

TECHNOLOGY

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EDUARDO RODRÍGUEZ LORENZO

Eduardo Rodriguez Lorenzo is Senior Manager at NETSCOUT and Adjunct Professor at IE School of Science and Technology. He is a technologist specializing in Telecommunication Networks, Cybersecurity, Software Architecture, Data Engineering and Analytics.

He studied at UPM (Universidad Politécnica de Madrid), King's College London and London University.

At NETSCOUT, he leads a global team of Data and Network Engineers with a strong focus on Network Service Assurance, Cybersecurity, Data Engineering and Analytics.

He has gained broad international experience delivering high-value Consulting Services (Customer Experience & Customer Journeys, Business Intelligence, Service Assurance, Data Monetization, Process Engineering...) and Data-driven Solutions (Cloud & Backend Architecture, Data Feeds, Database, Dashboard, Interaction & Visualisation Design) to global Enterprises and Communication Service Providers. He has played an active role in the launch, measurement and optimisation of Mobile Networks for various top international Telcos.

He is a member of the Spanish Charter of Telecommunications Engineers (COIT) where he is an active member of the Telecommunications Policy and Regulation Group and the Digital Transformation Group.

His main interests include Disruptive Technologies, Data Engineering Architectures, Networks, Distributed Systems and Graph technology.

He joined IE University in 2020.

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SUBJECT DESCRIPTION

Nowadays, the “techie” and “non-techie” divide is diminishing at record pace. Regardless of whether you are a Computer Science and AI student or a Law student, technology is essential and the sooner you stop yourself from considering yourself a techie or not, the sooner you will thrive in society. It is no longer essential to be skilled at coding languages to know how to apply technology. Low code and no code tools break down those barriers for all and make technology an asset and tool at everyone’s disposal. In fact, even skilled programmers often find low-code tools support them in building their solutions. Technology is a part of our everyday lives and will be a growing asset to all of society as we move forward and especially as we work to ideate and execute solutions to solve our world’s most pressing challenges, particularly related to sustainability.

The IE Impact Technology course is designed for all IEU students, from all schools and all bachelor programs. No technical knowledge is necessary. For those of you with technical knowledge, you will build upon your skills. All of you will continue to apply your critical thinking skills that you began to deepen during the IE Impact Humanities course to consider the implications of the different technologies that we will address in class, as well as those that you encounter in your day-to-day. This will be an engaging course that will stimulate your curiosity and creativity. You will find that what you learn in this course and how you grow in terms of your mindset towards technology will serve you in the next IE Impact course, Entrepreneurship, where you will dive deeper into problem-solving and creating enduring solutions.

During this portion of the IE Impact Learning Journey in which we aim to equip you with the skillsets, mindsets and toolsets you need to develop into innovative problem-solvers who will lead positive change. The course is aimed to help you to:

- develop a familiarity with the technologies that have had the greatest impact on society,
- apply your critical thinking skills to consider the implications of these technologies, and
- break down any limiting beliefs you may have about technology by creating a solution to a problem with technology.

UNIVERSITY

In this course, you will embark on a learning journey that will take you from the global challenges of the SDGs to the local opportunities of technology. You will start by understanding the role and potential of technology in advancing the SDGs and creating positive social and environmental impact. You will then dive into the different types of digital products and technologies that are shaping the present and future of our world, such as low-code/no-code platforms, generative AI tools, smart industry solutions, data economy platforms, cybersecurity systems, blockchain applications, web3 protocols, extended reality devices and metaverse platforms. You will learn how these technologies work, what are their benefits and risks, and how they are transforming various sectors and domains. You will also get hands-on experience with some of these technologies and create your own digital products using a proven Innovation Engineering methodology. Along the way, you will explore real-world case studies of companies that are applying these technologies successfully and innovatively. Finally, you will look ahead to the emerging technologies that will define the next decade and beyond, such as biotech, nanotech and climatetech. You will gain a critical and visionary perspective on these technologies and their implications for the SDGs and humanity. By the end of this course, you will have acquired a comprehensive and practical knowledge of the current and future technologies and their impact on the world. You will learn from experts and practitioners who will guide you through the most exciting and relevant topics and technologies of our time. You will also collaborate with peers and mentors who will inspire you and challenge you to create innovative and impactful solutions. You will develop your digital skills and competencies, and deepen your critical thinking skills and creativity. You will be well on your way to becoming a tech-savvy problem-solver who can leverage technology for the SDGs and for a better, sustainable future.

