AI Capstone Project with Machine Learning & Generative AI

[Prof. Pierre-Alexandre Balland](https://www.paballand.com/)

### Course Schedule

#### Week 1: 7/10 (Mon) - 7/16 (Sun)

* Orientation(2 hours) - Project Coordinator Grace & Erin
* Pre-coding Course (6 hours) -Dr. Brian’s session
* Pre-reading List

| Activity | Day | Date | Time | Location | Lecturer |
| --- | --- | --- | --- | --- | --- |
| Lecture 1 | Thursday | June 23 | 10:30-11:30 (AM) | Online | Prof. Balland |
| Lecture 2 | Thursday | June 30 | 10:30-11:30 (AM) | Online | Prof. Balland |
| Tutorial | Thursday | July 14 | 10:30-11:30 (AM) | Online | Prof. Balland |
| Presentations | Thursday | July 28 | 10:30-11:30 (AM) | Online | Prof. Balland |

##### **Lecture 1: ChatGPT, Artificial intelligence and human society**

*Topics covered*  
- Overview of class  
- Scope and limits of the AI revolution  
- What is ChatGPT and is it a tipping point for AI? - Key applications of AI for business and society  
- Predicting in a complex world  
- Winners and losers of the AI revolution

*Homework*  
This lecture is coupled with 1 hour of TA office hours. Students will have to write a 1000-word essay on a macro-level impact of AI on society or a specific use case of AI. This essay will be written in pair with ChatGPT and students will be evaluated based on their prompts, iterations & critical assessment of the AI input.

##### **Lecture 2: Artificial intelligence tools and principles**

*Topics covered*  
- What AI is and what AI is not  
- AI, network science, ML and DL  
- The data matrix behind key AI applications  
- Talking to your computer: demystifying programming language  
- Working principles of recommendation systems

*Homework*  
This lecture is coupled with 2 hours of TA office hours. Students will have to do a computer lab assignment in R/Python that will help them to understand the working principles of a simple ML recommendation system. ChatGPT can be used for pair-programming.

##### **Tutorial: Using ChatGPT to sharpen & pitch your big idea**

*Topics covered*  
- Introduction to the VC/start-up world  
- How can ChatGPT help  
- How to design your AI solution  
- Key elements of a pitch deck  
- Tips on communication & delivery  
- First discussion of students’ presentation topics

*Homework*  
This tutorial is coupled with 3 hours of TA office hours. Students will get feedback on building a recommendation system to solve a real-world problem of their choice and building the pitch deck to be presented during the final session. The deck should include a R/python script that reflect the main working principle of the recommendation system.

### Readings

There is no mandatory reading for these class but the following books, papers, and newspapers make excellent companions:

* [OpenAI documentation](https://openai.com/blog?authors=openai)
* [The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies](https://www.amazon.com/Second-Machine-Age-Prosperity-Technologies/dp/0393350649) by Erik Brynjolfsson & Andrew McAfee
* [Prediction Machines: The Simple Economics of Artificial Intelligence](https://www.amazon.com/Prediction-Machines-Economics-Artificial-Intelligence/dp/1633695670) by Ajay Agrawal, Joshua Gans & Avi Goldfarb
* [AI Superpowers: China, Silicon Valley, And The New World Order](https://www.amazon.com/AI-Superpowers-China-Silicon-Valley/dp/132854639X) by Kai-Fu Lee
* LeCun, Yann, Yoshua Bengio, and Geoffrey Hinton (2015) [Deep learning](https://www.nature.com/articles/nature14539), *Nature* (you don’t have to understand it all - just skim through it)
* Pierre-Alexandre Balland, Cristian Jara-Figueroa, Sergio G. Petralia, Mathieu P. A. Steijn, David L. Rigby & César A. Hidalgo (2020) [Complex economic activities concentrate in large cities](https://www.nature.com/articles/s41562-019-0803-3#:~:text=Complex%20economic%20activities%2C%20such%20as,as%20apparel%20or%20paper%20manufacturing.), *Nature Human Behavior*
* Amazon’s description of their [collaborative filtering AI system](https://www.amazon.science/the-history-of-amazons-recommendation-algorithm)
* [Why data is the most valuable resource](https://www.economist.com/leaders/2017/05/06/the-worlds-most-valuable-resource-is-no-longer-oil-but-data) according to *The Economist*