

# THE BIG HISTORY OF IDEAS AND INNOVATION

**Bachelor in Data and Business Analytics BDBA SEP-2023  
TBHII-DBA.1.M.A**

Area Humanities

Number of sessions: 30

Academic year: 23-24

Degree course: FIRST

Number of credits: 6.0

Semester: 1<sup>o</sup>

Category: BASIC

Language: English

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Chris Kostov is Adjunct Professor in the School of International Relations at IE University. He earned his PhD in History and Canadian Studies from the University of Ottawa, Canada, where he focused on modern European history and nation-building, Native studies and Canadian migration trends. His dissertation "Contested Ethnic Identity: The Case of Macedonian Canadians in Toronto (1940-1996)" dealt with interethnic relations and conflicts.

Prior to coming to Spain, Dr. Kostov taught history at the University of Ottawa. He was also an invited lecturer at the University of Innsbruck, Austria and a historical researcher in the federal government of Canada, Department of Indian and Northern Affairs.

Dr. Kostov edited in 2020 the volume Regionalism and Separatism in Modern Europe (Logos Verlag, 2020) and he is the author as well of three books: The Communist Century: From Revolution to Decay, 1917-2000. Explaining History, 2014. [e-book], Contested Ethnic Identity: The Case of Macedonian Canadians in Toronto, 1900-1996 (Peter Lang, 2010) and Terror and Fear: British and American Perceptions of the French-Indian Alliances during the Seven Years' War (Publish America, 2005), as well as book chapters, academic and encyclopedia articles and book reviews.

Currently, his main research interest is the Cold War and the impact of the communist secret services on the daily lives of common people in Eastern Europe and Russian propaganda in the West.

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## SUBJECT DESCRIPTION

This course provides an exciting and unique perspective on human evolution. It is an exploration of how science and technology has changed the lives of all human beings and how they have augmented our abilities. The digital human results from years of innovation, scientific endeavor and the creation of incredible new breakthroughs that have allowed us to develop abilities beyond our natural capabilities. The future for us will mean we evolve at a more rapid rate than ever before and breakthroughs in artificial intelligence, machine learning and the digital economy will give us capacities and opportunities that we could never have imagined in the past.

The course begins with a look at the early years of the scientific revolution and how it allowed many nations to conquer and divide the world. The rise of technologies from gunpowder to groundbreaking types of transport amazed early civilizations. Technology allowed us achieve things that were otherwise the realm of fiction. From manned flight, to man's first steps on the moon.

Since the advent of the integrated circuit, and then silicon chips, our rate of evolution has accelerated in unprecedented ways. Before, specializations meant that we could only do work that was naturally easy for us or that we had spent extensive time studying. Technologies have allowed us to expand beyond our areas of specialization, and through digital tools we can perform tasks with no rigorous and detailed training. The current impact of digital technologies on our abilities as humans will be explored, and how the Internet, apps, mapping services and search engines have made us more capable and advanced. We will examine the impacts of current technologies such as big data, social media and machine learning, with a reflection on how things have changed for us as a society since these technologies became commonplace.

As people, we have improved our ability to cope with physical problems and advances in medical technologies have brought us longer lives, better treatment of disease and a level of physical comfort never before known. Scientists are on the verge of developing treatments for almost every disability, from brain-controlled artificial limbs to human computers interfaces that will allow us to communicate using thoughts. The future could see us surpass our current state of consciousness, allowing us to communicate in ways beyond our imaginations. The future could also see the emergence of a-mortal humans who, without accidents, might continue to exist forever.

Artificial intelligence is set to dominate the coming decade, and this course will have implications on every aspect of our lives. The idea of a super intelligence that is more sophisticated than us both scared and amazes philosophers and futurologists and could mean that we create the ultimate invention. Ways that this future could manifest will be explored and examined, and questions about the ethical and human impact examined.

Finally, the course will look forward to a future of human cyborgs and super-human races. The possibilities for great good and great misdeeds will be debated and the next phase of evolution will be revealed.

Are you ready to see where all the innovation and disruption is leading? This course aims to prepare you for the coming storm of changes. The next decade will be unlike any other in the history of our species. The rate of change will increase and without knowing what is coming, the opportunities that will come may pass us by.

