Course Information

Business organizations and markets use a wide variety of structures to coordinate the productive activities of their stakeholders. Dramatic changes in information technology and the nature of economic competition are forcing firms to come up with new ways of organizing work. In particular, recent advances in artificial intelligence and machine learning have the potential to reshape work profoundly. This course uses economic theory to investigate the roles of information and technology in the existing diversity of organizations and markets and in enabling the creating of new organizational forms.

The class is designed for Ph.D students in management, economics, computer science, information technology, organizational behavior and related disciplines. For economists, this class offers the opportunity to apply economic tools to understand how information technology and information in general affect organizations and markets. For non-economists, this class offers an exposure to fundamental ideas in the economics of information, organizations, and markets. The main goal is to prepare Ph.D. students to produce publication-quality research using tools from information economics.

We will cultivate a culture of contribution. In particular, a seminar class works because students come prepared to engage in thoughtful discussions of the material. Students are asked to write informal, two page memos prior to several of the classes. These memos will generally be responses to some questions or issues we pose prior to each class. In addition, each student will be asked to present at least one of the research papers as part of the class discussion. This will typically involve meeting with the instructor ahead of time to discuss objectives and discussion plans and may involve suggesting related readings.

There are no exams in this class but a final paper is due at the end of the semester. It can be either a survey of the research in a particular area or a research paper on a specific topic. Either way, the paper can be thought of as a step towards developing a research program. In the past, some of these papers have led to publications. Further details of the paper will be provided in class.
Location: E62-450

Time: Wednesdays 2:30-5:20; First two sessions meet from 2:30-4pm; Second session meets on Friday, September 15.

Course Website: [https://stellar.mit.edu/S/course/15/fa13/15.575/](https://stellar.mit.edu/S/course/15/fa13/15.575/) [update this]


Course assistant: Naomi Stephen [nstephen@mit.edu](mailto:nstephen@mit.edu)

Readings:

Handouts are distributed in class.

Optional books:


Requirements:

- Weekly readings and class discussion
- Each session will have one or two student presenters of a relevant paper
- Term Paper (suitable for conference submission when complete)
- Short papers: Six 2-page short papers, as noted in the syllabus

Grading:

Grades will be assigned on the following basis:

- Class participation and presentation 35%
- Two page papers on readings 25%
- One Survey or Research Paper 40%
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<thead>
<tr>
<th>Guest Speaker</th>
<th>Date</th>
<th>Topic</th>
<th>Guest Speakers</th>
<th>Student Presenters</th>
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<tr>
<td></td>
<td>9/6</td>
<td>1a: Introduction: The Information Economy</td>
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<td>1b: Review of syllabus; Topic Selection and Discussion</td>
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<td>Note: Special Friday session</td>
<td>9/15</td>
<td>2a: Intangibles</td>
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<td>Alex Peysakhovich</td>
<td>9/20</td>
<td>3a: AI and Deep Game Theory</td>
<td>[Guillaume St. Jacques]</td>
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<td>3b: Superstars/CEO pay</td>
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<td>Frank Levy</td>
<td>9/27</td>
<td>4a: AI and Professional Work [FL]</td>
<td>[Rohan Parakh, Zhou]</td>
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<td>Shane Greenstein</td>
<td>10/4</td>
<td>5a: Consumer surplus [Elnaz Karimi, Cathy Cao]</td>
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<td>[Tommy Pan Fang, Flora Meng]</td>
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<td>5b: Measuring the Information Economy</td>
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<td>John van Reenen,</td>
<td>10/11</td>
<td>6a: Superstar firms [JVR]</td>
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<td>Michael Webb</td>
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<td>6b: What can AI do?</td>
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<td>8a: Ideas or genius as a factor of production [Seth Benzell]</td>
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<td>8b: Platforms and Standards [Zanele Munyikwa, Xia Li]</td>
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<td>David Autor</td>
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<td>7a: Technology and Labor, part 1 [DA]</td>
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<td>7b: Technology and Labor, part 2 [Claire McKenna, Alex Kowalski]</td>
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<td>Daron Acemoglu</td>
<td>11/8</td>
<td>9a: Robots and Jobs [DA]</td>
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<td>[Sebastien Steffen, Mahdi Hashemian]</td>
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<td>9b: ICT, Automation and Unemployment</td>
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<td>10a: Limitations of AI [GM]</td>
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<td>[Alice Jang, Erik Duhaime]</td>
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<td>10b: Wikipedia and Collective Intelligence [Meitong Li]</td>
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<td>11a: Privacy and Reputation Systems [Madhav Kumar, Richard Xiaoli Yang]</td>
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<td>12/6</td>
<td>Student Presentations</td>
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<td>Final paper due</td>
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Note: We will be updating the specific readings for each class based on student input.

