvas (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations as early as possible.

- CarmenCanvas accessibility ([go.osu.edu/canvas-accessibility](https://go.osu.edu/canvas-accessibility))
- Streaming audio and video
- Zoom accessibility ([go.osu.edu/zoom-accessibility](https://go.osu.edu/zoom-accessibility))

## Mental Health

As a student, you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating, and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce students' ability to participate in daily activities. No matter where you are engaged in distance learning, The Ohio State University's Student Life Counseling and Consultation Service (CCS) is here to support you. If you find yourself feeling isolated, anxious, or overwhelmed, on-demand mental health resources ([go.osu.edu/ccsondemand](https://go.osu.edu/ccsondemand)) are available. You can reach an on-call counselor when CCS is closed at 614- 292-5766. 24-hour emergency help is available through the National Suicide Prevention Lifeline website ([suicidepreventionlifeline.org](https://suicidepreventionlifeline.org)) or by calling 1-800-273-8255(TALK). The Ohio State Wellness app ([go.osu.edu/wellnessapp](https://go.osu.edu/wellnessapp)) is also a great resource.

## Harassment, Discrimination, and Sexual Misconduct Free Environment

The Ohio State University is committed to building and maintaining a community to reflect the diversity and improve opportunities for all. All Buckeyes have the right to be free from harassment, discrimination, and sexual misconduct. Ohio State does not discriminate based on age, ancestry, color, disability, ethnicity, gender, gender identity or expression, genetic information, HIV/AIDS status, military status, national origin, pregnancy (childbirth, false pregnancy, termination of pregnancy, or recovery from there), race, religion, sex, sexual orientation, or protected veteran status, or any other bases under the law, in its activities, academic programs, admission, and employment. Members of the university community





also have the right to be free from all forms of sexual misconduct: sexual harassment, sexual assault, relationship violence, stalking, and sexual exploitation.

To report harassment, discrimination, sexual misconduct, or retaliation and/or seek confidential and non-confidential resources and supportive measures, contact the Office of Institutional Equity:

1. Online reporting form at [equity.osu.edu](http://equity.osu.edu)
2. Call 614-247-5838 or TTY 614-688-8605
3. Email [equity@osu.edu](mailto:equity@osu.edu)

The University is committed to stopping sexual misconduct, preventing its recurrence, eliminating any hostile environment, and remedying its discriminatory effects. All university employees have reporting responsibilities to the Office of Institutional Equity to ensure the University can take appropriate action:

- All university employees, except those exempted by the legal privilege of confidentiality or expressly identified as a confidential reporter, must report incidents of sexual assault immediately.
- The following employees must report all other forms of sexual misconduct as soon as practicable but at most within five workdays of becoming aware of such information:
  1. Any human resource professional (HRP);
  2. Anyone who supervises faculty, staff, students, or volunteers;
  3. Chair/director; and
  4. Faculty member.

### **Copyright for Instructional Materials**

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the class. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.



## Topics Covered

1. Review of valuation building blocks
  - (a) Annuities, perpetuities, Gordon model
  - (b) Risk and return: CAPM
2. Direct holding of real estate assets
  - (a) Equity-financed assets
    - i. Valuation using the income approach (DCF: discounted cash flows)
    - ii. Alternative valuation methods: Replacement cost, Comparable assets
  - (b) Economics of mortgages
    - i. Amortization calculations
    - ii. Types of mortgages: fixed and variable rate
    - iii. Types of mortgages: interest only, negative amortization, option ARM, pre-payment penalty, points
    - iv. Advantages and risks of leverage
  - (c) Equity- and debt-financed properties
    - i. Cost of capital
    - ii. Valuing properties with senior and mezzanine debt
    - iii. Rent versus buy
    - iv. Corporate real estate
    - v. Moral hazard and adverse selection
  - (d) Behavioral finance and real estate
  - (e) Private equity and partnerships
    - i. Contractual structure
    - ii. Valuing properties with debt, equity general partner, equity general partners
  - (f) Monte Carlo simulations in real estate
  - (g) Real options in real estate
  - (h) Summary: Generating value in real estate
3. Real estate and financial markets
  - (a) Real estate investment trusts (REITs): Valuation, market analysis
  - (b) Securitization
  - (c) Institutional investors
4. Real estate cycles and crises
  - (a) Incentives in the real estate market
  - (b) What caused the Global Financial Crisis? Theories of real estate cycles



