



# Course program and reading list

Semester 2 Year 2020

**School:** General Studies Unit

## 21st Century Challenges

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<b>Course No.:</b>	<b>Course Type :</b>	<b>Weekly Hours :</b>	<b>Credit:</b>
6746	Elective	2	2

<b>Course Requirements :</b>	<b>Group Code :</b>	<b>Language:</b>
Final Paper	202674601	English



### Course Description

This is a fully on-line course, composed of 12 study units, which cover the 4 pillars that

constitute the main challenges of the 21st century. Each pillar is composed of 3 units, as listed below.

### Sustainability

1. **Planet Earth:** This unit teaches the basic structure of our planet and its evolution along geologic time, and focuses on the recent effects humanity and civilization have on the planet in the first decades of this century. In an era of climate changes, the interaction between the human race and the environment merits considerable attention, because it cannot be sustained in a responsible manner with "business as usual" practices.
2. **People, cities and resources:** This unit deals with the new urban reality, by which 70% of our planet's population of 7.5 billion resides in cities and lead urban life, detached from nature. Water, food and the clever use of natural resources are essential for maintaining social order and a reasonable standard of living.
3. **Energy, technology and resilience:** This unit deals with the different types of energy that are used by modern societies and describes future solutions for the decreasing the negative effects of a carbon-based economy. As modern society is depends heavily on electricity, the unit deals with natural disasters and how to develop resilience for different scenarios.
4. **Climate Change:** Short updates on the most critical issue that threatens humanity in the first decades of the 21st century, and some predictions for Israel.

### Technology

1. **User Experience and the Internet of Things:** This unit teaches what User Experience (UX) is, and how students can leverage it to analyze and invent new digital experiences. We review the principles of interaction design; learn what usability goals are, and discuss the revolution in the field, moving from screens to objects and from single devices to ecosystems of devices.
2. **Computer Networks and the Internet:** This unit teaches what computer networks are and how they work. We specifically describe the largest computer network, the Internet, which we so often take for granted. Where did it come from and what are the components that enable the Internet to function?
3. **Artificial Intelligence and Robotics:** This unit teaches what Artificial Intelligence (AI) is, and how it is different than human intelligence. We discuss the application of AI and robotics, as well as societal challenges related to AI and robotics.

### Genetics

1. **Genetics - The Language of Heredity:** This unit introduces the building blocks of human heredity and genetics – DNA, RNA, and proteins – by showing how they influence our health, physical and mental characteristics, and destiny.
2. **Evolution and Genetic Engineering:** This unit shows how human evolution proceeds by genetic modification. It provides an overview of new technologies of genetic engineering, and their implications for human society.
3. **Epigenetics:** This unit explores the notion that our experience can affect the traits we pass on to our children. It explores the factors that make up our *epigenome*,

and explains how

### Globalization

1. **Globalization and Governance:** This unit will discuss the key developments in the globalized world affecting governance, including connectivity and inter-dependency, the new actors in the international sphere, challenges to states, and possible modifications to state institutions
  2. **The Dark Side of the Global Economy:** This unit introduces the dark side of the global economy, and the challenges it presents. The unit will provide an overview of the illicit economy, with a focus on the challenges of combating money laundering and trafficking in persons, and discuss international efforts to combat the phenomena.
  3. **Challenges of the Cyber World:** In this unit we will discuss some of the challenges of the cyber world, including cyber security, cyber crime, cyber warfare and cyber terrorism, and provide an overview of the efforts to deal with these challenges.
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### Course Goals

This on-line course deals with 4 different topics, which contain the main challenges facing citizens of Planet Earth in the 21<sup>st</sup> century: Sustainability, Life Sciences, Technology and Globalization. Students will be exposed to highlights of modern, urgent and pertinent issues from those 4 areas. The course offers a rich and unique blend of learning materials and relies on innovative pedagogy of a fully on-line platform. The students are expected to study the material on their own, and the course team will interact and evaluate student performance through assignments and mini-projects.