September 6: Readings

1A. Introduction: Information Economics Data-Driven Decision Making and Artificial Intelligence

Optional


https://www.aeaweb.org/articles?id=10.1257/aer.p20161016

http://www.jstor.org/stable/1809376


http://www.sims.berkeley.edu/~hal/Papers/structure.pdf

Assignment:

1. Visit this site: PhD Reading List for Economics of Digitization (you will need to be invited to join) 
https://paper.dropbox.com/doc/PhD-Reading-List-for-Economics-of-Digitization-5ObwVrYMjdvMcMQflwHvm

And also review this syllabus. Then rank list 5 papers you’d be interested in presenting this semester.
September 15: Readings

2a. IT, Human Capital and Intangibles


Optional:


2b. Advice for doing good research

   http://people.ischool.berkeley.edu/~hal/Papers/how.pdf

   http://phdtips.com/


5. Romer, David, “Out in Five”
   http://www.j-bradford-delong.net/teaching_folder/Romers_rules.html

   http://pages.stern.nyu.edu/~wstarbuc/Writing/Etiquet.htm

   http://www.roie.org/how.htm

   http://faculty.haas.berkeley.edu/levine/cheap_advice.html

9. Levine, David, “David Levine’s Cheap Advice for new Faculty”.
   http://faculty.haas.berkeley.edu/levine/cheap_advice.html

10. Levine, David, “David Levine’s Cheap Advice: How to Present for Results”.
    http://faculty.haas.berkeley.edu/levine/cheap_advice.html

11. Piazzesi, Monika, “Tips on How to Avoid Disaster in Presentations”
11. David Laibson’s Job Market Advice

http://neweconomist.blogs.com/new_economist/2006/05/tips_for_aspiri.html

13. Krugman, Paul “Crib Sheet: How I work (Self-indulgent)”
http://krugman.blogs.nytimes.com/2013/07/05/crib-sheet-how-i-work-self-indulgent/

**Two Page Assignment due September 14 at 11:59pm (day before class).**

Please write a short, two page essay addressing the following two questions:
1. What topics in the economics of IT, AI and related topics do you see as most important for researchers to study over the next 10 years? Where do you see the most potential for progress? Which would you, personally, like to work on the most?
2. Please suggest paper or topics already in the syllabus or that you would like to add, which you propose to review and present to the rest of the class this semester.

Please email this memo to: Erik Brynjolfsson (erikb@mit.edu) with a copy to Naomi Stephen (nstephen@mit.edu). The length is a maximum of 400 words – be concise and feel free to use bullet points. Please email the memo to me no later than 11:59pm on the day BEFORE class.
September 20: Readings

3a. Economics and Deep Learning (Guest Alex Peysakhovich)

Required:


https://www.nature.com/nature/journal/v529/n7587/full/nature16961.html

Optional:

https://link.springer.com/chapter/10.1007/978-1-4757-2379-3_11

https://arxiv.org/abs/1702.03037

https://par.nsf.gov/biblio/10026426

3b. The Economics of Superstars and Top Incomes

Required:


Optional:


Brynjolfsson, Erik and Guillaume Saint-Jacques, “IT and CEO Pay”, Draft

Krueger, Alan B: “Land of Hope and Dreams: Rock and Roll, Economics, and Rebuilding the Middle Class”. http://www.whitehouse.gov/blog/2013/06/12/rock-and-roll-economics-and-rebuilding-middle-class


**Two Page Assignment due September 19 at 11:59pm (day before class).**

Please write a short, two page essay addressing one following two questions:

1. How will AI change the nature of cooperation and competition, and how will that affect markets, firms and other (potentially new) forms of organization?
2. What role do you think technological factors have in driving the growth of top incomes in the United States and how? Be specific. How would you test your hypothesis?