## Tentative Course Calendar (Subject to Change)

| #    | Date                             | Topic and Content  | Assignments |
|------|----------------------------------|--|-------------|
| 1    | 1/10                             | <b>Finance review: Cash flows and discounting</b><br><b>Big question:</b> What determines values of real estate assets? How does cap rate relate to the fundamentals of finance?<br><b>Classroom discussion:</b> <ul style="list-style-type: none"><li>Valuation building blocks: Annuities, perpetuities, DCF, Gordon model</li></ul> <b>Objectives:</b> <ul style="list-style-type: none"><li>Valuation in practice: <math>Value = \frac{NOI}{Cap\ rate}</math></li><li>Building blocks of valuation, Gordon Model</li><li>The relation between cap rate relates to the Gordon Model</li><li>Growth assumptions embedded in cap rate valuation</li></ul>   |             |
| 2    | 1/12                             | <b>Finance review: Risk and discounting rate</b><br><b>Big question:</b> How does cap rate account for risk?<br><b>Classroom discussion:</b> <ul style="list-style-type: none"><li>The relation between cap rate and risk</li><li>Valuation building blocks: Risk and return, Portfolio Theory, Capital Asset Pricing Model (CAPM)</li></ul> <b>Objectives:</b> <ul style="list-style-type: none"><li>Purpose of the discounting rate</li><li>Review fundamentals of investment in risky assets and risk-return relationship</li><li>Cap rate reflects both risk and growth components</li><li>Issues with implementing CAPM in real estate: lack of diversification, short selling constraints, transaction costs</li></ul> |             |
| 1/17 | <b>Martin Luther King Jr Day</b> |  |             |



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| # | Date | Topic and Content   | Assignments          |
|---|------|---|----------------------|
| 3 | 1/19 | <b>Valuation in practice I</b><br><b>Big question:</b> How cap rate is actually calculated and what are the pitfalls in implementing cap rate?<br><b>Classroom discussion:</b> <ul style="list-style-type: none"><li>• What are the components of cap rate? NOI, value</li><li>• Valuation: Cash flow proforma</li><li>• Behavioral biases in estimating cash flows</li></ul> <b>Objectives:</b> <ul style="list-style-type: none"><li>• Become familiar with the components of NOI and the logic behind them</li><li>• Practitioners account for greater cash flow uncertainty through higher discount rate</li><li>• Behavioral biases in estimating cash flows: optimism, overconfidence, biases in estimating probabilities</li><li>• Be able to construct proforma</li></ul> | <b>Problem Set 1</b> |
| 4 | 1/24 | <b>Valuation in practice II</b><br><b>Big question:</b> What are other valuation methods that people use, and how are they all related?<br><b>Classroom discussion:</b> <ul style="list-style-type: none"><li>• Other valuation methods: replacement cost, comps</li><li>• Valuation: Cash flow proforma</li></ul> <b>Objectives:</b> <ul style="list-style-type: none"><li>• Analyze the uses of the different valuation methods</li><li>• Understand the underlying assumptions in the different valuation methods</li></ul>  |                      |

