

Generative AI and Automation: Business and Societal Implications
Fall 2024 - 3 Units – M/W – 3:30-4:50pm or 5-6:20pm, room JKP 210.

Instructor: *Georgios Petropoulos*
Office: *401S, Bridge Hall*
Office Hours: *W - 2pm–3pm, by appointment (please, email me at: georgios@marshall.usc.edu).*

COURSE DESCRIPTION

Automation technologies such as Robotics, Machine Prediction, Artificial Intelligence (AI) and Generative AI have important implications for how companies stay competitive and how workers perform various tasks. Companies are currently undergoing digital transformations and becoming more data driven. This process incorporates a key consideration for how companies conduct their business and engage with consumers. This course will provide students with an overview of concepts from digital transformation, industrial economics and digitization research, that explains how companies have transformed using AI and automation technologies. The class will also look ahead to understand how the emergence of Generative AI can transform our economy, society and business in the coming years.

Frontier digital technologies have already started changing the production paradigm in many technology-oriented sectors. Their applications are expected to expand to almost all sectors of our economy. In particular, automation and AI fundamentally change digital transformation strategies and the production paradigm in many firms. As a result, employment relationships, market structures and competition, innovation strategies are affected in ways that invite the reorganization of business models to better fit this new era of technological progress. Its pervasive use and impact also generate calls for a new policy framework within which generative A.I. can flourish.

This class will be based on cutting-edge academic research into this topic, and discuss the business implications of these findings. This course will begin by focusing on automation and digital technologies and how they have transformed various sectors. This will evolve to look at our current paradigm of how ML and AI technologies are impacting companies and their production functions, and then move on to focus on Generative AI and its implications for firms of the future.

The course also aims at analyzing how generative AI should be regulated as well as to cover ethical, privacy and consumer protection dimensions related to its use.

COURSE OBJECTIVES

Upon successful completion of this course, students will be able to:

1. Calculate the exposure of automation at an occupational level.
2. Assess the impact of Generative AI on different business models.
3. Explain the major societal and regulatory concerns.
4. Describe how AI/Generative AI applications should be designed and implemented to address societal, regulatory, and ethical concerns.
5. Choose optimal managerial decisions regarding the adoption of automation, AI and Generative AI in a variety of business models.
6. Use Python programming language to implement machine learning.

COURSE MATERIALS

This course will be mainly based on lecture notes/slides developed by the instructor. In addition there are two recommended books (or textbooks) which provide the overview of key concepts in relation to these technologies and their practical implementation. These are supplemented by academic articles, along with practitioner oriented articles.

(Recommended Textbooks)

Agrawal, A., Gans, J., & Goldfarb, A. (Eds.). (2019). *The economics of artificial intelligence: an agenda*. University of Chicago Press. The chapters of this book are available [online](#).

Müller, Andreas C., and Sarah Guido. *Introduction to machine learning with Python: a guide for data scientists*. " O'Reilly Media, Inc.", 2016.

GRADING

This course will be graded based on in-class participation, homework, and team projects. These are listed below. These components will be as follows:

- o **In Class Participation:** Classes are interactive. Students are expected to participate in each class, by asking questions. They will also be asked to prepare and submit beforehand questions (by emailing them to the instructor) for the guest lecturers who will be hosted during the semester. Students who submitted the best questions will be called to ask their question during that lecture. In case there is a dinner with the guest lecturer and the instructor, the student who submitted the most intellectually challenging question for that guest lecture will be invited to the dinner. Classes will be taught in an interactive way where the instructor will be asking the class multiple questions about the material taught. Participation will be worth 10% of the final grade. See also Appendix III.
- o **Assignments.** This class will involve 5 homework assignments (with 10 points each). The 4 highest-graded assignments are taken into account for the grade in the course. Assignments will ask students to about material taught in the class. Late submissions after the deadline will not be accepted.
- o **Final Group Project:** This class will culminate in a major project where students will be asked to select an industry or a process where generative AI or automation can be very impactful. They will be asked to evaluate the value chain of that industry and to make arguments for why and how automation will impact workers and production processes. They will also be asked to make arguments about whether that will provide opportunities for new actors to enter the market, or strengthen existing actors. Finally, students will have to make an argument for how and why regulators may choose to regulate the use of AI in this industry and whether this will raise privacy or