## **LEARNING OBJECTIVES**

### **Part 1: Background**

- Understand how technology has played a role in the evolution of humans.
- Discover the major achievements through history that have been driven by technological change, which have allowed to achieve things that would have been impossible with new advancements.
- See how early technologies gave way to more advanced computational systems.
- Develop knowledge on how hardware has evolved from vacuum tubes to the silicon chips in modern computing devices,

## Part 2: The modern era

- Understand the key technologies of the second half of the 20th century, and their role in augmenting our abilities.
- See how businesses have been revolutionized by databases and digital transformation.
- Develop an understanding of how communication technologies have made our lives easier, and given us new abilities to reach anybody, at anytime.
- Understand the use of data to help us develop ground-breaking new scientific discoveries.
- See the impact the Internet and the Cloud have had, essentially creating a “second brain” for us in the case of Google and allowing powerful distributed computing in vast data centers.
- Develop a deep understanding of big data and how we use data to go beyond the limited processing abilities of our brains.
- Find insights into how social media has transformed the way we communicate and socialize and the impact that this has had on us.

## Part 3: The Digital Future

- Look forward to the possibilities that the artificial intelligence revolution will bring.
- You will learn of the ways AI will transform our lives and how it could be the final invention that we need to create.
- Discover how health will also be improved with technologies, leading to cures for many common diseases and ailments and even the possibility of a-mortal humans.
- Learn about cybernetics and how we could be enhancing and using biotechnology to accelerate the rate of evolution.
- Discuss the ethical and moral possibilities in this coming age of seemingly exponential improvements in technologies.

## TEACHING METHODOLOGY

IE University teaching method is defined by its collaborative, active, and applied nature. Students actively participate in the whole process to build their knowledge and sharpen their skills. Professor’s main role is to lead and guide students to achieve the learning objectives of the course. This is done by engaging in a diverse range of teaching techniques and different types of learning activities such as the following:

The class will consist of a mix of teaching, debate and assignments of readings and examination of artifacts relating to the classes. We will use multimedia to explore various topics, looking at historical archive footage and modern interviews and discussions. Students will be asked to read and produce summaries for homework as well as contribute to debate in the classes.

Learning Activity	Weighting	Estimated time a student should dedicate to prepare for and participate in
Lectures	30.0 %	45.0 hours
Discussions	10.0 %	15.0 hours
Exercises in class, Asynchronous sessions, Field Work	50.0 %	75.0 hours
Group work	0.0 %	0.0 hours
Individual studying	10.0 %	15.0 hours
TOTAL	100.0 %	150.0 hours

## **PROGRAM**

### **SESSION 1 (LIVE IN-PERSON)**

#### **Empires and Early Technologies**

An introduction to the course and to the concept of life from a technological point of view. This session examines the early years of civilization and how we went from hunter gatherers to be highly organized and ambitious explorers and conquerors of the world. We look at the earliest forms of technology and how they influences the generations to come.

### **SESSION 2 (LIVE IN-PERSON)**

#### **The Scientific Revolution**

A look back into the origins of technology and how our history created a culture of investment in innovation. In this session you will learn about how empires used technologies to capture and terrify native people all over the world. Our expansion and development of colonialism led to investment in technologies and the evolution of science. It changes us fundamentally as a species and transformed us from simple, peaceful agriculturalists into ambitious and driven empires.

Week 1 Reading:

*Book Chapters: Sapiens; p. 409-425 (See Bibliography)*

### **SESSION 3 (LIVE IN-PERSON)**

#### **Technologies and economic growth**

The advent of consumerism and capitalism created the idea of investment. Investment was the reason that technology and science developed at such a rapid pace. In this session, the implications of government-backed funding will be discussed and the influence of this on the types of technologies chosen for investment. The influence in government on technology will be explored and we will analyze the reasons that certain developments were pushed by investors of the industrial era.

### **SESSION 4 (LIVE IN-PERSON)**

#### **The Industrial Revolutions**

How we used technologies to begin the transformation of society into the industrial era. A look at early techniques that augmented our abilities as humans and how society reacted at the time.

### **SESSION 5 (LIVE IN-PERSON)**

#### **The Origins of Computers**

The earliest designs for computer systems will also be introduced, with Charles Babbage's Analytical and Difference Engine design. Then, we will look at the world's first programmer - Augustine Byron, and how she was a pioneer of the field.

Week 2 Reading:

*Book Chapters: The Innovators; Chapter 1, p. 41-61 (See Bibliography)*

### **SESSION 6 (LIVE IN-PERSON)**

#### **Telecommunication**

In 1854, the world was transformed through the invention of the telephone and for the first time people had the ability to communicate over a long distance. Our first major augmentation was the ability to communicate and do business and negotiate from anywhere on the planet with a telephone line.

## **SESSION 7 (LIVE IN-PERSON)**

### **The early days of data processing**

A look at the early days of the Tabulating Machine Company, which later became International Business Machines. How one man, Herman Hollerith, came up with the principle of enumeration and build the first system in the 1880s that could process text and data, and how this spawned the dawn of a new age - the age of data processing.