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| # | Date | Topic and Content  | Assignments          |
|---|------|--|----------------------|
| 5 | 1/26 | <b>Mortgage mechanics I</b><br><b>Big question:</b> How do debt contracts work?<br><b>Classroom discussion:</b> <ul style="list-style-type: none"><li>• Mortgages: Amortization schedule</li><li>• Mortgages: Fixed and adjustable rates, interest only, negative amortization, option ARM, prepayment penalty</li></ul> <b>Objectives:</b> <ul style="list-style-type: none"><li>• Review the fundamentals of mortgage calculations and amortization tables</li><li>• Understand that mortgages are annuities</li><li>• Get familiar with the different types of mortgage and mortgage features</li><li>• Be able to perform simple mortgage calculations and produce amortization tables</li></ul> |                      |
| 6 | 1/31 | <b>Mortgage mechanics: Practice</b> <ul style="list-style-type: none"><li>• Solve mortgage problems</li></ul> <b>Objectives:</b> <ul style="list-style-type: none"><li>• Understanding the mechanics of mortgages</li></ul>  | <b>Problem Set 2</b> |
| 7 | 2/2  | <b>Mortgage mechanics II</b><br><b>Big question:</b> Understanding the economics of mortgages even better<br><b>Classroom discussion:</b> <ul style="list-style-type: none"><li>• Solve complex mortgage problems</li><li>• Advantages and risks of debt leverage</li></ul> <b>Objectives:</b> <ul style="list-style-type: none"><li>• Review amortization tables</li><li>• Be able to perform complex mortgage problems</li><li>• Be able to discuss the advantages and risks of debt leverage</li><li>• Understand that buying an asset using debt is the same as buying on credit and paying over time</li></ul>  |                      |
| 8 | 2/7  | <b>Guest lecture: “Deal structuring”</b> <ul style="list-style-type: none"><li>• Frank Kass (CEO, Continental Real Estate)</li></ul> <b>Objectives:</b> <ul style="list-style-type: none"><li>• Understand how entrepreneurs think about valuation and borrowing</li></ul>   |                      |



| #  | Date | Topic and Content   | Assignments          |
|----|------|---|----------------------|
| 9  | 2/9  | <b>Mortgage mechanics II (Cont.)</b><br><b>Big question:</b> Understanding the economics of mortgages even better<br><b>Classroom discussion:</b> <ul style="list-style-type: none"><li>• Solve complex mortgage problems</li><li>• Advantages and risks of debt leverage</li></ul> <b>Objectives:</b> <ul style="list-style-type: none"><li>• Review amortization tables</li><li>• Be able to perform complex mortgage problems</li><li>• Be able to discuss the advantages and risks of debt leverage</li><li>• Understand that buying an asset using debt is the same as buying on credit and paying over time</li></ul>   |                      |
| 10 | 2/14 | <b>Guest lecture: “Building a real estate portfolio”</b> <ul style="list-style-type: none"><li>• Alex Klatskin (General Partner, Forsgate Industrial Partners)</li><li>• Combined session: 2:20–3:40</li></ul> <b>Objectives:</b> <ul style="list-style-type: none"><li>• How to think about building a real estate portfolio</li><li>• Advantages and disadvantages of concentration</li></ul>   | <b>Problem Set 3</b> |
| 11 | 2/16 | <b>Mezzanine debt, outside equity, and investment groups</b><br><b>Big question:</b> How do entrepreneurs raise equity capital?<br><b>Classroom discussion:</b> <ul style="list-style-type: none"><li>• Cost of capital</li><li>• Sources of funding</li><li>• Common contracts between entrepreneurs and investors</li><li>• Discuss industry practices</li></ul> <b>Objectives:</b> <ul style="list-style-type: none"><li>• Understand that the costs of the different sources of capital sum to the cost of capital, which is a component of cap rate</li><li>• Spell out the terms of the common contract for raising capital by entrepreneurs</li><li>• Understand that cost of capital and sources of funds are important determinants in determining prices of real estate</li></ul> |                      |



| #  | Date | Topic and Content   | Assignments          |
|----|------|---|----------------------|
| 12 | 2/21 | <b>Rent vs Buy</b><br><b>Big question:</b> Should one rent or buy?<br><b>Classroom discussion:</b> <ul style="list-style-type: none"><li>Analyze problem in a rigorous manner</li></ul> <b>Objectives:</b> <ul style="list-style-type: none"><li>Synthesize cash flow and value considerations to determine whether to rent vs buy</li><li>Understand how mortgages can be a useful tool for saving</li><li>Be able to implement analysis</li><li>Understand General Equilibrium outcome in rent vs buy (i.e., how the market organizes itself)</li></ul>   |                      |
| 13 | 2/23 | <b>Behavioral finance in real estate</b><br><b>Big question:</b> Understand the implications of behavioral finance to real estate<br><b>Classroom discussion:</b> <ul style="list-style-type: none"><li>How do behavioral biases could affect real estate transactions?</li></ul> <b>Objectives:</b> <ul style="list-style-type: none"><li>Understand the difference between rational and irrational behaviors</li><li>Understand why real estate is conducive for behavioral biases</li><li>Understand the different biases: optimism, overconfidence, loss aversion, endowment effect, present bias</li></ul> |                      |
| 14 | 2/28 | <b>Guest lecture: “Real options in the real world”</b><br><ul style="list-style-type: none"><li>Dr. Jason Black (Director of Analytic Insights, Huntington Bank)</li><li>Combined session: 3:55–5:15</li></ul> <b>Objectives:</b> <ul style="list-style-type: none"><li>Discuss how real options show up and are used in the real world</li><li>Discuss experimentation in corporations and banks</li></ul>   | <b>Problem Set 4</b> |