data sharing concerns. Specific topics of such projects will be distributed during September. Students will be assigned in groups of 5 or 6 students and each group will work on the different project topic. During the development of their projects, groups are welcome to meet with the instructor at least twice to discuss the progress of the project. Each group should record and submit a presentation of its project by **November 25**. Late submissions will not be accepted. Each student of a group should have an equal presenting time in the recorded presentation. The instructor will select the best presentations. The selected presentations will be presented in front of a jury of Faculty members of USC Marshall in the the final week of the class (December 2 and December 4). Each student should also submit individually a two-page report and critical assessment of the project, **by the date of the final**. Evaluation of the projects will be based on the following factors: The quality of work as it is assessed by the instructor during the development of the project, the quality of the recorded presentation and the individual two-page reports. These will account for 40% of the grade. For this evaluation, information provided through students' peer evaluations may also be considered (see Appendix II for more details).

<u>Assignments</u>	<u>Points</u>	<u>% of Overall Grade</u>
Class Participation (See participation rubric below. Maximum 1 point per week.)	10	10
Homework Assignments (Individual)	5x10	50
Final Projects (Group 5 or 6 students per group)	40	40
TOTAL	100	100%

EMERGENCY PREPAREDNESS

In case of a declared emergency if travel to campus is not feasible, the USC Emergency Information web site (<https://www.usc.edu/emergency/>) will provide safety and other information, including electronic means by which instructors will conduct class using a combination of USC's Brightspace learning management system (TBD), teleconferencing, and other technologies.

USE OF RECORDINGS

Pursuant to the *USC Student Handbook* (<https://policy.usc.edu/studenthandbook/>, page 27), students may not record a university class without the express permission of the instructor and announcement to the class. In addition, students may not distribute or use notes or recordings based on USC classes or lectures without the express permission of the instructor for purposes other than personal or class-related group study by students registered for the class. This restriction on unauthorized use applies to all information that is distributed or displayed for use in relationship to the class. Violation of this policy may subject an individual or entity to university discipline and/or legal proceedings.

USE OF AI GENERATORS

COURSE OUTLINE AND ASSIGNMENTS

	Topics	Additional Readings and Homework	Deliverables with Due Dates
<i>Week 1</i> Dates: 8/26 & 8/28	Introduction to Generative AI and Automation	<p>Petropoulos, Georgios. "<u>Machines that Learn to do, and do to Learn: What is Artificial Intelligence?</u>." <i>Bruegel</i>. https://search-proquestcom.lomc.idm.oclc.org/docview/1888642452 (2017).</p> <p>Manyika, James. "<u>Getting AI right: Introductory notes on AI & society.</u>" <i>Daedalus</i> 151.2 (2022): 5-27.</p>	1st homework will be assigned on 8/29. It should be submitted by 9/4.
<i>Week 2</i> Dates: 9/4	Automation and labor markets: Automation vs. Augmentation	Chapter 8 in Agrawal, A., Gans, J., & Goldfarb, A. (Eds.). (2019).	
<i>Week 3</i> Dates: 9/9 & 9/11	Automation, Gen A.I. and labor markets: Occupations and AI exposure	<p>Autor, David H. "<u>Work of the Past, Work of the Future.</u>" <i>AEA Papers and Proceedings</i>. Vol. 109. American Economic Association, 2019.</p> <p>Acemoglu, D., & Restrepo, P. (2020). Robots and jobs: Evidence from US labor markets. <i>Journal of political economy</i>, 128(6), 2188-2244.</p> <p><u>How Generative AI Will Transform Knowledge Work.</u> hbr.org</p> <p><u>How to Capitalize on Generative AI</u> (hbr.org)</p> <p>Ed Felten, Manav Raj and Robert Seamans. 2021. Occupational, Industry, and Geographic Exposure to Artificial Intelligence: A Novel Dataset and Its Potential Uses. <i>Strategic Management Journal</i>, 42(12): 2195-2217</p>	2nd homework is assigned on 9/9. It should be submitted by 9/16.

