

QUANTITATIVE METHODS

IE University

Professor: **MARÍA ESTEBAN CASAÑAS**

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Degree course: THIRD

Semester: 1º

Category: COMPULSORY

Number of credits: 3.0

Language: English

PREREQUISITES

SUBJECT DESCRIPTION

Welcome to Quantitative Methods, a course that goes beyond data and numbers to apply information visualization to ideas and concepts.

Throughout this course we will explore how to work with data for exploration and explanation. Topics include storytelling and narrative, choosing representations, understanding audiences, and the role of designers working with data. This course is structured in two units with specific deliverables at the end of each unit. The course will consist of project-based explorations that will challenge you to re-think the way you collect, classify, analyse, and use data to communicate narratives.

Data visualization is a powerful tool to communicate data-driven findings and detect patterns. It allows us to render visible the invisible. By creating visual elements like charts, graphs, and maps, we provide an accessible way to observe trends, outliers, and patterns in data. A report published in 2010 by MIT and IBM predicted that by 2012, data visualization is likely to be the analytical technique that creates the most value for an organization.

Through this course we will explore how to use data to reveal valuable insights and how to apply different techniques for finding a story in data. If you look at data directly, it may seem as you are looking at mere numbers and facts – however, if you start working with the data, interesting leads and patterns may be revealed.

Throughout the semester, we will be exploring the potential of data visualization. We will analyse examples of how it has been used throughout history to convey different narratives. We will also be looking at how biases can emerge in data collection, data classification, and data analysis, and the impact this can have on society. We will also explore the concept of ethics (privacy, power, visibility, data deception, etc.) in data visualization.

A sequence of lectures, workshops, ideation sessions, desk crits, and studio reviews will provide a framework for you to develop your data-driven design projects. Even though you are not required to literally carry all the lessons and findings from one exercise to the other, the sequence is designed to progressively engage with topics, references, and the local conditions necessary to understand the scope and complexities of the larger project. The assignments are designed to help you propel your project forward while exploiting the collective intelligence of the entire class. That is why active participation is essential in the classroom, accounting for 20% of the final grade.

Studio Culture: Work in the design studio will build sequentially. Therefore, your commitment to continual development of paramount importance. I want to emphasize the importance of your peers as a source of support, inspiration, and feedback. Magnification of your development as a designer is made possible by the collective nature of the class. Group reviews are collective for a reason, as each of you has something to gain from your peers. Our studio is a place for all, and it requires the careful attention to the needs of everyone in it.

Office Hours: I will hold virtual office hours over zoom outside of the listed class time. You are encouraged to come to my office hours, which will be held by appointment from Monday to Friday. Although office hours are optional, please do communicate with me if you feel like you are struggling or feeling lost at any point in the process. Design projects can often be confusing and difficult to know where you are at, so let me know if you have any questions. My door is always open!

Attendance: According to the current attendance policy of IE University, class attendance is mandatory: students must attend at least 70% of all class sessions. The studio is a great learning environment that requires your physical presence as well as your intellectual presence. Students' attendance is not determined by mere passive presence, but by an active participation in class. Merely coming to class is not enough: students must participate in class activities to be accounted for as attending the class.

Inclusivity Statement: I hope to foster a sense of community in this classroom and consider this classroom to be a place where you will be treated with respect. I welcome individuals of all backgrounds, beliefs, ethnicities, national origins, gender identities, sexual orientations, religious and political affiliations – and other visible and nonvisible differences. All members of this class are expected to contribute to a respectful, welcoming, and inclusive environment for every other member of the class. If this standard is not being upheld, please feel free to speak with me.

OBJECTIVES AND SKILLS

In this course you will learn how to translate datasets into visual representations, organise data so that it becomes knowledge, and combine and communicate multiple layers of information with the objective of extracting new insights.

By the end of this course, you will be able to:

- select the appropriate techniques, tools, and visual representation for your data.
- ask questions that challenge common assumptions.
- find data and reliable sources.
- portray data responsibly and ethically.
- re-organize information to find hidden patterns.
- use data visualization principles and visual alphabets to communicate your findings.
- connect data stories to meaningful, situated social action.

Through this course, you will be able to apply a purely scientific sensibility - that of data - to a job that is often driven by intuition - that of design.

Through the various assignments you will develop an approach and skills for thinking about data. It is expected, that as the course progresses, you will increasingly work independently, and take initiative and personal responsibility of your projects. You will also develop your own critical analysis skills, meaning that by the end of the course, you should be able to critically evaluate your own design work.