The first real enhancements of us as humans began with the idea that we could use computing technology to make our lives easier - especially when dealing with data.

## **SESSION 8 (LIVE IN-PERSON)**

### **Early Prototypes and the Advent of Electronics**

An exploration of the work of Charles Babbage's son and the race to create the first computing technologies. At the same time, great developments were occurring as the first electric devices were invented.

Week 3 Reading:

*Book Chapters: The Innovators; Chapter 2, p. 93-113 (See Bibliography)*

## **SESSION 9 (LIVE IN-PERSON)**

### **Pushing Boundaries - Flight and Space**

How we went from a species that seldom left our home countries to a global community. Flight opened the doors to globalization, discovery and a new freedom. Space brought some of the greatest leaps in technology as we finally stood on the moon. Both brought us new advances that also affected us and brought many enhancements to our world.

We will explore how technology allowed us to land on the moon. This session will focus on first the achievement of the space race and how computers with only a fraction of the power of modern machines were used to guide the early space pioneers.

## **SESSION 10 (LIVE IN-PERSON)**

### **The Transistor Age**

A look at one of the most important technologies of early computing - the discreet transistor. This powered everything from early computers to TVs and Radios and was a huge leap in innovation.

A look at how early computers were used to solve mathematical and real-world algorithms and the impact of the first full-scale computer system on the scientific community.

This session will examine how computing from 1940 to the early 1965 went from basic prototypes to advanced computational machines. We will look at the dawn of the first technological era, which led up to us achieving the first moon landing and advanced aerospace technologies.

The impact of the war will also be examined and great advances were made in encoding and communication because of the Second World War.

Project management was also born from the need to construct and build military equipment and they transferred this tradition to industry. This evolved and became the "waterfall" methodology, which was popular until the end of the 20th century.

## **SESSION 11 (LIVE IN-PERSON)**

### **The First Databases and the start of Digital Transformation**

This session explores the earliest business technologies and explains how these benefitted us and opened up opportunities. These enhancements to our abilities are the origins of much of the technology we use today.

Week 4 Reading:

*Book Chapters: The Innovators; Chapter 4, p. 258-278 (See Bibliography)*

## **SESSION 12 (LIVE IN-PERSON)**

### **The Advent of Networking**

The late 1960s and 1970s was the beginning of the connected era. The US military and science industries began creating the first networks. This was a time of great innovation and vision in which some of the greatest minds worked to send the first email. The future of communication and information interchange was born, paving the way for the Internet.

It was also the time when the modern computer was born. The 1980s was the most important time for computing because it is when most people first came into contact with the technology. It transformed the way we think about entertainment and created a generation of augmented workers who could code their way to solve complex and important problems.

## **SESSION 13 (LIVE IN-PERSON)**

### **The Age of the Microprocessor**

In the mid-1970s the microprocessor was invented. Using silicon, the incredible innovation brought the computer into our offices and living rooms. We will look at how processors are manufactured, the impact they had on society and the origins of the modern computer system.

## **SESSION 14 (LIVE IN-PERSON)**

### **The Internet**

The unification of the networks of the world occurred in the 1980s and development of early ideas such as the Gopher standard created the fundamental basis for sending and receiving hypertext websites.

The early 1990s saw the release of the white papers that would allow anyone to join the Internet revolution. The early Internet allowed anyone to access information worldwide and opened up possibilities for any person who had access to a phone line.

The advent of hypertext meant everyone could see a reason for connecting to the network and computer networking was catapulted from being a secure hobby to a mainstream "must have".

Week 5 Reading:

*Book Chapters: The Innovators; Chapter 11, p. 702-727 (See Bibliography)*

## **SESSION 15 (LIVE IN-PERSON)**

### **Midterm Exam**

## **SESSION 16 (LIVE IN-PERSON)**

### **Communication and Commerce - the Growth of the Web**

The late 1990s was the beginning of the online e-commerce revolution. We could shop, sell, communicate and have access to services that were cheaper, quicker and more convenient than ever before.

By having the Internet, people could access services with no regards for location, physical abilities, creed and race.

Email and collaboration also went mainstream and became the standard way to communicate in business, government and academia. These technologies meant the end of the era of letters and less need for face-to-face meetings.

## **SESSION 17 (LIVE IN-PERSON)**

### **The Tech Bubble Bursts and the Emergence of the Cloud**

The boom of the late 1990s ended with a bubble bursting in the early 2000s, which put an abrupt end to many early “dot com” ideas. Nevertheless, some survived and the next phase of the Internet began.

