Syllabus

Technology Innovation - Cognitive and Smart Systems

- **Instructor:** Norbert Sepp, seppn@ceu.edu
- **Credits:** 2 (4 ECTS)
- **Term:** Winter 2017-2018
- **Course level:** MSc in Business Analytics, MSc in Technology Management and Innovation
- **Prerequisites:** None required. Some experience in marketing and technology are advantageous.

Course description

In recent decades, technology has become one of, if not the primary, most important factors to fuel progress and economic growth. The main driver that enables these positive changes is innovation. Technology innovation is widespread, and its pace is extraordinary. To benefit from its advantages one should familiarize with its nature and understand its attributes.

This course intends to introduce important approaches to technology innovation, analyze key ICT innovation trends from a strategic perspective and discuss questions of managing innovation.

Students will gain an understanding of innovation concepts, terminology and current trends. They will be able to evaluate ideas based on their innovative value, feasibility and viability and also to make reasonable decisions using modeling and analysis. Well-established reasoning for either the owner of the idea or owner of the project is essential when it comes to deciding whether and how to pursue an innovation task. Students will also practice critical thinking and learn how to gather and purposely use qualitative and quantitative methods to assess and facilitate innovation.

Learning outcomes

At the end of the course students will gain an understanding of and familiarity with:
- The central concepts in innovation, like innovation cycles, sustained, disruptive and open innovation, hypes, the diffusion model and tipping points.
- Critical TI components like the third platform (cloud computing, Big Data and the power of social and mobile computing)
- Smarter Planet, smarter solutions
- Startups, Open Innovation and API Economy
- Artificial intelligence, smart systems and the cognitive era, IoE and mesh computing.
- Future trends based on technology outlooks – where are we now and where are we heading
- Applicability of the techniques based on examples of significant ICT companies, from startups to industry leaders like Apple, IBM, Google, Amazon and others
- You will be able to critically analyse, even practice "how to enable" innovation

Reading list

Reading is detailed next to the individual topics. Freely available content is our primary reference. Recommended Readings are optional and will not be discussed, but can significantly add depth to the student's understanding.

Assessment

Grading is based on the following evaluation elements:

- Individual project paper   50 %
- Class attendance and participation   26 %
- Minute papers   (best 3 out of 4 @ 8 points)   24 %

The grading scale baseline is the following:

Grades		%
A	Outstanding	94-100
A-	Excellent	87-93
B+	Very Good	80-86
B	Good	73-79
B-	Satisfactory	66-72
C	Minimum Pass	60-65
F	Fail	0-59

The above table serves as a generic example of the scaling applied: in line with the CEU grading policies the instructor reserves the right to adjust the scale, that is, to grade on a "curve", should he find that significantly more than the usual number of students would not pass the course under the indicated grading scale or should the distribution of the grades represent an unrealistic pattern.

Project paper – 50%

The project paper is an individual essay. It should analyse a real-world innovation (successful or failed) and it should reflect that the author knows and can apply concepts and approaches learned in the class. During the term, one topic should be selected from those offered by the instructor – or you can bring a topic by yourself, but it should get approved by the instructor. Background literature evaluation, critical thinking, original ideas are necessary. The paper should be limited to appx. 6-8 pages

Class attendance and participation – 26%

This element evaluates class preparation and contribution to the discussions (bringing real life examples related to the actual topics, based on own experience or research).

Minimum class attendance is 75%, otherwise this element yields 0%.

Minute papers – 24%

Minute papers are short, unannounced written exercises about reading assignments and previously discussed topics – all topics covered in previous classes. The three best out of four results will count; each exercise can have 8 points maximum.

