

## Managing Disruptive Technologies (MDT) (outline subject to minor changes)

### Course statement and motivation:

We live in a rapidly changing world dominated by a myriad of technology-enabled disruptions. As a consequence, there is a strong need for individuals who understand the nature of these innovations and the complex ways in which they may affect marketplaces. In line with this need, this course is about understanding technology-driven disruption and evaluating from a managerial point of view. The course combines several lectures introducing fundamental concepts of economics and management applied to technology-enabled markets, such as multi-sided platforms, direct and indirect network effects, diffusion and critical mass, market power, economies of scale, winner-takes-all markets, pricing strategies, multi-homing, switching costs, differentiated services, bundling, artificial intelligence/machine learning and the value of data. These lectures are complemented by case studies as well as academic papers looking at specific real-world companies focusing on innovative technologies like social networks, online marketplaces and the sharing economy. We will also have a set of guest lectures that will shed light on these topics from an industry perspective. Students learn how to anticipate disruptive technologies and are exposed to frameworks and tools to characterize and manage these technologies in the workplace.

### Learning objectives:

Students will learn fundamental tools to understand how to manage the dynamic aspects of technology-enabled marketplaces as a way to understand industry disruption. They will also develop an understanding of the key elements that need to be evaluated when trying to anticipate and manage disruptive technologies in the marketplace. By the end of the course, students should be able to:

- (1) Identify and contrast new disruptive technologies to those based on traditional definitions.
- (2) Evaluate strategies aimed at platform growth through leveraging direct and indirect network effects.
- (3) Use basic data analysis (linear regressions, A/B tests etc) to evaluate technology strategy decisions by companies.
- (4) Assess the current AI and ML landscape and its future potential as well as risks.
- (5) Identify and evaluate strategies that have been already used by major technology companies in the real world.

**Prior knowledge:** a course in economics is required (e.g. 95710 – economic analysis).

### Key learning resources:

This course pulls materials from different sources to provide the best mix to studying disruption and digital platforms. Appropriate readings selected by the instructor will be available on the course website. Related textbooks (non-mandatory reading) include:

- 1) The Innovators Dilemma by Clayton Christensen, Harvard Business Review Press
- 2) Platform Revolution by Geoffrey Park and Marshall Alstyne, W. W. Norton & Company

**Course activities:** 13 semi-weekly lectures of 1hr 20 mins

**Course schedule:** TR, 9.30am (HBH 1204), 11am (HBH 1204), 2PM (HBH 1206)

**Assessment structure:**

There are five assignments which will be made available. All homework deadlines are published on the course website and set since the first lecture. Late homework is received up to 48 hours after the deadline. A 20% penalty on the obtained grade is applied. No homework is received after 48 hours unless the delay is due to illness (contact me in such cases ahead of the deadline).

**Assignments 1, 2 and 3** are to be submitted individually (i.e. each student submits their work). Assignment 1 and 2 count for 10% (each) of the total grade. Assignment 3 counts for 15% of the grade. These assignments are due 5 days after being posted online. The assignments have to be submitted on Gradescope.

**Assignment 4 and 5** are to be submitted in groups of 5 students. Students will keep the same team for assignments 3 and 4. Assignment 4 is based on a group presentation in the final two lectures. Assignments 4 and 5 will count for 20% and 15% respectively. The assignments have to be submitted on Gradescope.

**In-class quizzes:** 20% of the grade will be for short quizzes randomly administered through the course during the lectures. The quizzes will last for a maximum of 10 minutes. The objective of the quiz is to simply keep you updated about the material covered in the lectures. No extra reading or preparation is required if you have following the material and discussions in the class. Quizzes will be administered during the lectures and attendance is compulsory to be able to take the quiz. Quizzes cannot be taken outside the designated time.

**Class participation:** will account for 10% of the grade. The quality of our learning environment is contingent on the effective and informed participation of each class member. The goal here is not to dazzle us with your individual brilliance or maximize the number of comments you make, but rather to help make the class learn. Note that, in addition to providing new insights to the discussion, it is possible to make the class smarter by asking the right question or by assimilating comments from other students or sources. Contribution is assessed on an individual basis. This is inherently a subjective assessment but will take the following factors

into account: preparation, ability to coherently present arguments and to contribute to a discussion. Attendance in class is necessary but not sufficient to get credit for the contribution grade. A Teaching Assistant will sit in every class and record class participation.