METHODOLOGY

This course is centered around project-based learning assignments, where you will investigate and actively respond to different design challenges. Projects are expected to be developed during the class sessions and completed afterwards, and will span multiple sessions, allowing you to put into practice the newly acquired concepts. Many of this course's sessions will be focused around desk crits and reviews, allowing you to work in an iterative process (feedback - loop), an essential skill in the design world. Such sessions also allow for a critical dialogue to emerge, involving the participation of all of you to learn one from each other.

Outside of our class sessions, you will be guided to independently learn the technical aspects through the infinite potential of online learning resources. In between class sessions, you will be able to get further feedback on your work through my office hours.

To prepare for each class, course assignments are to be completed and posted on MIRO prior to our class meetings. MIRO will be used as the main online platform for this course as it will provide you with an easy access to all the required learning resources as well as a space where you can upload your work, share references, and give/receive feedback. I will be also posting my office hours on MIRO for those who would like extra input. At the beginning of the course, I will share and upload to MIRO a detailed schedule, including the due dates for all the assignments.

| Teaching methodology | Weighting | Estimated time a student should dedicate to prepare for and participate in |
|---------------------------|-----------|--|
| Lectures | 13.33 % | 10 hours |
| Discussions | 13.33 % | 10 hours |
| Exercises | 40.0 % | 30 hours |
| Group work | 6.67 % | 5 hours |
| Other individual studying | 26.67 % | 20 hours |
| TOTAL | 100.0 % | 75 hours |

PROGRAM

PART ONE

Part one will consist of a series of exercises, case studies, readings, and short projects exploring various topics ranging from data visualisation types, tools, and choosing representations to contextualizing data, historical examples, and working ethically in this field.

Sessions: 1 - 6

SESSIONS 1 - 2 (LIVE IN-PERSON)

Course overview, historical precedents, and contemporary context.

SESSION 3 (LIVE IN-PERSON)

Review of readings and discussion of case studies followed by work session.

SESSION 4 (ASYNCHRONOUS)

Asynchronous - assignment review.

SESSIONS 5 - 6 (LIVE IN-PERSON)

Presentations and discussions, followed by class exercises.

PART TWO

This second part will focus on storytelling and narrative (storyline communicating insights, the context surrounding it, and actions you recommend and aim to inspire in your audience), understanding audiences, and the role of designers working with data. We will start with an initial prompt from which you will be able to select a topic according to your interests. You will be asked to define your audience and select data. This final project is aimed at putting into practice all the concepts learned during the semester. The course will end with a final review, where you will showcase your projects through 5-minute presentations, explaining your data analysis, audience, set of goals, methodology, narrative, and visualizations of the data to communicate its story clearly and memorably.

Sessions: 7 - 15

SESSIONS 7 - 8 (LIVE IN-PERSON)

Intro to second part of our course followed by work session with desk crits.

SESSIONS 9 - 10 (LIVE IN-PERSON)

Student presentations of sketches for critique, followed by work session with desk crits.

SESSIONS 11 - 12 (LIVE IN-PERSON)

Exercises and desk crits focused on final project presentation.

SESSIONS 13 - 15 (LIVE IN-PERSON)

Final Project Review

BIBLIOGRAPHY

Recommended

- Catherine D'Ignazio and Lauren F. Klein. *Data Feminism*. The MIT Press. ISBN 9780262044004 (Printed)

- Ben Fry. *Visualizing Data*. O'Reilly Media. ISBN 9780596514556 (Printed)

- Isabel Meirelles. *Design for Information*. Rockport Publishers. ISBN 1592538061 (Printed)

- Tamara Munzner. *Visualization Analysis and Design*. CRC Press. ISBN 9781466508910 (Printed)

- Edward R. Tufte. *The Visual Display of Quantitative Information*. Graphics Press.

ISBN 9780961392147 (Printed)

- Colin Ware. *Visual Thinking for Design*. Morgan Kaufmann. ISBN 0123708966 (Printed)

EVALUATION CRITERIA

Evaluation is continuous, which implies that all the work produced by the students along the semester will contribute to the final grade. Final grade for the course is calculated as the weighted average in the following percentages:

| Criteria | Percentage | Comments |
|---|------------|----------|
| Part 1 | 30 % | |
| Part 2 | 40 % | |
| Attendance | 10 % | |
| Class Discussions, Participation, and Evolution | 20 % | |

Class discussions and participation includes an active participation during class session. You are required to submit all material to receive credit and a grade for the course. Evolution refers to the improvement of the quality of submitted project related to the previous work in class.

