Course program and reading list

Semester 2 Year 2022

School: School of Sustainability Founded by Israel Corp. ICL

Technology, Big-data and Sustainability

Lecturer:

Ms. Michelle Specktor  Michelle.Specktor@post.idc.ac.il
Mr. Guy Pross  guy.pross@post.idc.ac.il

Teaching Assistant:

Nadav Zohn  nadav.zohn@post.idc.ac.il
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Course No.: 3173  Course Type: Lecture  Weekly Hours: 2  Credit: 2

Course Requirements: Final Paper  Group Code: 222317300  Language: Hebrew

Prerequisites

Students who took one of the courses listed below will not be allowed to register to the course Technology, Big-data and Sustainability (3173):

5935 - Sustainable Development

Course Description

Course Lecturers:
Course Summary

Today, technology and innovation have become a major driving force for our economy and life. Revolutions that occurred over lifetimes are happening before our eyes and are shaping new innovation curves and models. New technological advances have become a foundation for innovation in our countries and cities driving change in the way that we communicate, trade, travel, work, learn and live.

During the course we will explore new frameworks of innovation and drill down into the most important foundations of our technological world including AI, Big Data, Robotics, IoT and many more. We will then explore how these technologies impact key verticals including the urban sphere, mobility, energy, food and agriculture.

Finally, the course will explore the connection of our modern innovative world on Climate Change, how it has impacted our environment and how potentially technology and innovation could also be used to create a more sustainable planet through Climate Tech initiatives and innovations.

Course introduction: Yesterday - historical perspective at the evolution of technology

“Three important revolutions shaped the course of history: the Cognitive Revolution kick-started history about 70,000 years ago. The Agricultural Revolution sped it up about 12,000 years ago. The Scientific Revolution, which got underway only 500 years ago, may well end history and start something completely different.” - Yuval Noah Harari in Sapiens

Who could imagine a world without the invention of spoken and written language, the wheel, money, and agriculture? What are the most important inventions of the last millennium? Century? Decade?

What led us to this point? In the course of the 18th to 21th centuries, there have been four revolutions: mechanization, mass production, automation, and robotics.

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Part I: Today - looking at today's key technology trends

Includes an introduction to the course and a special two week active learning session on technology frameworks and emerging technology trends:

(1) Frameworks – The structure and format of the course. A look at innovation frameworks for evaluating transformative technologies. Diffusion (Rogers), Creative Destruction and S-Curves (Schumpeter), Hype Cycle (Gartner) and the Nexus of Forces (Gartner) - Session Lecturer: Guy Pross

(2) Review of the Tech Trends Report by the Future Today Institute (4 Classes) Emphasis on how to analyze the report, understand its structure and content and initial dive into the 19 trends presented - Session Lecturer: Michelle Specktor

1. Robotics and 3d printing
2. Big Data/IoT
3. Artificial Intelligence / Machine Learning
4. Cyber Security / Fintech / Blockchain
5. Telco/5G/VOIP
6. Sensors and Sensing Technology
7. Data Centers and Data Analytics (data as the new oil)
8. Digital Twins

(3) The Ethics of Technology – Is technology a change for good? Can we control the outcomes? Will machines replace humans? The Autonomous vehicle dilemma - Session Lecturer: Michelle Specktor

(4) The Innovation economy - Israel case study. A review of how Israel, against all odds, has become a superpower of innovation, creating a significant portion of the world's Unicorns, this year more than the UK and China (and second only to the US) - and shifting from a Startup nation to a Scale up nation! Session Lecturer: Guy Pross

Part II. Tomorrow / Modern Revolutions- the People and Frameworks That Enabled Them

(5) Urban Revolution : As our world population moves towards cities we investigate how the urban nature of our lives is changing and how the role of cities has transformed from a service provider towards a platform for urban innovation and creativity. Through the course we will review strategic plans from major cities such as Boston, London and Tel Aviv and consider approaches of great global mayors. Session Lecturer: Guy Pross

(6) Mobility Revolution : Advances in transportation have altered the human experience and economy. A look at the people, technologies and innovations- past, present and future including the 4 major transformational trends in this space CASE - connected, automated, shared, and electric mobility. Session Lecturer: Michelle Specktor

(7) Energy Revolution : Electric vehicles, solar panels, wind turbines, these technologies have survived through the investment ups and downs of the cleantech boom and have scaled and matured to help make our world oil independent. Session Lecturer: Guy Pross

(8) Food / Ag Tech : Large-scale Agriculture, and the deforestation associated with it, account for -25% of the global GHG emissions. Countless companies are working on
solutions, each one taking a different approach: from taste-buds appeasing meatless-meat, fishless-fish, and eggless-omellte, to growing "real" meat in the lab; from growing crops in an automated 10 story-high warehouse with no soil, to using drone and cameras to improve crops yield while reducing the use of pesticides. It is clear that there is no single solution but rather a combination of all could help mitigate this industry's massive impact.

Session Lecturer: Guy Pross and Nadav Zohn

**Part III The Future: Technology and Innovation in the context of Climate Change**

(9) Technology's negative impact on climate: The negative impact of technology on the environment and how it is linked to climate change.

(10) Technology leveraged to correct climate change: How technology and data can be used to effectively fight climate change.

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### Course Goals

### Requirements

1. Reading the written material and being prepared to discuss the concepts.
2. Participation and presence in lectures
3. Submitting and presenting projects.
4. Minimum attendance in class 80%

### Grading

1. Lectures and discussions on Technology, Big Data and Climate Change, theory and implementation
2. Midterm Project: 30%
3. Final Project: 60%
4. Attendance and Class Participation: 10%

### Lecturer Office Hours

Course Lecturers:

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Teaching Assistant

TA:

Nadav Zohn  nadav.zohn@post.idc.ac.il

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Reading List

Books


Supplementary Articles:

8. A long-term economic perspective on recent human progress (Gary M. Walton) http://www.ftfe.org/teacher-resources/lesson-plans/is-capitalism-good-for-the-poor/historical-overview/
9. 100 Gadgets that changed the world http://www.popularmechanics.com/technology/gadgets/reviews/g165/101-gadgets-that-changed-the-world/?slide=101


Videos


27. Yuval Noah Harari: Entire video course https://www.youtube.com/watch?v=CGhTQ4irULc&list=PLfc2WtGuVPdmhYaQjd449k-YeY7fiaFp