IMPACT PROJECT

AREA: HUMAN SCIENCES MASTER IN BUSINESS ANALYTICS AND BIG DATA PART-TIME Nº OF SESSIONS: 15

Professor: **FEDERICO CASTANEDO SOTELA**

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- Federico Castanedo is a data science and AI leader with extensive experience in academia, industry, and start-ups. He has a successful track record of developing data science and AI products with business impact and leading high-performing data science teams.
- He has held leadership positions at well-known organizations such as DataRobot and Vodafone, where he successfully hired, led, and coached teams of specialized data scientists, delivering exceptional performance results. Federico also co-founded WiseAthena, a leader in AI price optimization for consumer packaged goods (CPG) companies, and served as the Chief Data Scientist at the company.
- Currently, serves as an Adjunct Professor at IE University, where he imparts his knowledge and expertise to the next generation of professionals. He also works as a freelance data science advisor and consultant for various companies, helping them to leverage the power of data and AI to solve complex business problems.
- Federico holds a PhD in Computer Science and Artificial Intelligence from Universidad Carlos III de Madrid (2010) and has conducted research at Stanford University as a visiting researcher. He is also a published author, with several O'Reilly e-books on data science topics and research papers that have received over 1500 citations.

Professor: **JUAN JOSE CASADO QUINTERO**

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- Big Data & Advanced analytics expert with 15 years of work experience in consulting focused on helping business from different industries to get the most value from their data.
- Juan Jose has led teams of Data Scientists at CFI Group, Cognodata, Everis and most recently IBM where he was the Head in Spain of the Strategy & Analytics Service Line and a Big Data evangelist.
- From 2015 to 2018 Juan Jose is committed to transform the health care system trough big data advanced analytics as the Data & Analytics Corporate Director at Sanitas (BUPA EUROPE) - Currently he is working to apply Big Data and Artificial Intelligence at the Energy Industry as Chief Data Officer at Repsol
- Awarded Best Chief Data Officer at Spain & Latam (2021)

27th January 2023

- Juan Jose is founder, Professor & Academic Program Director of the Master in Business Analytics & Big Data at IE business school (Instituto de Empresa)

- MBA at IE Business School (2001), Business Administration Degree at Madrid Complutense University

DESCRIPTION

The objective of the Capstone Project, also known as the Impact Project, is for students to demonstrate their proficiency and apply the tools, knowledge, and experience gained throughout the MBD program.

This project serves as the final and culminating experience of their master's program. The Capstone Project requires students to create, present, and defend an original work to graduate. This project provides students with the opportunity to apply their learning to a real-world problem or challenge proposed by an external company. This exercise takes place concurrently with the last weeks of the MBD's Electives Period. Participating in this Impact Project involves accepting a business challenge from an external partner organization, conducting an in-depth analysis of the situation, making recommendations based on the data provided, and having regular interactions with the company and an IE Academic Tutor.

Students will work in groups of **four** to **six** for the Impact Project, but each team member will receive an individual evaluation based on their individual performance.

LEARNING OBJECTIVES

The student will have the opportunity to demonstrate their ability to solve real-world business challenges using data-driven analytics. Partner companies will provide data sets for students to work as a team. Through this capstone project, students will showcase the knowledge and skills acquired during the program by:

- Clearly **defining** and **analyzing** the business challenge or problem and proposing a **datadriven solution.**
- **Selecting** the appropriate data science model and methodology to effectively solve the problem and evaluate the trade-offs of the different solutions.
- **Designing** a sustainable architecture to support the chosen model.
- **Implementing** a proof of concept using real-world data and the tools and techniques learned during the program.
- **Communicating** their proposal and analysis clearly and effectively to a panel.
- **Identifying** and **addressing** any ethical or legal considerations involved in the proposed solution.

The goal of this capstone project is to provide a **data-driven solution to a business challeng**e presented by a partner company, turning data into real-world business value.

METHODOLOGY

Participants will work on solving a real-world business problem proposed by a partner company, using the tools and skills acquired throughout the program. The company will provide a dataset and their specific business goal. The outcome should be a solution that is presented to a panel of experts.

The Capstone Project carries a weight of **6 ECTS**, and is developed through a combination of master classes, group work, and tutoring sessions. These sessions are designed to ensure appropriate progress, support, supervision, and guidance from the Academic Tutor, who will

work closely with the students to develop the project, as well as provide validation and feedback from the external partner organization.