LEARNING OBJECTIVES

After this course students will be able to:

1. Explain the role and potential of technology in advancing the SDGs and creating positive social and environmental impact.
2. Identify and describe the different types of digital products and technologies that are shaping the present and future of our world.
3. Analyze real-world case studies of enterprises that are applying these technologies successfully and innovatively and learn from their best practices and challenges.
4. Evaluate the benefits and risks of these technologies for different stakeholders and interests, and apply ethical principles and frameworks to technology design and implementation.
5. Compare and contrast different types of digital products and technologies in terms of their features, functions and applications.
6. Use the Innovation Engineering framework to create digital products using low-code/no-code platforms.
7. Communicate your digital products effectively using storytelling techniques and visual aids.
8. Anticipate and prepare for the potential disruptions and opportunities of emerging technologies, such as biotech, nanotech and climatetech, and develop a critical and visionary perspective on their implications for the SDGs and humanity.

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:

Learning Activity	Weighting	Estimated time a student should dedicate to prepare for and participate in
Lectures	13.33 %	10.0 hours
Discussions	6.67 %	5.0 hours
Exercises in class, Asynchronous sessions, Field Work	6.67 %	5.0 hours
Group work	46.67 %	35.0 hours
Individual studying	26.67 %	20.0 hours
TOTAL	100.0 %	75.0 hours

PROGRAM

IE IMPACT is a multi-bachelor, multi-school mandatory academic program for all IEU students whose mission is to foster the skillsets, mindsets, and toolsets we at IE University believe students need to develop into innovative problem-solvers who will lead positive change.

IE IMPACT begins with "pillar courses" in three of IE's core values: the Humanities, Technology and Entrepreneurship. The IE Impact learning journey aims to help IEU students to develop:

- humanistic approaches to interpersonal relations, decision-making and critical thinking;
- familiarity with the technologies that are applied to solve some of the world's greatest challenges; and
- entrepreneurial mindsets, know-how, and skills to identify and solve problems worth solving, and to create validated business models that enable solutions to be enduring and scalable to achieve a greater positive impact.

The **IE Challenge** is the culmination of the IE Impact learning journey, and its fourth and final course. Students in the IE Challenge will apply the skills, mindsets, and knowledge they began to develop during the three pillar courses, and through their hands-on work they will deepen their learning development and skills related to IE's core value of Diversity. In the IE Challenge, IEU students will choose which challenge or sector they want to focus on and then they will be placed into teams. Some challenges are framed within a client-model in which the teams work as Innovation Consultants, while other challenges are supported by industry leaders who serve as mentors and industry experts and teams work as Innovators and/or Entrepreneurs. All challenges are aimed at students deepening their knowledge of problems related to the sustainability of People, Planet and Prosperity as per the Sustainable Development Goals and the UN's 2030 Agenda.

IE IMPACT OVERVIEW

SESSIONS

IE IMPACT TECHNOLOGY SYLLABUS

SESSION 1 (LIVE IN-PERSON)

Intro to Course

- Course summary: contents description.
- IE and Students expectations.
- Assignments and Grading.

Group Project: Project Introduction, survey for team formation, ideas on how to choose a project.

SESSION 2 (LIVE IN-PERSON)

Sustainable Development Goals (SDG) and Technology

- Define and understand the relevance of the Sustainable Development Goals (SDGs)
- Identify the positive impact of Technology on achieving the SDGs
- Explore examples of breakthrough Technology solutions for the SDGs

Group Project: Pitch initial ideas. Explain NABC with example.

SESSION 3 (LIVE IN-PERSON)

Digital Products and Digital Technology.

- Define what a digital product is and identify different types of digital products.
- Explain how digital technology enables the creation and delivery of digital products.
- Compare and contrast the advantages and disadvantages of digital products versus physical products.
- Analyze the impact of digital products on various aspects of society, such as economy, culture, environment, and ethics.
- Evaluate the quality and usability of digital products using appropriate criteria and metrics.
- Apply the principles of design thinking to ideate and prototype digital products that solve real-world problems.
- Data storytelling.

