Digital Transformation of the World Economy
Syllabus

Instructor
Natalia Milovantseva, nmilovantseva@hse.ru
Office Hours: Tues, 2pm-6pm, Location: Shaboloka 26, room 5417

Pre-requisites
English language proficiency, 4th year standing

Course Type
Elective; limited to 35 students

Course Description
This course overviews critical changes in the world economy due to its rapid digital transformation. We will examine the nature of these changes in three distinct, but integrated parts: (i) development and global scope of digital economy, (ii) contemporary and potential challenges arising from global digital transformation, and (iii) future opportunities and implications related to digital economy expansion. During the course of two modules, students will examine key issues of the transformation of real economy into digital economy and examine the role of technology revolution in global economy, analyze digital innovation's impact on economic growth, discuss the concept of the "Fourth Industrial Revolution", identify the components of digital economy's ecosystem, review the regression analysis in order to better understand machine learning and artificial intelligence, identify disruptive potentials of distributed ledger technology blockchain, study firms, households and the government through the framework of digital economic transition, compare the world economies to recognize frontiers and laggards; gain a global perspective on the advancement in innovation in the digital economy, select key factors of globalization and economic growth in the digital age, develop an appreciation of the digital economy's social impact, gage the digital divide and estimate current and potential impacts of digitization on the world economy on both, macro- and micro- levels. While the course is not primarily technically focused, the technical aspects needed to understand the implications, opportunities, limitations and management issues related to the expansion of the digital economy will be covered. No advanced mathematics will be involved.

Learning Objectives and Student Learning Outcomes
At the end of the course students will develop the language and acquire the insights to make good decisions regarding various facets of the digital economy. The knowledge and skills gained in this course will contribute to students' toolkit necessary for anticipating and shaping the impact of emerging technologies and for reacting quickly to changing circumstances in the evolving new

global economy. On successful completion of the course students should be able to:
1) know the fundamentals of the digital economy,
2) explain the theoretical basis of the growth in the digital economy,
3) be familiarized with the nature and extent of the global digital economy today,
4) able to evaluate the various challenges that the globalization of digital economy presents,
5) discuss the likely global implications of digital economy development in the future.

Textbook
There will be no textbook for the course (but see assigned readings below).

Attendance and participation
Attending lectures is the best way to learn the material and to maximize your overall performance. Active work during seminars is crucial for developing practical skills in this course. Attendance is not mandatory but strongly recommended. Exam questions may be drawn from the topics discussed in classes but not covered in the readings.

Guidelines for knowledge assessment
Students are encouraged to work together on paper topics and ideas development, however, submitted work must be individually original. It is students' responsibility to be thorough familiar with university's plagiarism policy. Cheating and disruptive behavior in any form are never allowed. You have a responsibility to refrain from any form of academic dishonesty and to treat your fellow students, teaching assistants, and instructors with courtesy, civility, and respect.

The course includes a paper (essay) and concludes with a "closed book" written in-class examination, i.e., books, notes, calculators, cell phones and other forms of assistance are not permitted. Although, the exploration of potential topics for essays will be conducted during seminars, students are strongly encouraged to formulate their own topics. Learning how to articulate relevant and potent questions is an important skill to have in the digital era. The course will provide an opportunity to hone this skill.

The associated percentage of the final grade for each assignment (essay and exam) is presented as follows: essay – 50%; exam – 50%. Rounding off will be done according to the common NRU HSE practice. No early exams will be given. If you miss essay submission deadline, each missed day will result in one point deduction from the essay's grade. Late essays will not be accepted starting on the sixth calendar day after the announced deadline, not including the due date.