To ensure proper progress, students are expected to validate their work with the Academic Tutor on a weekly basis. They will also present their proposal to the Partner Organization for validation.

Students will work in teams and will be assigned an IE professor as an Academic Tutor for the project. The professor will act as a guide for the student team and will also evaluate their progress throughout the project. It is the students' responsibility to reach out to the assigned Academic Tutor and plan for tutoring sessions.

Their work will be evaluated by other professors and the Partner Organization during the final presentation of their analyses and recommendations. Attendance of class sessions and participation in regular group meetings is mandatory for all students. The dates and times for master classes are fixed for all groups, however, students are responsible for organizing their own individual and collective work times and spaces, as well as the tutoring sessions.

Groups Formation

The companies will present the project and the students will express their interest, but the assignation will be performed by IE Faculty members.

Project Development

To ensure academic quality in all the projects carried out by the students, they will be supervised by, on the one hand, an academic tutor and, on the other, a tutor from the company that has provided the data set. This has the purpose to carry out the continuous evaluation of the work developed by the students in groups, as well as the contribution of each one of the students to the final deliverables.

The "academic tutor" will be a professional specialized in the subject, who will help students during the tutoring sessions to work in the process of solving the challenge proposed by the company. Attendance to the tutoring sessions is **mandatory** and will have an impact in the individual grading of each student.

Project Presentation

The Final Presentation is made once the Impact Projects have been previously evaluated by the Tutors. Nevertheless, both the Academic Tutor and the Company Sponsor must approve that their groups have the minimum quality to present in the Final Presentation.

At the end of the time allotted for the completion of the Impact Project, all members of the work team must present the results obtained, as well as the proposed solution, to an evaluation panel.

The final panel will be made up of tutors from the companies that provide the data sets and two professors. These members of the panel oversee the final evaluation of the work carried out, this being the deliverables and presentation. The presentation is expected to be deliverer showing the communication skills and data visualization necessary for a professional work.

REPORT AND PRESENTATION

The final report should provide a comprehensive overview of the proposed solution to the problem or challenge presented by the company with the following sections.

- **Objective**: this section should clearly define the problem being addressed and the target of the work to be carried out.
- **Data sources**: this section should detail the data used in the analysis, including any preparation or processing that was done, and any additional data that was needed and how it was obtained.
- **Methodology**: this section should describe the tools and processes used to solve the problem, as well as the technology used.
- **Potential solution**: this section should present at least two alternatives that were considered throughout the resolution process, with an explanation of why one was chosen over the others.

- **Development**: this section should include the code used to solve the problem, adapted to established standards for ease of understanding by a specialist in the field.
- **Conclusions**: Finally, the conclusions section should present the result from a technical perspective, including any metrics such as algorithm choice and precision, as well as its potential impact and viability for implementation in the business.

The report, along with the information included in it, will be meticulously evaluated by both the academic tutor and the company sponsor throughout the tutoring sessions leading up to the final presentation before the panel. The report must receive the endorsement of both the company sponsor and academic tutor before the group can present their solution to the panel.

Presentation Guidelines

One of the most important evaluation criteria will be professionalism, i.e. the capability to inspire confidence in the analysis and proposed strategy. Therefore, bear in mind the following points:

- **Professional setting**: You should not act as if you were before a panel of professors, but rather as a member of the team of business analytics presenting in front of executive management from the company.
- **Focus on analysis and recommendations**: You should not begin by listing the characteristics of the company or its sector, given that the audience will be more than aware of them already. Rather, we want you to analyze the specific problem or challenge, propose alternatives using the tools and knowledge you developed, and make data-driven decisions relevant to the company's situation. The audience is there to hear the final conclusions of your analysis, but also to understand the way you reached it. Organize your presentation and report around the insights and recommendations you want to transmit (and the information and data backing them up), but do not forget to include the process and tools you followed to discover them.
- **Use tools wisely and avoid one size fits all:** You should not try to show that you are an expert in a vast number of models and tool, but rather that you can identify management problems and of providing feasible, realistic solutions using the technical tools you have acquired during the program.
- **Synthesize**: The presentation should be clear, specific, and concise. Do not waste time mentioning anything that has no direct bearing on an important conclusion. When presenting numerical data, just briefly point out the assumptions (unless they are obvious) behind said numbers and the results that you consider important.
- **Design and content:** You should use slides, but you need to make sure you have the right quantity and quality of slides to keep the audience's attention.
- **Format**: **15 min**. of presentation in which ALL team members must present. Around 10 min of Q&A.
- **Time management:** It is advisable to spend a certain amount of time before the exam preparing the structure of the presentation to ensure optimal time allocation. Remember, however, that although the exam usually goes as planned, the exam panel may suggest skipping a point or ask for more detail at any point.

