

Econometrics: Data Analytics for Development

Master in International Development MID SEP-2023 S-1

Area International Relations

Number of sessions: 20

Term: Term 2

Category: regular

Language: English

Professor: **JEAN-BAPTISTE BOVE**

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Jean-Baptiste is an experienced information management specialist with a background in both the private and nonprofit sectors. His passion lies in leveraging technology and data for humanitarian and development purposes. His areas of expertise include conducting humanitarian needs assessments, managing cash transfer programs, implementing logistics information systems, advocating for open data practices and applying machine learning in emergency contexts.

Currently, Jean-Baptiste is an Assessment Expert within the Italian Red Cross and is concurrently pursuing a doctoral degree at the CIMA Research Foundation. His research focuses on enhancing crisis prevention and response by integrating early warning systems and situational awareness.

Over the course of his career, Jean-Baptiste has held key roles at international organizations, including Logistics and Information Management Manager at WeWorld-GVC, Product Owner at Data Friendly Space, and Assessment Officer at IMPACT REACH.

He holds a Master of Science (MSc) in Humanitarian Logistics, another MSc in International Development, and a Bachelor of Arts (BA) in Biomedical Engineering, reflecting his solid academic background and a deep understanding of the humanitarian and development sectors.

Office Hours

Office hours will be on request. Please contact at:

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(Office hours will be on request and the week prior to the exam)

Professor: **JOSE LUIS DELGADO DAVARA**

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Jose Luis is a professional in the field of Information Technologies with over 9 years of experience working for the private sector and multilateral organizations. He has a strong background in data analytics, international development, innovation, and product management. During his time in the multilateral development banks, Jose Luis played a key role in designing and implementing data-driven solutions that helped drive positive change in developing countries. Currently, Jose Luis is the founder and CEO of Mottum.io, a technology and strategy consulting firm that leverage in data analytics and innovation to help businesses and organizations navigate the ever-changing technology landscape.

Office Hours

Office hours will be on request. Please contact at:

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(Office hours will be on request and the week prior to the exam)

SUBJECT DESCRIPTION

The course "Data Analytics for Development" represents a thorough investigation into the dynamic discipline of data analysis and its fundamental significance within the development sector. The rapid and ongoing advancements in data technologies have ushered in unprecedented opportunities to facilitate progress, gain insights into societal trends, and formulate efficacious strategies for comprehensive development efforts. This course is expressly tailored to address the nexus between theoretical comprehension and the practical implementation of data analytics within the domain of development and serves as a pivotal gateway to equip students with the requisite knowledge and skills for data-driven decision-making in the development field.

LEARNING OBJECTIVES

By the end of this course, participants will be able to

- 1. Comprehend Data Analytics Fundamentals:** Develop a solid foundation in data analytics concepts, methodologies, and tools, including data collection, cleaning, visualization, and analysis, with a specific focus on their applicability within the international development sector.
- 2. Apply Data Analytics Techniques:** Acquire hands-on experience in utilizing data analytics techniques to extract actionable insights from real-world development data sets. Students should be able to apply various analytical methods to solve practical development challenges.
- 3. Interpret and Communicate Data Findings:** Develop the ability to interpret complex data findings and effectively communicate them to diverse stakeholders, such as policymakers, practitioners, and community members, to inform evidence-based decision-making in the international development sector.
- 4. Ethical Data Use and Privacy:** Gain an understanding of ethical considerations and privacy concerns related to data analytics in the development sector. Learn how to navigate ethical dilemmas and adhere to international standards while working with sensitive data.

5. **Project-Based Problem Solving:** Engage in hands-on, project-based learning experiences that require students to apply data analytics techniques to real-world development problems. Foster critical thinking and problem-solving skills by working on development-focused data analysis projects throughout the course.

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:

- **Interactive Lectures:** Lectures that encourage students to actively participate through questions, discussions, and brainstorming sessions.
- **Case-Based Learning:** Presentation and analysis of real-world scenarios to help students relate theoretical knowledge with practical situations. Through this, students get a chance to apply their understanding, discuss potential data analytics solutions, and learn from real-life examples from the experience of the professors.
- **Team Projects and Group Work:** Students will collaborate in groups to complete assignments and work in projects. The idea of these exercises is to mirror the real-world corporate environment.
- **Hackathon style activities:** Students are presented a real challenge where they will have to apply the knowledge practiced in class in a timed activity.