<p><i>Week 4</i> Dates: 9/16 & 9/18</p>	<p>Lab sessions: Machine Learning with Python</p>	<p>Chapters 1 & 2 of Müller, Andreas C., and Sarah Guido (2016)</p>	<p>3rd homework is assigned. It should be submitted by 9/25.</p>
<p><i>Week 5</i> Dates: 9/23 & 9/25</p>	<p>Gen A.I., productivity and economic growth Gen A.I. and Big Tech Platforms</p>	<p>Brynjolfsson, Erik, Daniel Rock, and Chad Syverson. "Artificial intelligence and the modern productivity paradox: A clash of expectations and statistics." <i>The economics of artificial intelligence: An agenda</i>. University of Chicago Press, 2018. 23-57.</p> <p>Petropoulos, Georgios, and Mamta Kapur. "<u>Artificial intelligence: increasing labour productivity in a responsible way.</u>" <i>The future of work: a transatlantic perspective on challenges and opportunities</i> (2022).</p> <p>Parker, Geoffrey G., Marshall W. Van Alstyne, and Sangeet Paul Choudary. <i>Platform revolution: How networked markets are transforming the economy and how to make them work for you</i>. WW Norton & Company, 2016.</p>	<p>Students are assigned to group projects this week. The recording of the group presentation should be submitted by 11/25.</p> <p>4th assignment is assigned. Deadline by 10/3.</p>
<p><i>Week 6</i> Dates: 9/30 & 10/2</p>	<p>AI and Competition IoT and Data Sharing</p>	<p>Parker, Geoffrey, Georgios Petropoulos, and Marshall W. Van Alstyne. "Digital platforms and antitrust." (2020).</p> <p>Geoffrey Parker, Georgios Petropoulos, Marshall Van Alstyne, <u>Platform mergers and antitrust</u>, <i>Industrial and Corporate Change</i>, Volume 30, Issue 5, October 2021, Pages 1307–1336.</p> <p>Martens, Bertin and Parker, Geoffrey and Petropoulos, Georgios and Van Alstyne, Marshall W., Towards Efficient Information Sharing in Network Markets (January 3, 2024). Proceedings of the 57th Hawaii International Conference on System Sciences 2024, Available at SSRN:</p>	

		https://ssrn.com/abstract=3954932 or http://dx.doi.org/10.2139/ssrn.3954932	
<i>Week 7</i> Dates: 10/7 & 10/9	AI Strategy: An Introduction	Case Studies: General Electric and AI-driven Predictive Maintenance Netflix's Recommendation Engine John Deere's AI strategy	5th homework is assigned. Deadline by 10/15.
<i>Week 8</i> Dates: 10/14 & 10/16	Core elements of AI strategy and more case studies		
<i>Week 9</i> Dates: 10/21 & 10/23	Further examples of successful business AI strategies		
<i>Week 10</i> Dates: 10/28 & 10/30	Gen A.I., innovation and intellectual property	Cockburn, Iain M., Rebecca Henderson, and Scott Stern. "The impact of artificial intelligence on innovation: An exploratory analysis." <i>The economics of artificial intelligence: An agenda</i> . University of Chicago Press, 2018. 115-146. Eapen, Tojin T., et al. " <u>How generative AI can augment human creativity</u> ." <i>Harvard Business Review</i> 101.4 (2023): 56-64.	Preparation for the guest lectures on 11/4. Questions should be submitted by 11/2. Preparation for the guest lectures on 11/6. Questions should be submitted by 11/4.
<i>Week 11</i> Dates: 11/4 & 11/6	Guest lecture by Jeff Crume (IBM) on 11/4 at 3:30pm. Guest lecture by Ryan Kido (CTO at Ateliere Creative Technologies) on 11/4 at 5pm. Only one class that date. Guest lecture by Rahul Jain (USC) on 11/6 at 3:30pm		Preparation for the guest lecture on 11/13. Questions should be submitted by 11/11.