Evaluation Criteria and Grading: The following criteria will be used for the evaluation of your work, both in terms of helping their progress and in final grading. (01) Concept: How clearly is the student articulating the conceptual intentions? (02) Translation of Concept: How well is the student using their concept to develop a design response to given problems? (03) Representation Appropriateness: How well matched is their choice of representational means to their intentions? (04) Representation Quality: How accomplished are they with regards to drawing, modeling, digital representation, etc.? To what degree does their representations convey what they ought to? (05) Oral Presentation Skills: How clearly are they presenting their ideas orally, whether at their desk, in class discussions, or to a more formal jury? (06) Participation in Discussions: How actively and how constructively are they involved in class discussions, both formally and informally? (07) Response to Criticism: How do they effectively take advantage of criticism from instructors, classmates, and outside jurors? (08) Auto-Critical Skills: To what extent are they able to critique their own work regularly and effectively? (09) Attendance: According to the current attendance policy of IE University, class attendance is mandatory: students must attend at least 70% of all class sessions. Students' attendance is not determined by mere passive presence: merely coming to class is not enough, students must participate in class activities to be accounted for as attending the class.

A more detailed assessment matrix for each assignment will be provided once the course starts.

If you are caught committing plagiarism, you will automatically fail the assignment that you plagiarized. Plagiarism on a second assignment is an automatic failure of this class.

If at any point you are unsure of how you are being graded, please let me know.

PROFESSOR BIO

Professor: **MARÍA ESTEBAN CASAÑAS**

E-mail: mestebanc@faculty.ie.edu

María graduated from Massachusetts Institute of Technology (MIT) with a Master of Science in Architecture Studies. Her individual research on artificial intelligence, ethics, and design was recognized with the MIT Thesis Prize.

María is a former researcher at the Self-Assembly Lab at MIT, where she worked on self-assembly and programmable material technologies for novel manufacturing, products, and construction processes, including 4D Printing. She also became a collaborator at Harvard University, developing new bioinspired materials at the Wyss Institute for Biologically Inspired Engineering.

During her time at MIT, she taught design studios in the disciplines of Architecture and Design at both undergraduate and graduate levels.

Prior to MIT, she received her Master's Degree in Architecture from University College London (Bartlett School of Architecture) and a Master of Arts in Architecture from the University of Edinburgh.

María was awarded the Rome Prize in Architecture from the Spanish Academy in Rome where she pursued individual research as a Rome Prize Fellow.

Previously, María has worked at several renowned design and architecture offices including Grimshaw Architects (London) and Dominique Perrault (Paris).

She has designed and built installations and exhibitions at galleries around the world (Boston, Chicago, Edinburgh, LA, London, Madrid, Rome, Seoul, and Venice) including the I Seoul Biennale of Architecture and Urbanism, and the 13th, 14th and 17th Venice Architecture Biennales. Her work has been featured in international publications, for which she has received various awards and scholarships. María has lectured at different institutions including Korea University, University of Plymouth, and the Architectural Association Visiting School Madrid.

María was named one of the "Top 24 Most Innovative and Radical Female Artists in Spain" by El Mundo magazine in 2019, and in 2020, she was included in the list of "Spaniards who are Changing the World" from La Razon newspaper.

Right now, María is leading design and research projects at MITdesignX, an academic program in the MIT School of Architecture and Planning dedicated to design innovation and entrepreneurship. She is also Adjunct Professor at IE School of Architecture and Design.

OTHER INFORMATION

Academic Integrity Statement

In this course, I will hold you to the high standard of academic integrity expected of all students at IE University. I do this for two reasons. First, it is essential to the learning process that you are the one doing the work. I have structured the assignments in this course to enable you to gain a mastery of the course material. Failing to do the work yourself will result in a lesser understanding of the content, and therefore a less meaningful education for you. Second, it is important that there be a level playing field for all students in this course and at the Institute so that the rigor and integrity of the Institute's educational program is maintained.

All the work that a student submits has to be original and produced by the student: not copied nor downloaded from the internet, unless students are specifically instructed to copy other's work as a part of the actual exercise.

Please review the [IE Code of Ethical Conduct](#), where you will be able to read the IE's Academic Standards. Contact me if you have any questions about appropriate citation methods, the degree of collaboration that is permitted, or anything else related to the Academic Integrity of this course.

Mental Health

As a student, you may experience a range of challenges that can interfere with learning, such as strained relationships, increased anxiety, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may impact your ability to attend class, concentrate, complete work, take an exam, or participate in daily activities.

The student community at IEU has access to their counselling service during the academic year. This service is free and confidential. The team is comprised of guidance counsellors (IEU staff) and clinical psychologists and psychiatrists from SINEWS, a mental health service provider.

To schedule an appointment:

- Email: Counseling.IEU@ie.edu (or Mentoring.IEU@ie.edu)
- Phone: (+34) 921 415 312
- 24/7 Mental Health Crisis Line: (+34) 619 270 148 (English/Spanish)

For urgent or after-hours concerns, please dial 112 immediately.