Course Schedule

Date	Wk day	Time		Topic	Reading
Module 2				*9 lectures and 5 seminars scheduled in module 2*	
WEEK 1					
18.11.2017	Сб	09:00 10:30	10:20 11:50	**Lectures 1-2. Introduction; explaining growth in digital economy** Course overview and expectations. What is a digital economy and why we study it? Elements of information. Analogue to digital transformation. Digital divide. Innovation and its role in explaining economic growth. Schumpeter's theory of economic development and growth. Schumpeter's theory vs. Solow growth model.	<u>Required</u> Negroponte, N. Being Digital. 1995. New York: Alfred A. Knopf. Pp.3-85. (available electronically at HSE library) <u>Additional</u> Barua et al. "A Schumpeterian Approach to Explaining Growth in the Digital Economy."
WEEK 2					
29.11.2017	Ср	13:40 15:10	15:00 16:30	**Lectures 3-4. Fourth Industrial Revolution (4IR)** Role of technological progress in the world economy. Historical context. Concept of the "Fourth Industrial Revolution." Distinctions of the 4IR. Disruption to jobs, skills and business. Innovation and productivity. Fusion of technologies. Potential risks of 4IR.	<u>Required</u> van Ark. 2016. The Productivity Paradox of the New Digital Economy. International Productivity Monitor, 31. Schwab, K. 2016. The Fourth Industrial Revolution: what it means, how to respond. <u>Additional</u> Clark, G. 2005. The Condition of the Working-Class in England, 1209-2004.
WEEK 3					
06.12.2017	Ср	13:40 15:10	15:00 16:30	**Lecture 5-6. Digital economy's ecosystem** Knowledge. Digitization. Virtualization. Molecularization. Integration. Internetworking. Disintermediation. Convergence. Innovation. Prosumption. Immidiacy. Globalization. Discordance.	<u>Required</u> Negroponte, N. Being Digital. 1995. New York: Alfred A. Knopf. Pp.89-126. (available electronically at HSE library) <u>Additional</u> Review datanami at https://www.datanami.com/ News portal. Provides information about emerging trends in big data.
09.12.2017	Сб	10:30	11:50	**Lecture 7. Effects of digital technology on economic activity** Evolution of communication, computing power and digital technology. Net neutrality. Cost reductions. Search, replication, transportation, tracking and verification costs.	<u>Required</u> Goldfarb, A. and C. Tucker. 2017. Digital Economics. NBER Working Paper No. 23684 <u>Additional</u> Review The Quartz Index https://qz.com/index/ Tracks how the global economy is changing.
WEEK 4					
13.12.2017	Ср	13:40 15:10	15:00 16:30	**Lecture 8-9. Big data; machine learning; artificial intelligence** Big data in research and business, advantages and types of big data. Brief review of regression analysis. Basics of machine learning and artificial intelligence methods.	<u>Required</u> Einav, L., Levin, J. 2014. Economics in the Age of Big Data. Science 346 (6210): 715 (available electronically at HSE library). Negroponte, N. Being Digital. 1995. New York: Alfred A. Knopf. Pp.89-218. (available electronically at HSE library)

Date	Wk day	Time	Topic	Reading
				Additional
				Review Andrew Ng's course on deep learning, Stanford, Coursera