The learning is assisted by a Study Guide that recommends the order and pace of study. Generally, each topic is to be covered within 3 weeks during the semester, according to the prescribed order. Every Study Unit contains several short videos presented by the lecturers, which describe and distill the main issues that the unit deals with, and offers an introduction and a focus. These short videos are accompanied by additional on-line learning materials such as papers, tutorials, summaries, presentations and external links pointing to essays and additional Youtube videos. For each unit, there would be 1-2 learning assignments, to be completed before moving-on to the next one. There will also be one on-line quiz for self assessment for each Study Unit (that is, 3 per topic). At the end of each Topic, the students will upload a final assignment that will be graded.

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### Grading

**The course contains 4 Topics, each**

# holding 25 points of the total final grade.

The Topic grade breakdown is as follows:

**6 points for 2 learning assignments** (each subject contains 3 assignments; students are required to submit **at least two**).

Note: A bonus will be granted for students who complete all 3 assignments in each topic.

**6 points for the completion of 3 digital quizzes.**

**13 points for the final assignments.**

**The total is 6+6+13=25 in each topic.**

The final course grade is the summary of the grades from all 4 Units (Total of 25 points x 4 topics = 100).

A strict submission schedule will be maintained, with no delays granted.

**In case a student fails to submit the final assignment of a topic, her/his grade in that topic will be 0 (meaning 25 points of the final grade will be deducted). In case a student fails to submit 2 final assignments - you will fail this class.**



## Learning Outcomes

### **Learning outcomes for the "21<sup>st</sup> century challenges" course**

#### Unit 1

The student should be able to:

1. Describe the main events in Earth's natural history and explain present day conditions
2. Identify human influences on the Earth system, and analyze their potential impacts
3. Find and rank possible solutions to environmental problems, and to evaluate their validity

#### Unit 2

The student should be able to:

1. Analyze data on global and national population growth and to describe major urban expansion trends
2. Describe the food-loss issue and will be able to evaluate different approaches to the hunger problem
3. Describe and rank the main problems in modern urban life and design their own solutions

### Unit 3

The student should be able to:

1. Identify the main resources of energy for the coming decades – and distinguish between renewable and non-renewable resources
2. Describe different types of natural disasters and to analyze how technology enables early warning
3. Evaluate the vulnerabilities of the modern society and cities by describing "black-sky" scenarios

### Unit 4

The student should be able to:

- a) List and explain the interaction design principles.
- b) Describe what are usability goals and how we can use them.
- c) Describe the shift that the internet of things represent

### Unit 5

The student should be able to:

- a) List the layers of the Internet model and describe the responsibilities of the TCP and IP layers.
- b) Describe the concepts of HTTP and HTML and the difference between them
- c) Describe the steps necessary to request and display a web page.

### Unit 6

The student should be able to:

- a) List the various problems AI covers
- b) Describe the three kinds of machine learning
- c) Describe at least two societal challenges of AI and robotics

### Unit 7

The student should be able to:

1. Explain how genes are responsible for human characteristics and genetic disorders
2. Describe the cellular mechanisms of inheritance, including genetic transcription and translation
3. Provide examples of recessive and dominant human traits and what causes them.

### Unit 8

The student should be able to:

1. Explain how adaptive factors have shaped human evolutionary development
2. Give examples of genetic engineering in agriculture and industry

3. Discuss the ethical and societal issues posed by genetic engineering

#### Unit 9

The student should be able to:

1. Describe the mechanisms of epigenetics, and how they bridge nature and nurture
2. Give examples of epigenetic phenomena across the lifespan
3. Explain the dangers of stress in human life in terms of epigenetic effects

#### Unit 10

The student should be able to:

1. Become familiar with the impacts of globalization on governance and sovereignty
2. Describe the new actors in the global field
3. Discuss modalities for evolution of state institutions to address new challenges.