| #  | Date | Topic and Content  | Assignments                       |
|----|------|--|-----------------------------------|
| 15 | 3/2  | <b>Modelling uncertainty: Real options</b><br><b>Big question:</b> How should we think about modelling optionality in real estate?<br><b>Classroom discussion:</b> <ul style="list-style-type: none"><li>• What are real options?</li><li>• Discuss examples of real options</li><li>• Discuss modelling real options</li></ul> <b>Objectives:</b> <ul style="list-style-type: none"><li>• Be able to identify options in business situations</li><li>• Understand the variables that determine the value of options</li></ul>             |                                   |
| 16 | 3/5  | <b>Risk management</b><br><b>Big question:</b> How to think about and account for risks<br><b>Classroom discussion:</b> <ul style="list-style-type: none"><li>• Risk management</li><li>• Mitigating risk: self-insurance, hedging, futures</li><li>• Moral hazard and adverse selection</li></ul> <b>Objectives:</b> <ul style="list-style-type: none"><li>• Understand sources of risk and risk management</li><li>• Discuss ways to reduce risk</li><li>• Discuss the economic concepts of moral hazard and adverse selection</li></ul> |                                   |
| 17 | 3/7  | <b>Guest Lecture: “Real estate and banking”</b> <ul style="list-style-type: none"><li>• Dr. Tayfun Tuzun (Chief Financial Officer, BMO Financial Group)</li><li>• Combined session: 2:20–3:40</li></ul> <b>Objectives:</b> <ul style="list-style-type: none"><li>• Understand how bankers think about valuation and borrowing/lending</li></ul>  | <b>Proposal for final project</b> |





| #  | Date | Topic and Content   | Assignments          |
|----|------|---|----------------------|
| 18 | 3/9  | <b>Modelling uncertainty: Monte Carlo simulations</b><br><b>Big question:</b> How to model uncertainty?<br><b>Classroom discussion:</b> <ul style="list-style-type: none"><li>• Modelling uncertainty</li></ul> <b>Objectives:</b> <ul style="list-style-type: none"><li>• Understand how to model uncertainty</li><li>• Be able to implement uncertainty modelling</li></ul>   |                      |
|    | 3/14 | <b>Spring Break</b>   |                      |
|    | 3/16 | <b>Spring Break</b>   |                      |
| 19 | 3/21 | <b>Capturing value in real estate</b><br><b>Big question:</b> Money time. So how do people really make money in real estate?<br><b>Classroom discussion:</b> <ul style="list-style-type: none"><li>• How to generate value in real estate?</li></ul> <b>Objectives:</b> <ul style="list-style-type: none"><li>• Understand that one needs to identify sources of value creation in transactions</li><li>• Understand why entrepreneurs believe that debt is cheap</li><li>• Identify attribute value creation (e.g., Tax Increment Financing (TIF))</li></ul> |                      |
| 20 | 3/23 | <b>Real estate investment trusts (REITs)</b><br><b>Big question:</b> How can real estate be traded on the stock market?<br><b>Classroom discussion:</b> <ul style="list-style-type: none"><li>• Asset management space: open-ended vs closed-end funds</li><li>• The mechanics of REITs</li></ul> <b>Objectives:</b> <ul style="list-style-type: none"><li>• Compare dividend yield and cap rate</li><li>• Understand discount/premium</li><li>• Understand the timing of fund issuances</li></ul>  | <b>Problem Set 5</b> |