Group Project: Teams choose project. User/Customer Validation.

SESSION 4 (LIVE IN-PERSON)

Low-Code/No-Code Technology

- Compare and contrast different no-code/low-code platforms and tools
- Design a digital product using a no-code/low-code tool (Demo)

Group Project: Low-tech Demo

SESSION 5 (LIVE IN-PERSON)

Artificial Intelligence and the AI Tool Ecosystem

- Define AI and its subfields (machine learning, deep learning, natural language processing, computer vision, etc.)
- Compare and contrast different types of AI (narrow vs general vs super; symbolic vs sub-symbolic; supervised vs unsupervised vs reinforcement; etc.)
- Use an AI tool to perform a specific task (e.g., image recognition, sentiment analysis, chatbot creation, etc.)

Group Project: Where to start

SESSION 6 (LIVE IN-PERSON)

Generative AI

- Define generative AI and its subfields (generative adversarial networks, variational autoencoders, transformers, etc.)
- Compare and contrast different types of generative AI models (text generation vs image generation vs audio generation vs video generation; etc.)
- Prompt Engineering
- Generative AI ecosystem: ChatGPT, DALL-E, GitHub Copilot, Bing Chat, Auto-GPT and AI Agents, LangChain...
- Use a generative AI tool to create content or media (e.g., text summarization, image synthesis, music composition, video editing, etc.)

Group Project: Explain Tech strategy

SESSION 7 (LIVE IN-PERSON)

Towards the future: BioTech, NanoTech and ClimateTech

- Define biotech, climatetech, and nanotech and their subfields (biotechnology: genetic engineering, biomedicine, biofuels, etc.; climatetech: renewable energy, carbon capture, climate adaptation, etc.; nanotech: nanomaterials, nanodevices, nanomedicine, etc.)
- Compare and contrast different examples and impacts of biotech, climatetech, and nanotech (biotech: GMOs, vaccines, biofuels, etc.; climatetech: solar panels, wind turbines, electric vehicles, etc.; nanotech: nanosensors, nanobots, nanofibers, etc.)
- Recognize the trends and developments in biotech, climatetech, and nanotech (biotech: CRISPR, synthetic biology, biohacking, etc.; climatetech: green hydrogen, geoengineering, carbon removal, etc.; nanotech: quantum dots, nanomedicine, molecular machines, etc.)
- Industries that apply BioTech, NanoTech and ClimateTech

Group Project: Showcase.

Catalyst Impact Case

SESSION 8 (LIVE IN-PERSON)

Internet and the Data Economy: Surveillance, Privacy and Regulation

- Describe how the internet works and how data is collected, stored, and transmitted online.
- Define the data economy and its drivers (data generation, data collection, data analysis, data monetization)
- Compare and contrast different models and actors of the data economy (data producers vs data consumers vs data brokers; data markets vs data commons vs data trusts; etc.)
- Explain the concepts of surveillance, privacy, and regulation and how they relate to the data economy.
- Evaluate the opportunities and challenges of the data economy (value creation vs value extraction; privacy vs transparency; innovation vs regulation; etc.)
- Evaluate the benefits and risks of data collection and use for individuals, organizations, and society.
- Discuss the ethical, legal, and social implications of data collection and use and the challenges of protecting privacy and security online.
- The role of Policy and Governments in the Data Economy

Group Project: Showcase.

SESSION 9 (LIVE IN-PERSON)

Cybersecurity

- What is cybersecurity and why is it important?
- What are the main types of cyberattacks and how do they work?
- What are the common vulnerabilities and threats that affect digital systems and devices?
- What are the best practices and tools for preventing and responding to cyberattacks?
- What are the roles and responsibilities of different stakeholders in cybersecurity, such as users, developers, organizations, and governments

Group Project: Showcase.