#### Unit 11

The student should be able to:

1. Explain what the dark economy is and its significant impact on the economy governments and societies
2. Understand the inter-dependency between states in combating cross border crime and complexities involved.

#### Unit 12

The student should be able to:

1. Recognize the new cyber challenges
2. Become familiar with the ongoing policy debates
3. Become familiar with international efforts for cooperation and regulation.



#### Lecturer Office Hours

Prof Yoav Yair - Course Coordinator and manager - Thursdays 1200-1300, By appointment

Room SL 410 (Sustainability-Law building, second floor, Dean's office)

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#### Teaching Assistant

#### **GROUP 1**

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 Additional Notes

**This is a unique course, designed for self-study, in a paced and structured manner. Its**

**Learning is your responsibility! We will support and assist as needed, and expect that progress will be made according to the prescribed schedule.**

**The course web-site is the focus for learning - all materials and communication will be done on-line.**

**Please adhere to the schedule, read carefully the instructions and submit assignments on-time!**

**We have zero tolerance for ethical issues, and any misconduct (copying, delaying, improper language) will be treated according to IDC procedures.**

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 Reading List

### Sustainability

#### 1. Climate change

**The weather makers: the history and future impact of climate change. Tim Flannery, 2005.**

**The Inter-governmental Climate Change (IPCC) - 5th Assessment Report (from <https://ipcc.ch/report/ar5/>)**

### Technology

#### 1. Networks and Internet:

**Severance, Charles R., and Sue Blumenberg. "Introduction to Networking: How the Internet Works." (2015).**

#### 2. AI and Robotics:

**Minsky, Marvin. *The emotion machine: Commonsense thinking, artificial intelligence, and the future of the human mind*. Simon and Schuster, 2007.**

**Gunkel, David J. *The machine question: Critical perspectives on AI, robots, and ethics*. MIT Press, 2012.**

**Not required but additional reading: Jordan, John M. *Robots*. MIT Press, 2016.**

### Genetics

**National Institute of General Medical Sciences. (2010). *The New Genetics*. Available at: <https://publications.nigms.nih.gov/thenewgenetics/>**

**"Epigenetics and Inheritance": <http://learn.genetics.utah.edu/content/epigenetics/inheritance/>**

## **Globalization**

### **1. Introduction to the Globalized World – Governance Connectivity and Interdependency**

Stiglitz, J. E. (2007). *Making Globalization Work*. New York: W.W. Norton & Company.

Armstrong, D., & Gilson, J. (2011). Introduction: Civil Society and International Governance. In Armstrong, D., Bello, V., Gilson, J., & Spini, D. (eds.), *Civil Society and International Governance*, London: Routledge

### **2. Economic Globalization – Challenges and Opportunities**

Watson, M. (2014). Global Trade and Finance. In Baylis, J., Smith, S., & Owens, P. (eds.), *The Globalization of World Politics: An Introduction to International Relations*, Oxford: Oxford University Press.

World Economic Forum (October 2015). State of the Illicit Economy: Briefing Papers. *Global Agenda*. [http://www3.weforum.org/docs/WEF\\_State\\_of\\_the\\_Illicit\\_Economy\\_2015\\_2.pdf](http://www3.weforum.org/docs/WEF_State_of_the_Illicit_Economy_2015_2.pdf)

### **3. The Global World of Cyber**

Kurbalija, J. (2014). *An Introduction to Internet Governance*, 6<sup>th</sup> edition, DiploFoundation. Available for free at: <https://www.diplomacy.edu/resources/books/introduction-internet-governance>

Harris, S. (2014). *@War: The Rise of the Military-Internet Complex*. New York: Eamon Dolan/Houghton Mifflin Harcourt.

Follow the Blog - DayZero: Cybersecurity Law and Policy. Available on the Lawfare Blog (<https://www.lawfareblog.com/coverage/dayzero-cybersecurity-law-and-policy>)