Please email this memo to: Erik Brynjolfsson (erikb@mit.edu) with a copy to Naomi Stephen (nstephen@mit.edu). The length is a maximum of 400 words – be concise and feel free to use bullet points. Please email the memo to me no later than 11:59pm on the day BEFORE class.
September 27: Readings

4a. AI and Professional Work (Guest Frank Levy)

Required:


https://hbr.org/2016/10/robots-will-replace-doctors-lawyers-and-other-professionals

Optional:


https://www.economics.ox.ac.uk/Department-of-Economics-Discussion-Paper-Series/re-thinking-the-capabilities-of-machines-in-economics

https://www.economics.ox.ac.uk/Department-of-Economics-Discussion-Paper-Series/a-model-of-technological-unemployment

4b. Information Goods and New Growth Theory

Required:


Optional:


Paul Romer’s blog articles on the 25th anniversary of new growth theory:

1. https://paulromer.net/nonrival-goods-after-25-years/
5. https://paulromer.net/speeding-up-and-missed-opportunities-evidence/
6. https://paulromer.net/speeding-up-theory/
7. https://paulromer.net/where-has-all-the-excludability-gone/

Chad Jones on Paul Romer's Contribution to Growth Theory


**Two Page Assignment due September 26 at 11:59pm (day before class).**

Please write a short, two page essay addressing one following two questions:

1. Is professional work more or less susceptible to automation by the latest wave of AI, particularly machine learning? What are the implications for wages, employment and inequality? How would you test your hypothesis? Be specific.
2. How do new technologies change the extent to which ideas are non-rival and non-excludable? What are the implications for growth and/or business organization? How would you test your hypothesis? Be specific.

3. Please email this memo to: Erik Brynjolfsson (erikb@mit.edu) with a copy to Naomi Stephen (nstephen@mit.edu). The length is a maximum of 400 words – be concise and feel free to use bullet points. Please email the memo to me no later than 11:59pm on the day BEFORE class.
October 4: Readings

5a. Consumer Surplus

Required:

http://pubsonline.informs.org/doi/abs/10.1287/mnsc.49.11.1580.20580

http://www.nber.org/papers/w22627

Optional:


5b. Measurement Tommy and Flora

Required:


Optional:


W. Erwin Diewert and Kevin J. Fox 2017: The Digital Economy, GDP and Consumer Welfare


**Two Page Assignment due October 3 at 11:59pm (day before class).**

Please write a short, two page essay addressing following question:

1. GDP is the most common way we measure the growth of the economy. Productivity, which is based on GDP, is one of the most common ways economists measure technical progress. What are the strengths and weaknesses of GDP for these purposes? What special problems does the digital economy raise for GDP as a metric? How can new data sources and methods be used to improved our metrics or develop new ones. Be specific.

Please email this memo to: Erik Brynjolfsson (erikb@mit.edu) with a copy to Naomi Stephen (nstephen@mit.edu). The length is a maximum of 400 words – be concise, references the readings, and feel free to use bullet points. Please email the memo to me no later than 11:59pm on the day BEFORE class.
October 11: Readings

6a. Superstar Firms (Guest John van Reenen)

Required:

Autor, David; Dorn, David; Katz, Lawrence; Patterson, Christina; Van Reenen, John (2017) : Concentrating on the Fall of the Labor Share, IZA Discussion Papers, No. 10539  https://www.econstor.eu/handle/10419/161162


Optional:


6b. What can AI do? (Guest Michael Webb)

Required:

Michael Webb (2017). "What can AI do?"

https://economics.mit.edu/files/11574

Optional:


**Due: Paper Proposal. Be prepared to discuss your ideas in class. No two-pager this week**
October 18: Readings

7a. Ideas or genius as a factor of production

Required:

See here for latest version: https://sites.google.com/site/sbenzell/home/research-overview


7b. Platforms and Standards

Required:


Two Page Assignment due October 17 at 11:59pm (day before class).