SESSION 10 (LIVE IN-PERSON)

Blockchain

- Define blockchain and its components (blocks, transactions, hashes, consensus mechanisms)
- Compare and contrast different types and examples of blockchain (public vs private vs hybrid; permissionless vs permissioned; Bitcoin vs Ethereum vs Hyperledger; etc.)
- Explain the basics and applications of cryptocurrencies (cryptocurrency mining, cryptocurrency wallets, cryptocurrency exchanges)
- Use Case: Bitcoin
- Ethereum use cases: Smart Contract, NFTs, DAOs
- Practice: Crypto Wallet

Group Project: Showcase.

SESSION 11 (LIVE IN-PERSON)

Web3

- Define Web3 and its evolution from Web1 and Web2

- Compare and contrast different features and technologies of Web3 (decentralization vs centralization; peer-to-peer vs client-server; blockchain vs distributed ledger; smart contracts vs traditional contracts; etc.)
 - Explore the potential and limitations of Web3 for innovation and social change (web3 applications, web3 platforms, web3 communities)
 - Web3 ecosystem and tech stacks
 - dApps vs traditional web applications
 - dApps Use Cases
- Group Project: Showcase.

SESSION 12 (LIVE IN-PERSON)

Extended Reality and the Metaverse

- Define XR and its subfields (virtual reality, augmented reality, mixed reality)
- Compare and contrast different types and devices of XR (head-mounted displays vs handheld displays vs projection-based displays; standalone vs tethered vs smartphone-based; etc.)
- Identify different metaverses and understand their differences (Meta Horizon, Decentraland, Roblox...)

Group Project: Showcase.

Immersive Experience Discussion

Practical Case : Eye in the storm: your role in climate change action (EEN010191-U-ENG-HTM)

Games & Simulations: Eye in the Storm VR (CSR090011-U-ENG-VXR)

SESSION 13 (LIVE IN-PERSON)

Smart Industries

- Define smart industries and their characteristics (automation, connectivity, intelligence, optimization)
- Compare and contrast different examples of smart industries (smart manufacturing vs smart agriculture vs smart healthcare vs smart education; etc.)
- Analyze the opportunities and challenges of smart industries (productivity vs quality; innovation vs standardization; sustainability vs profitability; etc.)
- Explore examples of smart industry solutions and best practices (smart sensors, smart robots, smart factories, smart grids, etc.)

Content Quiz

Catalyst Impact Case

Group Project: Showcase.

SESSIONS 14 - 15 (LIVE IN-PERSON)

Group Presentations and wrap up.

- Group presentations
- Course Wrap up

READINGS

Session materials will be provided in advance (slides and recommended readings).

EVALUATION CRITERIA

criteria	percentage	Learning Objectives	Comments
Group Assignment	40 %		Group Project Delivery. Evaluation based on: Project Proposal (30%) Project Design (30%) Demo Day & Tool utilization (30%) Peer Review by group team members (10%)
Class Participation	15 %		Class Practice Assignments, Attendance
Individual Evaluation	25 %		Content Quiz (Technologies)
Individual Work	20 %		Discussions, Case studies, assignments, weekly quizzes on assigned homework.

RE-SIT / RE-TAKE POLICY PARTICIPATION

The “Practice” portions of sessions may require students to upload a contribution to IE Campus (before or during a class). This will be factored into your Class Participation evaluation.

In this IE Impact-Technology course, you will work during the entire semester on a group project. Learning to work effectively in diverse teams is a fundamental aspect of the overall IE Impact program. Teams are required to work together to manage, execute and monitor the tasks and deliverables of this final group project.

“Free-riding” (any student who does not take an active role in contributing to the progress and completion of the work expected of each team weekly and who allows the work to be done by others) will be monitored and evaluated accordingly.

Any student who is having difficulty in developing the skills, mindsets and know-how necessary to contribute actively to his/her team, should email the IE Impact Team at ieimpact@ie.edu to request additional support so that the the IE Impact team, in collaboration with your Technology professor, can help those students who want to do better but may be unclear about how to do better on their own.

Likewise, any student who thinks that his/her team may need extra support in terms of team management should also reach out to ieimpact@ie.edu to discuss options and redirect team dynamics, if necessary

BIBLIOGRAPHY

Recommended

- Ikhtlaq Sidhu. (2020). *Innovation engineering : a practical guide to creating anything new*. Sidhu Innovation Engineering. ISBN 9781733431705 (Printed)

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.