Course schedule and materials for each session:

	TOPIC	READ/WATCH : Articles, papers, books, videos
1	**Introduction to the course.** Introduction to the course goal, requirements and methodology, **Innovation cycles, Hypes and the Tipping Point** We immerse ourselves in innovation. It is important to understand its nature and to investigate possibilities for qualitative analysis on innovation. Innovation cycles, the Hype Cycle, Magic Quadrants, and theory of the Tipping Point will be presented and their applicability will be discussed. **Innovation concepts, theories. The diffusion model and disruptive innovation** We discuss important concepts and theories. We try to understand how new methods or even new thoughts can spread successfully. The industry is not static, 8 out of 10 top companies will disappear from the top in less than a decade. We investigate what forces influence these changes, what is sustainable, what is disruptive and how we can align our strategies with the market forces.	http://en.wikipedia.org/wiki/Diffusion_of_innovations http://en.wikipedia.org/wiki/Disruptive_innovation **Recommended Reading**: Malcolm Gladwell: The Tipping Point **Recommended Reading**: Clayton M. Christensen: The Innovator's Dilemma: The Revolutionary Book That Will Change the Way You Do Business
2	**Innovation as a Process** Innovation can not only be described, we are also interested in prescriptive strategies. Methods about fueling and boosting innovations as well as the economic implications will be discussed.	http://en.wikipedia.org/wiki/Innovation_management
3	**Business model innovation - The third platform** Mobile, social, data, cloud. These components contributed to a successful technological change. Though seemingly well established, some of their promises are not fully understood. We will highlight those attributes that are meaningful for our discussion, **Business model innovation – Beyond the third platform**	https://www.wikiwand.com/en/Third_platform http://www.infoworld.com/d/cloud-computing/what-cloud-computing-really-means-031 http://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-146.pdf (Chapter 2) http://en.wikipedia.org/wiki/Big_data

	We will extend the discussion to related topics: security, networks, the blockchain, internet of everyThing. We return to understand why and how data could be meaningful beyond being "Big".	**Recommended Reading**: Albert-László Barabási: **Linked: How Everything Is Connected to Everything Else and What It Means for Business, Science, and Everyday Life**
4	**Smarter Planet**, **Openness and innovation ecosystems** Instrumented, Interconnected, Intelligent. The three main factors of Smart. We discuss real examples of implementations. We will analyze the success factors and conclude in what sense we can talk about smart improvements. We look at open innovation and innovation ecosystems. **Startups: hands-on with ICT innovation** We will get a deep dive and real case study of a startup – from the idea ("light bulb") to market deployment. We understand lessons learned and best practices both from organization management and technology point of view	https://www.wikiwand.com/en/Smarter_Planet https://www.youtube.com/watch?v=9wfZH6ZWxmk https://www.youtube.com/watch?v=2PtiWdS6UZA https://www.youtube.com/watch?v=2UDBaDtwXfI https://www.wikiwand.com/en/Lean_startup
5	**New ways of Computing. The Watson Story** We will discuss paradigm shift from the von Neumann computing architecture to new directions that partially mean evolutionary but also revolutionary changes. We introduce two different but not unrelated new paradigms: cognitive computing and quantum computing. We show the story of artificial intelligence and discuss the success of Watson. We will talk about machine learning, robotics, natural language processing. **Innovation Commercialization. Cognitive Computing as a business enabler** We will examine how an innovative idea can reach maturity, and what strategies could be followed to facilitate market success. We will discuss this with regards to the innovation lifecycle. We look at the most successful domains of application.	https://www.youtube.com/watch?v=YRdeFdiBjHM https://www.youtube.com/watch?v=WFR3lOm_xhE https://www.youtube.com/watch?v=P18EdAKuC1U
6	**Future of Technology Innovation, Technology Outlook – Closing** Technology is still evolving rapidly, we will see some work on interesting directions, as well as the technical feasibility of some long-wanted dreams. We will also discuss technology horizons, what strategies are recommended to be followed for a successful leader if she or he wants to be prepared for future challenges, and finally we summarize and wrap-up what we concluded during the course.	Wrap-up of the course; Technology Outlook and Final Evaluation