	Guest lecture by Eric Chung (USC) on 11/6		
<i>Week 12</i> Dates: 11/13	Guest lecture by Pernille Ryden (Copenhagen Business School)		Preparation for the guest lecture on 11/18. Questions should be submitted by 11/16. Preparation for the guest lectures on 11/20. Questions should be submitted by 11/18.
<i>Week 13</i> Dates: 11/18 & 11/20	Guest lecture by Christian Wagner (Google) on 11/18 Guest lecture by Aren Megerdichian (Compass Lexecon) on 11/20 at 3:30pm. Guest lecture by Abigail Horn (USC) on 11/20 at 5pm.		Preparation for the guest lectures on 11/25. Questions should be submitted by 11/23.
<i>Week 14</i> Dates: 11/25	Guest lecture by Thomas Roca (Microsoft) on 11/25 at 3:30pm. Guest lecture by Yu Yuan (BILL) on 11/25 at 5pm.		
<i>Week 15</i> Dates: 12/2 & 12/4	Best team project presentations in front of a Jury		
<i>FINAL</i> Date	Submission of the individual two-page reports.		For the 3:30pm class the deadline is on 12/16 at 4pm For thr 5pm class the deadline is on 12/11 at 6:30pm.

The date/time of the Final Exam is determined by the University. For the date and time of the final for this class, consult the USC *Schedule of Classes* at www.usc.edu/soc. Select the corresponding semester to view and click on the “Final Examinations Schedule” link on the left side of the screen.

OPEN EXPRESSION AND RESPECT FOR ALL

An important goal of the educational experience at USC Marshall is to be exposed to and discuss diverse, thought-provoking, and sometimes controversial ideas that challenge one's beliefs. In this course we will support the values articulated in the USC Marshall "[Open Expression Statement](https://www.marshall.usc.edu/open-expression-statement)" (<https://www.marshall.usc.edu/open-expression-statement>).

STATEMENT ON ACADEMIC CONDUCT AND SUPPORT SYSTEMS

Academic Integrity:

The University of Southern California is a learning community committed to developing successful scholars and researchers dedicated to the pursuit of knowledge and the dissemination of ideas. Academic misconduct, which includes any act of dishonesty in the production or submission of academic work, compromises the integrity of the person who commits the act and can impugn the perceived integrity of the entire university community. It stands in opposition to the university's mission to research, educate, and contribute productively to our community and the world.

All students are expected to submit assignments that represent their own original work, and that have been prepared specifically for the course or section for which they have been submitted. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s).

Other violations of academic integrity include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), collusion, knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage.

The impact of academic dishonesty is far-reaching and is considered a serious offense against the university. All incidences of academic misconduct will be reported to the Office of Academic Integrity and could result in outcomes such as failure on the assignment, failure in the course, suspension, or even expulsion from the university.

For more information about academic integrity see [the student handbook](#) or the [Office of Academic Integrity's website](#), and university policies on [Research and Scholarship Misconduct](#).

Please ask your instructor if you are unsure what constitutes unauthorized assistance on an exam or assignment, or what information requires citation and/or attribution.