DELIVERABLES

Each group must submit the following deliverables.

- **Executive Summary:** A short description of the problem and solution (in PDF format) to scitech@ie.edu and uploading to blackboard. Max. 2 pages (in PDF format). It can also be an A3/poster with the main aspects of the solution proposed.
- **Written Report**: (in PDF format) via e-mail scitech@ie.edu and uploading to blackboard on the date the program management will confirm, typically 3 to 5 workdays before the final presentation date. The format must be Min. 10 pages, Max. 20 pages (not counting appendices), 1.0 spacing, 12- point Times New Roman font, with proper citation. File name should indicate the content and incorporate the name of the project and the team members' primary surnames.
  The cover page should include the team members' primary surnames.
- **Final Presentation:** send a pdf version of your presentation via email to sci-tech@ie.edu by 08:30 am on the day of your final presentation.
- **Code**: Github repository url, added to the executive summary.
- **Ethics Statement:** The cover page of the Written Report must contain the following statement and be accompanied by the students' signatures. Please ensure that each team member signs the cover page (digital signatures).
  "I hereby certify that this report and the accompanying presentation is my own original work in its entirety, unless where indicated and referenced."
- **Citations**: You need to properly cite and reference all your external sources in the report. It is not necessary to cite the source of the pictures you may be using in your presentation. However, if you incorporate graphics or charts with information content into the presentation or the report, you should include a small note at the bottom of the slide or graphic indicating the source, or their originality when they are created by you.
- **Final Presentation**: There is no minimum or maximum number of slides required in the presentation, but students must observe the time allotment for the presentation.

File name should indicate: **IMPACT PROJECT_PRESENTATION_name of the project.**

ACADEMIC TUTOR ROLE

The role of the academic tutors is to help follow up, to evaluate the evolution of the group, and to make sure that the group is advancing properly in the project.

It is a technical advisor, but will not participate in the analysis, nor the decision-making process.

The tutors duties do not include to solve specific doubts related to code bugs, detection of errors in settings, evaluation or validation of models, or similar ones.

Students have been prepared during the entire course to perform these tasks autonomously and errors they may make in the specific tasks of data preparation or modeling will not be considered responsibility of the tutors.

The tutor will evaluate the members of the group individually, will control attendance to the agreed meetings and will provide the grade before the Final Presentation.

Finally, it is the tutor's prerogative to tell the students the final grade granted to each of the members of the group, before the Final Presentation.

There is also a Technical Coordinator, Prof. Federico Castanedo, who will provide to general sessions on how to address professionally the project.

RECOMMENDATIONS

- **Business Understanding**. Students should work on a technical proposal according to the challenge presented by the partner organization in the introductory session. The proposals must include the necessary elements that allow the company to evaluate each one of them (goals, teams, planned worked, durations, responsibilities, limitations, etc). The proposal will be considered as part of the evaluation.
- **Data Understanding**. Students should work on the understanding of the data before starting the analytical tasks themselves. These tasks include to determine what data is needed, to explore it, verify data quality, process and prepare it, visualize it. Some descriptive analysis is normally desired. Data audit process will be part of the evaluation.
- **Data preparation.** One of the most important tasks in a project that normally makes the difference in the outcome. However, is simultaneously the most time consuming and least rewarding one. Tasks include cleaning data, merging data sources, generate new attributes or transform existing variables. Goal is to enrich datasets and prepare them for modeling. Data preparation will be considered as part of the course evaluation.
- **Modeling & Evaluation**. The students will be responsible for designing the modeling strategy and executing the technical tasks. Each group must evaluate and validate its analysis proposals as the basis for the analytical solution to be offered to company's managers. The design of the modelling strategy as well as the technical work done, and the quality of the results will be part of the evaluation.

PROGRAM

SESSIONS 1 - 2 (LIVE ONLINE)

Companies Presentations and their Challanges

During these two sessions, we will introduce the participating companies and their proposed challenges. Students will have the opportunity to hear directly from the companies about their data challenges and ask any questions they may have.