**Integrity Policy:**

All students are urged to follow CMU's policies for academic integrity and plagiarism. In general, students are encouraged to discuss lecture material among themselves. For individual home assignments, students should not consult among themselves. For the assignments that require group study each team is required to submit their team answers without consulting other teams.

**Use of AI in coursework:** To ensure all students have an equal opportunity to succeed and to preserve the integrity of the course, students are not permitted to submit the output from artificial intelligence (AI) systems such as ChatGPT or any other automated assistance for any classwork or assessments. This includes using AI to generate answers to assignments or using AI to complete any other course-related tasks. Violations of this policy will be treated as academic misconduct. There are tools to detect whether the submitted text is written by ChatGPT or other similar tools. If you have any questions about this policy, please do not hesitate to ask for clarification.

**Course attendance:**

Class attendance is mandatory for taking the quizzes and getting a minimum grade for class participation. All the take-home assignments will be based on material and discussions in the lectures. The presentations will have a section where you will need to link to the lectures.

**Contacts:**

Instructor: Ananya Sen

More information: <https://sites.google.com/view/ananyasen/home>

Contact via email: [ananyase@andrew.cmu.edu](mailto:ananyase@andrew.cmu.edu)

Teaching Assistants: Naveen Bavasaraaj (naveentb@cmu.edu), Helen Zheng (shuxuanz@andrew.cmu.edu), Zekai Fan ([zekai@cmu.edu](mailto:zekai@cmu.edu)), Andy Wu (andywu@andrew.cmu.edu)

Office Hours: TBD (Helen Zeng – HBH 3008)

TBD (Zekai Fan – HBH 1107)

**Tentative Calendar:**

**Lecture 1 (March 12). INTRODUCTION AND DISRUPTIVE TECHNOLOGIES**

Introduction to the course. Disruptive technologies according to Clayton Christensen.

**Lecture 2 (March 14). MODERN CONCERNS WITH THE THEORY OF DISRUPTION**

Critiques to the theory of disruption. Examples and concerns raised by digital platforms.

**DATA ANALYSIS TUTORIAL (MARCH 16 at 1pm). ON ZOOM**

Using Stata, Excel and R to carry out simple linear regressions. Recording will be made available.

**Lecture 3 (March 19). NETWORK EFFECTS**

Direct network effects. Dynamics with positive network externalities. Critical mass.

**Lecture 4 (March 21). INDIRECT NETWORK EFFECTS AND PRICING**

Definition of indirect network effects and two-sided markets.

**Lecture 5 (March 26). NON-PRICE STRATEGY AND NETWORK EFFECTS: DATA ANALYSIS I**

Analysis of non-monetary incentives to stimulate network effects.

**Lecture 6 (March 27). GUEST LECTURE: ROHIT SUPEKAR (NYT) (12.30pm-1.50pm, HBH A301)**

NO REGULAR CLASS ON MARCH 28.

**Lecture 7 (April 2). WINNER TAKE ALL IN PLATFORM MARKETS**

Analysis of recommendation technology decisions using A/B testing.

**Lecture 8 (April 4). TECHNOLOGY STRATEGY USING A/B TESTING: DATA ANALYSIS II**

Analysis of recommendation technology decisions using A/B testing.

**Lecture 9 (April 8). GUEST LECTURE: EMMA ZETTERDAHL (SPOTIFY) (12.30pm-1.50pm, HBH A301)**

NO REGULAR CLASS ON April 9

**Lecture 10 (APRIL 16). GUEST LECTURE: VINEETH LOGANATHAN (VIRALGAINS)**

The business value of Generative Artificial Intelligence (eg ChatGPT).

**Lecture 10 (APRIL 18). THE BUSINESS VALUE OF AI AND ML: THE VALUE OF DATA**

Value of data in prediction, data network externalities, market structure and GDPR + California Privacy Act.

**Lecture 12 (April 23). PRESENTATIONS ON AI/ML and PLATFORMS**

Group presentations of assigned cases (platforms, AI/ML, sharing economy, regulation)

**Lecture 13 (April 25). PRESENTATIONS ON AI/ML and PLATFORMS**

Group presentations of assigned cases (platforms, AI/ML, sharing economy, regulation)