Please write a short, two page essay addressing ONE of the following questions:
1. Some people have called AI humanity’s “final invention” since it has the potential to not only add to productivity like other technologies, but also reshape or even replace the invention process itself. What evidence, if any, is that we are seeing effects of AI or related technologies on the economy already? What indicators would you look for? Be specific, describing the data sources you would use and hypotheses you would test.
2. How two-sided markets and platforms related? What is different about them compared to traditional network effects or economies of scale? Why is there so much more attention to them today than 10 or 20 years ago?

Please email this memo to: Erik Brynjolfsson (erikb@mit.edu) with a copy to Naomi Stephen (nstephen@mit.edu). The length is a maximum of 400 words – be concise, references the readings, and feel free to use bullet points. Please email the memo to me no later than 11:59pm on the day BEFORE class.
November 1: Readings

8a. Technology and Labor, Part 1 (Guest David Autor)

Required:


Optional:


“Skill Complementarity of Broadband Internet”


8b. Technology and Labor, Part 2

Required:


Two Page Assignment due October 31 at 11:59pm (day before class).

Please write a short, two page essay addressing ONE of the following questions:

1. Inequality has been called a “race between technology and education”. Do you agree this was true over the past 50 years? Do you expect it to be true over the next 10 years? After that? Based on the readings this week, summarize the evidence for your answers and point to any new theory or data that may be relevant.

2. Autor, Levy and Murnane compare how IT was used on two different floors of the same bank. Why were the outcomes so different? What does this tell you about to interpret large-scale econometric studies of the effects of IT? What new and improved studies, methods or data would you suggest in light of your answer?

Please email this memo to: Erik Brynjolfsson (erikb@mit.edu) with a copy to Naomi Stephen (nstephen@mit.edu). The length is a maximum of 400 words – be concise, references the readings, and feel free to use bullet points. Please email the memo to me no later than 11:59pm on the day BEFORE class.
November 8: Readings

9a. Robots (Guest: Daron Acemoglu)

Required:


Optional:

Christos Makridis, TBD

9b. ICT, Automation and Unemployment

Required


Two Page Assignment due November 7 at 11:59pm (day before class).

Please write a short, two page essay addressing ONE of the following questions:

1. As Acemoglu and Restrepo (2016) note, technologies can both substitute for human labor or complement it. How else can technology affect labor demand? List and explain other types of channels and effects, being as formal and precise as possible. What new implications does your expanded framework suggest and how would you empirically assess them?

2. IT (or even “technology” in general) is also treated as a monolith, but Bloom et al. describe two distinct types of technology and argue they have very different effects on decision-making. List and explain other types digital technologies and how they are likely to affect decision-making, centralization and/or firm boundaries. Be as formal and precise as possible. What new implications does your expanded framework suggest and how would you empirically assess them?

Please email to Erik Brynjolfsson (erikb@mit.edu) and copy Naomi Stephen (nstephen@mit.edu)
November 15: Readings

10a. Limitations of AI (Guest: Gary Marcus)

Required:


Optional:


Debate: "Does AI Need More Innate Machinery?" (Yann LeCun, Gary Marcus) NYU Center for Mind, Brain and Consciousness. Watch the first 25 min of the video after Chalmers' intro. (ie Gary Marcus's opening remarks).  
https://m.youtube.com/watch?v=vdWPQ6iAkT4

https://www.nber.org/papers/w24001

10b. Wikipedia and Collective Intelligence

Required:

Gallus, J. (2016). Fostering Public Good Contributions with Symbolic Awards: A Large-Scale Natural Field Experiment at Wikipedia. *Management Science*. Published online Articles in Advance 30 Sep 2016 & Meitong Li  
https://doi.org/10.1287/mnsc.2016.2540

http://fengzhu.info/wikipediabias.pdf

http://fengzhu.info/BritannicaWikipedia.pdf

**Two Page Assignment** due November 14 at 11:59pm (day before class).

Please write a short, two page essay addressing ONE of the following questions:

1. Hollywood movies notwithstanding, we are vary far from artificial general intelligence (AGI). What can AI do well and not so well? What makes commonsense reasoning difficult for machines? What are the implications for the economy and for businesses?