The Internet is clearly established and people are interacting with the first real artificial intelligence: Google.

Now, people have a “brain in the cloud” that can answer any question and the Internet is no longer a list of catalogued websites, but a true information resource. The impact of Google on academia, science, business and in personal lives is huge.

In 2006, Amazon created the first large-scale cloud computing platform, and this opened up the world of commerce for millions of people and organizations. It made computing affordable and meant anyone could have a website.

Week 6 Readings:

*Book Chapters: Science and Technology in World History; Chapter 19, p. 850-859 (See Bibliography)*

*Book Chapters: The Innovators; Chapter 11, p. 782-793 (See Bibliography)*

## **SESSION 18 (LIVE IN-PERSON)**

### **New Industries**

How technology has enabled the transformation and convergence of many traditional industries and how it has resulted in the emergence of completely new and novel forms of business.

## **SESSION 19 (LIVE IN-PERSON)**

### **The Emergence of the Data Economy**

Data science and big data analysis has transformed the way we look at the world and what we expect to predict. Our brain and traditions of mathematics have not been replaced by complex computational systems that can do far more than a person alone.

We have been able to tame nature and predict more accurately everything from population growth to weather. Big data has enabled us to predict when and where protests and civil unrest will occur, how and when diseases will spread, trends in financial markets and behavior of customers. It gives us abilities to use information from the past to accurately predict our future.

## **SESSION 20 (LIVE IN-PERSON)**

### **Social Media**

The early 2000s were dramatically impacted by two major technological changes. First, mobile came and put computing into everyone's pockets. Then, Silicon Valley focussed its attention on social media and the second version of the Internet, Web 2.0, was born.

Instead of putting information online, the users of the Internet became the content creators. This meant people could have a voice, communicate in novel ways, share a variety of media and network with people who otherwise would have never come into their lives.

How this helped us as humans is under intense debate today. Is social media causing widespread addiction? It is the greatest communication tool ever created? Is it causing people to become socially paranoid and reclusive? Have we lost all concept of privacy?

In this session we will debate all these issues and more.

Week 7 Readings:

*Book Chapters: Homo Deus; Chapter 11, p. 533-541 and 558-565 (See Bibliography)*

## **SESSION 21 (LIVE IN-PERSON)**

### **Bionics and Human Enhancement**

The field of bionics was started in the 1950s but the rapid development of technologies such as bio-printing (3D printing with cells) has meant it is going to develop more in the coming years. This session will look back at the history of the field and forward to the possibilities.

## **SESSION 22 (LIVE IN-PERSON)**

### **Life 3.0: Artificial Intelligence**

Artificial intelligence is the focus of Silicon Valley today. All large technology companies are racing to find the best solutions to help us perform all manner of tasks. Artificial intelligence will be the ultimate enhancement of humans, giving us a digital helper that can traverse the Internet and help us achieve real-world tasks. Artificial intelligence has the potential to evolve into super intelligence, which is something more intelligent than humans. That could mean it is the last and most important discovery in our history, and it could do anything we need.

## **SESSION 23 (LIVE IN-PERSON)**

### **The Fourth Industrial Revolution**

The future of industry is a combination of many technologies that will mean a new way of doing business. Customized and on-demand products that can be created either in futuristic smart factories or even at home using 3D printing will be explained. The use of Big Data and e-commerce to make the process of doing business much more automated and efficient will also be introduced and we will see the ethical dilemmas brought up by the possibility of mass automation.

Week 8 Reading:

*Book Chapters: Life 3.0; Chapter 2, p. 131-155 (See Bibliography)*

## **SESSION 24 (LIVE IN-PERSON)**

### **Transhumanism**

Transhumanism is a philosophy that considers that we are still at an early stage of development as a species. According to Max More "Transhumanism is a class of philosophies of life that seek the continuation and acceleration of the evolution of intelligent life beyond its currently human form and human limitations by means of science and technology, guided by life-promoting principles and values." (1990). In this session we will explore this concept and look at the ethical implications.

Online reading:

*Article: What is Transhumanism? (whatistranshumanism.org)*



## **SESSION 25 (LIVE IN-PERSON)**

### **The Robotics Revolution**

A look at the history of robotics and what it could hold for us in the future. Robots are going to form the physical manifestations of AI in our world and in recent years, we have seen huge advances. From robotic factory workers to robot chefs and even as extreme as robot soldiers. The implications of this technology are huge for our future.