| #  | Date | Topic and Content  | Assignments             |
|----|------|--|-------------------------|
| 21 | 3/28 | <b>Guest lecture: “Private equity in real estate”</b> <ul style="list-style-type: none"><li>• Michael Glimcher (Chairman/CEO, Donahue Schriber)</li><li>• Combined session: 3:55–5:15</li></ul> <b>Objectives:</b> <ul style="list-style-type: none"><li>• Discuss sources of value that REITs generate</li><li>• Evaluate the information content of discount/premium in valuing REITs</li><li>• Understand how REITs are being priced in the market</li></ul>  |                         |
| 22 | 3/30 | <b>Securitization</b> <p><b>Big question:</b> How do securitizations increase the supply of capital in the economy?</p> <p><b>Classroom discussion:</b></p> <ul style="list-style-type: none"><li>• The mechanics of securitization</li></ul> <p><b>Objectives:</b></p> <ul style="list-style-type: none"><li>• Understand how securitization works</li><li>• Understand how securitization increases the supply of capital</li><li>• Understand how securitization increases the incentives for moral hazard</li></ul>  |                         |
| 23 | 4/4  | <b>Guest lecture: “Institutional investment”</b> <ul style="list-style-type: none"><li>• Bill Avoli (Managing Director, Rockbridge)</li><li>• Combined session: 2:20–3:40</li></ul> <b>Objectives:</b> <ul style="list-style-type: none"><li>• Understand the role of institutional investors in the commercial real estate market space</li><li>• Understand how institutional investors decide on which properties to buy and dispose</li><li>• Understand the sources of financing of institutional investors</li><li>• Understand the behavior of institutional investors around the Global Financial Crisis</li></ul> | <b>REITs assignment</b> |



| #  | Date | Topic and Content  | Assignments                |
|----|------|--|----------------------------|
| 24 | 4/6  | <b>Real estate cycles and the Global Financial Crisis</b><br><b>Big question:</b> How real estate cycles drive economic activity?<br><b>Classroom discussion:</b> <ul style="list-style-type: none"> <li>Factors that created the boom: supply of credit, expectations</li> </ul> <b>Objectives:</b> <ul style="list-style-type: none"> <li>Analyze the main narratives for the real estate boom (2000–2006) and subsequent Global Financial Crisis</li> </ul>   |                            |
| 25 | 4/11 | <b>Guest lecture: “The Global Financial Crisis (2008)”</b> <ul style="list-style-type: none"> <li>TBD (Robert Schottenstein (CEO, M/I Homes))</li> <li>Recorded lecture; Video link will be posted on CarmenCanvas</li> </ul> <b>Objectives:</b> <ul style="list-style-type: none"> <li>Understand the function and structure of the U.S. mortgage market</li> <li>Contextualize the real estate boom (2000–2006) in the organization of the U.S. residential mortgage market</li> </ul>   | Interview report           |
| 26 | 4/13 | <b>Guest lecture: “The boom and bust of the housing market in the 2000s”</b> <ul style="list-style-type: none"> <li>Robert Schottenstein (CEO, M/I Homes)</li> <li>Combined session: 3:55–5:15</li> <li>Video option: <a href="https://mediasite.osu.edu/Mediasite/Play/c41d39875e4a4c5dabd99f490a6a34d71d">https://mediasite.osu.edu/Mediasite/Play/c41d39875e4a4c5dabd99f490a6a34d71d</a></li> </ul> <b>Objectives:</b> <ul style="list-style-type: none"> <li>Analyze the U.S. residential mortgage market</li> <li>Discuss the economic conditions during the boom and bust of the residential real estate market in the 2000s</li> <li>Evaluate the current residential real estate market</li> </ul> | Final project              |
| 27 | 4/13 | <b>Student presentations I</b> <ul style="list-style-type: none"> <li>4 groups in each session</li> </ul>  |                            |
| 28 | 4/20 | <b>Student presentations II</b> <ul style="list-style-type: none"> <li>4 groups in each session</li> </ul>   |                            |
| 29 | 4/25 | <b>Student presentations III</b> <ul style="list-style-type: none"> <li>4 groups in each session</li> </ul>  | Personal project summaries |