Module 3	*7 lectures and 5 seminars scheduled in module 3*	

Date	Wk day	Time	Topic	Reading
TBA			**Lecture 10-11. Blockchain. Households and firms in the digital economy** Blockchain's disruptive potential. Blockchain as a trust tool. Blockchain as an anchor technology for cryptocurrency. Financial technology (FinTech) and banking. IT skills and growing digital population. Digital capabilities and resources. Online platforms. Software. Hardware. Internet of Things. Cloud computing. Data protection. Cybersecurity. Changing structure of consumption. Individualization of products and services. Potential for economic participation. Digital business models. E-commerce. Increasing pressure to innovate. Large internet companies. OTT (over the top) services. Start-ups. Cross-border trade issues. Intellectual property.	Required Niforos et al., 2017. Blockchain: Opportunities for Private Enterprises in Emerging Markets. IMF Roland Berger Strategy Consultants. 2015. The Digital Transformation of Industry. Eurostat, 2017. Digital economy and society statistics - households and individuals Additional European Commission. 2012. Ethical and Regulatory Challenges to Science and Research Policy at the Global Level. Brussels: European Commission. Dietz et al. 2017. Remaking the bank for an ecosystem world. McKinsey & Co Report. Mettler, A. and A. D. Williams. 2011. The Rise of the Micro-Multinational: How Freelancers and Technology-Savvy Startups are Driving Growth, Jobs and Innovation. Brussels: The Lisbon Council. Track changes on The Quartz Index https://qz.com/index/
TBA			**Lecture 12. Future of work** 4IR's impact on labor markets. Transformed by new digital technologies concept of work/jobs. Vulnerabilities and opportunities: Potential job destructions in technology-driven sectors. Digitalized industries' inclusive opportunities.	Required Sundararajan, A. 2016. The Sharing Economy: The End of Employment and the Rise of Crowd-Based Capitalism. Cambridge, MA: MIT Press. Additional Autor, D. 2010. The Polarization of Job Opportunities in the U.S. Labor Market: Implications for Employment and Earnings. Washington, DC: Center for American Progress and The Hamilton Project.
TBA			**Lecture 13. States in the digital economy:** E-government. E-public service. E-health care. Digital enabling. Evolving governance frameworks relevant to the digital economy.	Required Loorbach, D. and Rotmans, J. 2010. The practice of transition management: Examples and lessons from four distinct cases, *Futures: the journal of policy, planning and futures studies*, 42(3), pp. 237- 246. Additional Varian, H. 2010. Computer-Mediated Transactions. American Economic Review 100 (2): 1–10.
TBA			**Lecture 14. Global technology frontiers** Comparative cross-country overview of the advancement	Required The Future of Global Value Chains

Date	Wk day	Time	Topic	Reading
			in innovation in the digital economy development.	Business as Usual or "A New Normal"? STI Policy Note, September 2017, OECD. Additional Worries about premature industrialization. Special Report. The Economist. 27 October 2017.
TBA			**Lecture 15. Digital economy's social impact. The digital divide.** Changing social dynamics. Persistence/exacerbation of inequalities due to weak social protection systems.	Required Talbot, D. 2016. The Unacceptable Persistence of the Digital Divide. MIT Technology Review.
TBA			**Lecture 16. Wrapping up the course.** Current and potential impact of digitization on the world economy on macro- and micro- levels.	Required McElheran, K. 2016. Only as strong as the weakest link. MIT IDE Research Brief, VOL. 2016.10. Additional Fox, J. 2014. What Still Makes Silicon Valley So Special. Harvard Business Review.

Additional materials may be added to the course through HSE Informational Learning Space (http://www.lms.hse.ru). Any changes to this Syllabus will be announced in class and available electronically. For brevity, not all sources posted here for your reading with hyperlinks include full citation records. The proper citations may be established by researching the web links.

Exam study guide (*drawn mainly from key ideas discussed during the lectures*)
1. Basic elements of digital transformation.
2. Role of smallest units of information in the digital economy.
3. What distinguishes digital economy from the conventional notion of an economy?
4. Three pillars of digital economy.
5. Digital divide.
6. Using Solow growth model and Schumpeter's theory of economic development for explaining economic growth in the digital age.
7. Industrial Revolutions' role in human development of the last 4000 years.
8. Impact of Industrial Revolutions on economic growth.
9. In what ways the 4th Industrial Revolution (4IR) distinguishable from the 3rd?
10. Disruption to jobs and skills, disconnect between innovation and productivity, fusing nature of technologies and business disruption as key issues of 4IR.
11. Lifecycle model of innovation.
12. Contemporary trends in products' lifecycle.
13. Inequality, security, governance, moral, ethics and identity challenges as potential risks of 4IR.
14. Using the digital economy features, examined in lectures, explain how the economy, the enterprise and the technology have been transforming and are linked in the digital age. Be able to provide examples.
15. Broadband, bandwidth in connection with digital economy.
16. Economic non-arithmetical benefit of the development of magnetic core memories in computers.
17. Moore's law of productive technology.
18. Expression of computing power growth.
19. Net neutrality.

20. How search, replication, transportation, tracking and verification costs are affected in the digital economy and why?
21. Types and sources of big data. Application of big data based on types.
22. Problem formulation for regression analysis.
23. Problem formulation for machine learning.
24. Artificial intelligence compared to machine learning.
25. Basics of deep learning.