2. Why has Wikipedia been relatively successful as a repository of collective knowledge? What specific incentives mechanisms, principles, structures and culture were important? How would you model this? What general lessons can you infer?

Please email to Erik Brynjolfsson ([erikb@mit.edu](mailto:erikb@mit.edu)) and copy Naomi Stephen ([nstephen@mit.edu](mailto:nstephen@mit.edu))
November 29: Readings

11a. Privacy and Reputation Systems

Required:


http://journals.ama.org/doi/abs/10.1509/jmr.10.0355?code=amma-site


http://journals.ama.org/doi/abs/10.1509/jmkg.74.2.133

11b. Data Driven Decision (DDD) Making

Required:


https://www.aeaweb.org/articles?id=10.1257/aer.p20161016


Assignment due November 28 (day before class)

1. Please prepare a presentation for class based on your term paper. The presentation should be approximately 10 minutes plus 3 minutes for Q&A. Feel free to ask the class for help or advice on how to best addressing portions of your research question. Please send me either your PowerPoint or Acrobat presentation file, or a detailed written outline for your talk. Regardless of the date of your presentation, please submit your slides by November 28.

Please email your file to me (erikb@mit.edu) and copy Naomi Stephen (nstephen@mit.edu)

Draft Schedule:

**December 6**
Rohan Parakh,
Zhou Zhou
Elnaz Karimi
Cathy Cao
Tommy Pan Fang

Flora Meng
Zanele Munyikwa
Xia Li
Claire McKenna
Alice Jang
Sebastien Steffen

**December 13**
Alex Kowalski
Mahdi Hashemian
Erik Duhaime
Meitong Li

Madhav Kumar
Richard Xiaoli Yang
Alex Chan
Will Kimball
December 6 and December 13: Student Papers and Presentations

Required Readings

Draft Student Papers and Presentations

Assignment:

BEFORE CLASS ON DECEMBER 6: Please prepare brief feedback on each of your classmate’s presentation files (distributed in class November 29. Specifically, please prepare and print out a separate sheet with your brief (1-2 sentence) answers to these questions:

1. What did you like best about this paper?
2. What would you recommend changing about this paper?
3. What is the most important thing you learned from this paper?
4. What concrete suggestions do you have (e.g. related articles, contacts at companies or elsewhere, data sources, other comments)?
5. What questions do you still have about the research? (You may want to ask these during your classmate’s presentation).

During each presentation, you may wish to write additional comments. After class, give the relevant sheet to each presenter and collect corresponding sheets on your own presentation from your classmates.

Review Advice on writing and presenting (Optional):

   http://people.ischool.berkeley.edu/~hal/Papers/how.pdf

   http://phdtips.com/

   http://www.economics.harvard.edu/faculty/kremer/files/checklist.pdf


5. Romer, David, “Out in Five”
   http://faculty.ses.wsu.edu/rosenman/econs529/david_romer_rules.htm
December 13: The Future of the Information Economy

It’s useful to understand what the future will be like. After all, we’ll be spending the rest of our lives there. Fortunately, some predictions are relatively easy to make. For instance, we can be pretty confident that digital technologies will continue to improve radically. That will affect not only microprocessors, but all sorts of information and communication technologies from data storage and memory, to fiber optics and wireless bandwidth, and in not only performance, but also energy efficiency, size and other metrics.

But what are the implications for how we live and work, or even whether we live and work? Please give some thought to this question and come prepared to make a prediction or two.

Readings

TBD
Optional:

Kelly, Kevin “We are the Web” KurzweilAI.net Jan, 2006
http://www.kurzweilai.net/meme/frame.html?main=memelist.html?m=1%23664
(originally published in Wired, August 2005) (11 breezy pages)

Joy, Bill “Why the Future Doesn’t Need Us”, Wired, 8.04
http://www.wired.com/wired/archive/8.04/joy.html
(19 sometimes-depressing pages)