Students and Disability Accommodations:

USC welcomes students with disabilities into all of the University's educational programs. [The Office of Student Accessibility Services](#) (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

Support Systems:

[Counseling and Mental Health](#) - (213) 740-9355 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

[988 Suicide and Crisis Lifeline](#) - 988 for both calls and text messages – 24/7 on call

The 988 Suicide and Crisis Lifeline (formerly known as the National Suicide Prevention Lifeline) provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week, across the United States. The Lifeline is comprised of a national network of over 200 local crisis centers, combining custom local care and resources with national standards and best practices. The new, shorter phone number makes it easier for people to remember and access mental health crisis services (though the previous 1 (800) 273-8255 number will continue to function indefinitely) and represents a continued commitment to those in crisis.

[Relationship and Sexual Violence Prevention Services \(RSVP\)](#) - (213) 740-9355(WELL) – 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender- and power-based harm (including sexual assault, intimate partner violence, and stalking).

[Office for Equity, Equal Opportunity, and Title IX \(EEO-TIX\)](#) - (213) 740-5086

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

[Reporting Incidents of Bias or Harassment](#) - (213) 740-5086 or (213) 821-8298

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

[The Office of Student Accessibility Services \(OSAS\)](#) - (213) 740-0776

OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

[USC Campus Support and Intervention](#) - (213) 740-0411

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

[Diversity, Equity and Inclusion](#) - (213) 740-2101

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

[USC Emergency](#) - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

[USC Department of Public Safety](#) - UPC: (213) 740-6000, HSC: (323) 442-1200 – 24/7 on call

Non-emergency assistance or information.

[Office of the Ombuds](#) - (213) 821-9556 (UPC) / (323-442-0382 (HSC)

A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

[Occupational Therapy Faculty Practice](#) - (323) 442-2850 or otfp@med.usc.edu

Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.

Appendix I. MARSHALL GRADUATE PROGRAMS LEARNING GOALS

How DSO 599 Contributes to Marshall Graduate Program Learning Goals

Marshall Graduate Program Learning Goals	DSO 599 Objectives that support this goal	Assessment Method*
<p><i>Learning Goal #1: Develop Personal Strengths.</i> Our graduates will develop a global and entrepreneurial mindset, lead with integrity, purpose and ethical perspective, and draw value from diversity and inclusion.</p>	Y	Class as the whole and in particular the aspects below
1.1 Possess personal integrity and a commitment to an organization's purpose and core values.	Y	Part of the course analyzing the implications of technologies on organizations core values
1.2 Expand awareness with a global and entrepreneurial mindset, drawing value from diversity and inclusion.	Y	Part of the course referring to the inclusive nature of technology in the way it is adopted by managers in their corporations
1.3 Exhibit awareness of ethical dimensions and professional standards in decision making.	Y	Part of the course that will cover ethical aspects of technology
<p><i>Learning Goal #2: Gain Knowledge and Skills.</i> Our graduates will develop a deep understanding of the key functions of business enterprises and will be able to identify and take advantage of opportunities in a complex, uncertain and dynamic business environment using critical and analytical thinking skills.</p>	Y	Class as the whole and its components below
2.1 Gain knowledge of the key functions of business enterprises.	Y	final project
2.2 Acquire advanced skills to understand and analyze significant business opportunities, which can be complex, uncertain and dynamic.	Y	Assignments and lab sessions

2.3 Use critical and analytical thinking to identify viable options that can create short-term and long-term value for organizations and their stakeholders.	Y	Assignments and final project
<i>Learning Goal #3: Motivate and Build High Performing Teams. Our graduates will achieve results by fostering collaboration, communication and adaptability on individual, team, and organization levels.</i>		
3.1 Motivate and work with colleagues, partners, and other stakeholders to achieve organizational purposes.		
3.2 Help build and sustain high-performing teams by infusing teams with a variety of perspectives, talents, and skills and aligning individual success with team success and with overall organizational success.		
3.3 Foster collaboration, communication and adaptability in helping organizations excel in a changing business landscape.	Y	A major objective of the course, to teach students how they can use information and communication technologies to change business landscape

Appendix II

PEER EVALUATION FORM

Grades for individual student contributions to team projects are assigned by me, based on my observations of the team’s working dynamics, my assessment of the team’s project quality, and thoughtful consideration of the information provided through your peer evaluations.