SESSIONS 3 - 4 (LIVE ONLINE)

How to approach Data Science Projects

During these two sessions, we will delve into the common approaches and best practices when undertaking a Data Science project. We will have the opportunity to discuss various strategies and methodologies and explore different ways to approach a data science project.

SESSIONS 5 - 8 (ASYNCHRONOUS)

Weekly Tutoring Sessions

During the weekly tutoring sessions, the assigned professor will provide individualized support to each student team by answering questions, giving guidance, monitoring progress, and providing constructive feedback on the work completed up to that point.

SESSION 9 (LIVE ONLINE)

Improving Data Science Projects

In this session, we will share valuable insights and strategies on how to enhance Data Science projects. This session is being held during the midpoint of the proposed timeline for the group project, providing an opportunity to address common questions and discuss general approaches to the projects.

SESSIONS 10 - 11 (ASYNCHRONOUS)

Weekly Tutoring Sessions

During the weekly tutoring sessions, the assigned professor will provide individualized support to each student team by answering questions, giving guidance, monitoring progress, and providing constructive feedback on the work completed up to that point.

SESSIONS 12 - 13 (ASYNCHRONOUS)

Weekly Tutoring Sessions

During the weekly tutoring sessions, the assigned professor will provide individualized support to each student team by answering questions, giving guidance, monitoring progress, and providing constructive feedback on the work completed up to that point.

SESSIONS 14 - 15 (LIVE IN-PERSON)

Project Presentation

During the final week (**15th of July**) in Madrid we will have these 2 sessions where the groups will present their projects.

EVALUATION CRITERIA

The final score of each person will consist of **20%** from the Academic feedback and **80%** from the Report and Presentation of the Impact Project.

- Follow-up of the Academic tutor (**20%**) individually during the tutorials that the academic tutors maintain with each one of the groups.
- Report and presentation of the Impact Project (**80%**).
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The (**80%**) from the presentation and report of the final solution proposed by the group will be evaluated by the members of the presentation panel by ranking based on the following criteria:

1. Originality and possibilities of effective application of the design/study and of the final recommendations: **25%.**
2. Argumentation of methodological or design choices: **25%.**
3. Coherence and clarity of written, verbal, and visual expository: **25%**.
4. Capacity to defend the arguments presented before the possible observations raised: **25%**

The panel the evaluation will be composed by 2 academics/professors (66%) and 1 or 2 representatives from the Partner Organization (33%).

Academic Tutors can attend the panel of their mentored group but cannot evaluate the presentation.

Criteria	Percentage	Comments
Final Exam	80 %	Report and Presentation
Academic Tutor	20 %	Acacademic Tutor evaluation

Failing the Impact Project

The following circumstances will lead to failing the Impact Project:

- Breach of the rules on attendance to tutorships or other educational activities required by the professor, following the 70% minimum attendance as per IE's attendance policy.
- Non-delivery of the Written Report and supporting documentation on time and under the established conditions without cause duly substantiated (this implies a grade of "0").
- The Written Report alone does not reach a minimum grade of 2 (on a scale of 1 to 5), even if the overall grade counting all other aspects is above 2.
- Non-appearance before the evaluating panel at the requested time, unless otherwise decided by such panel for duly justified reasons.
- The overall grade of both components (Process and Presentation) is less than 1.5 out 5.

All students must meet the participation requirements in the sessions prior to the final presentation and must participate in the final presentation.

Failure to participate in the final presentation will result in an automatic failure for the student.

BIBLIOGRAPHY Compulsory

- Foster Provost, Tom Fawcett. (2013). *Data Science for Business..* O'Reilly. ISBN 9781449361327 (Digital) https://www.oreilly.com/library/view/data-science-for/9781449374273/

FAILING GRADE AND REASSESSMENT

When students receive a Fail in a course, they can present themselves for reassessment in order to earn the necessary credits toward graduation.

The reassessment of students should be scheduled between 5 and 10 working days after the review session takes place.

Grades for the reassessment are limited to a Low Pass and Fail.

Both, the initial Fail as well as the grade of the reassessment remain on the transcript. To calculating the GPA however, only the grade of the reassessment is to be considered. Students receiving a failing grade in the reassessment of a course will not be able to continue in the program.