## **SESSION 26 (LIVE IN-PERSON)**

### **Healthcare and Biotechnology**

Biotechnology has allowed us to perform what early civilizations called miracles. It has enhanced our world, our bodies and the lives of everyone. We will look at the development of this exciting field of science and debate future implications and whether it is ethical to play God.

Week 9 Readings:

*Book Chapters: Life 3.0; Chapter 3, p. 177-185 (See Bibliography)*

*Book Chapters: Homo Deus; Chapter 1, p. 42-48 (See Bibliography)*

## **SESSION 27 (LIVE IN-PERSON)**

### **A Quantum Future**

Quantum computing is the next step for computer technology. With systems requiring the same temperature as outer space, these systems are nothing like their silicon counterparts. We will look at the technology and examine how it works and how it is going to allow us to move to the next level of computation.

## **SESSION 28 (LIVE IN-PERSON)**

### **Is technology Really Good for Us?**

A session on the forum to discuss your feelings on some of the topics that have appeared in the course.

## **SESSION 29 (LIVE IN-PERSON)**

### **Future Evolution (Review Session)**

The Internet of Things and connected vehicles, combined with automated factories and smart cities will create a world full of data. This data will enhance our lives and make the world a living, breathing organism that responds to change.

3D printing could allow us to have factories in our homes, where we can download specifications and create anything from gourmet food to products manufactured from a variety of different materials. This could allow us to make anything we want, when we want it. 3D printing could also allow "bio-printing" where we can print new organs and parts of our bodies making us immortal.

The result could mean that we are going to evolve into a new state, leaving the limitations of the homo sapiens existence behind. Our bodies could become modular, cybernetic systems that can be easily repaired and our brains interconnected with other people and technologies. Our whole existence could become something alien to normal people today.

There are many ethical, social and legal issues that will come about due to these changes and this class will be spent exploring and philosophizing about the impacts this change could have on all our futures.

## **SESSION 30 (LIVE IN-PERSON)**

## Final Exam

### EVALUATION CRITERIA

The evaluation will be based on two exams and two written assignments. The work done in the classes will also be submitted and will contribute to the final assessment. The exams will test understanding of the topics and information from the slides. The final exam will include all aspects of the course. The assignment will be a focus on two aspect of the course and will allow the opportunity to explore concepts in more detail.

criteria	percentage	Learning Objectives	Comments
Final Exam	30 %		
Midterm	20 %		
Individual Work	30 %		
Class Participation	20 %		

### RE-SIT / RE-TAKE POLICY

#### Retake Policy

Students who have to retake the subject will have to resubmit any assignments that were failed and if the exam was not passed this will also need to be sat again.

#### Final Exam

The minimum grade for the final exam is 3.5. If a student scores below they will go to the retakes irrespective of overall course grade.

#### As per University Policy:

Each student has 4 chances to pass any given course distributed in two consecutive academic years (regular period and July period).

It is mandatory to attend 100% of the classes. Students who do not comply with at least 70% attendance will lose their 1st and 2nd chance, and go directly to the 3rd one (they will need to enroll again in this course the next academic year).

Grading for retakes will be subject to the following rules:

- Those students who failed the subject in the first regular period will have to do a retake in July(except those not complying with attendance rules who are banned from this possibility).
- Dates and location of the July retakes will be posted in advance and will not be changed. Please take this into consideration when planning your summer.
- The maximum grade that a student may obtain in the 2nd exam session is 8 out of 10. Those students in the 3rd call will be required to attend 50% of the classes. If due to schedule overlap, a different option will be discussed with the professor in order to pass the subject.

### BIBLIOGRAPHY

#### Compulsory

- McClellan, J. E., & Dorn, H. (2016). *Science and Technology in World History: An introduction*. 3rd. Baltimore: Johns Hopkins University Press. ISBN 9781421417752 (Printed)
- Isaacson, W. (2015). *The innovators: How a group of hackers, geniuses, and geeks created the digital revolution*. Simon & Schuster. ISBN 9781471138805 (Printed)

## **Recommended**

- Harari, Yuval N. *Sapiens : a brief history of humankind*. ISBN 9780062316110 (Digital)

- Harari, Y. N. *Homo deus: A brief history of tomorrow*. ISBN 1910701882 (Digital)

- Tegmark, M. *Life 3.0: Being human in the age of artificial intelligence*. ISBN 1101946598 (Digital)

## **BEHAVIOR RULES**

Please, check the University's Code of Conduct [here](#). The Program Director may provide further indications.

## **ATTENDANCE POLICY**

Please, check the University's Attendance Policy [here](#). The Program Director may provide further indications.

## **ETHICAL POLICY**

Please, check the University's Ethics Code [here](#). The Program Director may provide further indications.

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