Please identify your team and team members for the ____ Project(s) that you worked on. Then rate all your team members, *including yourself*, based on the **contributions** of each team member for the selected assignment according to the criteria listed below. On a scale of 0 – 2 with 0 indicating does not meet expectations, 1 meets expectations and 2 exceeds expectations, rate each person on each of the five criteria. Lastly, add up the points for each person with the maximum number of points for each person being 10. In the box below, describe the exact contributions of each team member, including yourself.

Team Members/ Assessment Criteria of Team Contributions	Team Member 1	Team Member 2	Team Member 3	Yourself
1. Role Performance				
2. Assists Team Members				
3. Listening and Discussing				
4. Research and Information Sharing				
5. Time Management				
Total				

Contribution details:

Appendix III

CLASS PARTICIPATION STATEMENTS

Class participation is an extremely important part of the learning experience in this course as the richness of the learning experience will be largely dependent upon the degree of preparation by *all* students prior to each class session.

A course that incorporates the frequent use of case analyses to illustrate the practical application of concepts and practices requires the student to diligently and thoroughly prepare cases and actively offer the results of the analyses and conclusions derived as well as recommendations during each class session. My expectation and that of your classmates are that you are prepared for *all* classes and will actively participate in and meaningfully contribute to class discussions.

In-class participation is also a critical part of this course's learning experience. Cold calling may take place to encourage active participation and to gain multiple perspectives and points of view, thus lending itself to the richness of the learning experience. In-class participation grading will be based on students' demonstrated willingness to participate and the quality of the comments expressed, rather than quantity. While some students are far more comfortable than others with class participation, *all* students should make an effort to contribute meaningfully.

Students will offer their opinions in group settings many times in their careers; thus, class participation serves to prepare students for this business experience.

The evaluating of in-class participation is based on the following:

- *Relevance* – Does the comment or question meaningfully bear on the subject at hand? Irrelevant or inappropriate comments can detract from the learning experience.
- *Responsiveness* – Does the comment or question connect to what someone else has said?
- *Analysis* – Is the reasoning employed consistent and logical? Has data from course materials, personal experience, or general knowledge been employed to support the assertions/findings?
- *Value* – Does the contribution further the understanding of the issues at hand?
- *Clarity* – Is the comment concise and understandable?

During class sessions, I frequently assume the role of a facilitator to encourage a discussion that includes perspectives from a variety of viewpoints and, secondly, to help pull together prevailing analyses and recommendations. The direction and quality of a discussion is the *collective responsibility of the class*.

For each in-class session two (2) points will be awarded to a student for relevant and meaningful participation, one (1) point for modest contributions to the class and zero (0) points for no participation or absence.

To underscore the importance of participation, 10 percent of the course grade or 10 of 100 points are allocated to class participation.

Class Participation—Behavioral Anchor Rating Scale:

Excellent Performance

- Initiates information relative to topics discussed
- Accurately exhibits knowledge of assignment content
- Clarifies points that others may not understand
- Shares personal experiences or opinions related to topic
- Offers relevant / succinct input to class
- Actively participates in class exercises
- Demonstrates ability to apply, analyze, evaluate & synthesize course material.
- Demonstrates willingness to attempt to answer unpopular questions
- Builds on other students' contributions

Average Performance

- Participates in group discussions when asked
- Demonstrates knowledge of course material
- Offers clear, concise, “good” information on class assignments
- Offers input, but tends to reiterate the intuitive
- Attends class regularly

Unacceptable Performance

- Fails to participate even when directly asked
- Gives no input to discussions
- Does not demonstrate knowledge of the readings
- Shows up to class: does nothing
- Distracts group / class
- Irrelevant discussion