Learning Activity	Weighting
Lectures	30.0 %
Discussions	5.0 %
Exercises in class, Asynchronous sessions, Field Work	30.0 %
Group work	25.0 %
Individual studying	10.0 %
TOTAL	100.0 %

PROGRAM

SESSION 1 (LIVE IN-PERSON)

Introduction to data analytics for development

Present the syllabus and main concepts covered in this class. Introduce the pillars of data analytics and some practical use cases in the development sector. Talk about quantitative vs qualitative, raw vs structured, continuous vs discrete, nominal vs categorical etc.).

Learning objectives:

1. Understand the objectives of the class, syllabus and evaluation scheme
2. Understand the main concepts and definition of data analytics

3. Discover and present practical use cases in the development sector
 4. Understand the expectations of the students
- The learning material will be uploaded to the platform prior to the class.

SESSION 2 (LIVE IN-PERSON)

Practical Use Cases of Data Analytics for Development

Presents practical use cases of data analytics for development to give the students an overview of the current status of data analytics in development, trends and future possible future evolution of techniques and processes.

Learning objectives:

1. Review several use cases of how data analytics, AI and machine learning are used in the development sector
2. Understand the main requirements, risks and implications of using these technologies in the development sector

The learning material will be uploaded to the platform prior to the class.

SESSION 3 (LIVE IN-PERSON)

Data collection Theory

Present the different data collection techniques and tools used in the development sector. Define the types of data collected (primary, secondary, quantitative, qualitative, etc.). Define the techniques (surveys, FGDs, KI interviews etc.). Define the tools (kobo, ODK, GIS etc.). Define the sources (Open data, World Bank, HDX etc.).

Learning objectives

1. Understand what type of data is collected in the development sector
2. Understand why data is collected in the dev sector and how it is used
3. Understand how data is collected in the dev sector and what are the main challenges

The learning material will be uploaded to the platform prior to the class.

SESSION 4 (LIVE IN-PERSON)

Data Collection Workshop 1

Introduce the use of Kobo toolbox and survey design using the form builder and the xls forms.

Learning objective

1. Learn the basics of data collection and survey design.
2. Learn how to use the form builder of kobo.
3. Learn how to create forms with the xls forms

The learning material will be uploaded to the platform prior to the class.

SESSION 5 (LIVE IN-PERSON)

Data collection Workshop 2

Collect data with kobo collect and export data. Get a first overview of the output of data and the importance of using features that limit errors in data collection and therefore minimize the data cleaning steps needed to turn raw data into clean data. Explore sources of open data and understand the importance of collecting both primary and secondary data within a project.

Learning objective

1. Learn how to collect data on the field with Kobo Toolbox
The learning material will be uploaded to the platform prior to the class.

SESSIONS 6 - 7 (LIVE IN-PERSON)

Data cleaning Theory

Present the different data cleaning techniques used in the development sector and provide insights on how minimize and automate the steps needed to turn raw data into structured data.

Learning objective

1. Understand the difference between raw and structured data.
2. Understand the steps needed to clean the data.
3. Understand the main sources of errors in the data and how to minimize them.

Data cleaning Workshop 1

Practical workshop on cleaning techniques using advanced tools like Power BI Query editor.

Learning objective

1. Hands-on learning activities to clean datasets using advanced tools commonly seen in large corporations.
 2. Practice solving the main challenge when working with real data.
- The learning material will be uploaded to the platform prior to the class.

SESSION 8 (LIVE IN-PERSON)

Data cleaning and exploration Workshop 2

Practical workshop for data cleaning and data exploration using the most advanced tools. The tools used will be LLMs and Chat GPT Enterprise for data cleaning and exploration.

Learning objective

1. Practice Generative AI tools to efficiently clean and interpret data.
- The learning material will be uploaded to the platform prior to the class.

SESSION 9 (LIVE IN-PERSON)

Midterm exam

Graded practical and theoretical exercise on the material seen.
The learning material will be uploaded to the platform prior to the class.

SESSION 10 (LIVE IN-PERSON)

Data Viz theory

Introduce the main principles of good data analysis and visualization. Present the tools used in the development sector to visualize and extract insights from data.

Learning objective

1. Learn about the importance of data visualization for effective communication
2. Understand the design principles and different types of dashboards
3. Develop critical thinking when developing dashboards

SESSION 11 (LIVE IN-PERSON)

Data viz Workshop 1

Hands-on data visualization bootcamp using Power BI. During this practical session student will have their first interaction with Power BI, the data analytics tool from Microsoft that will allow them to extract, transform and analyse data. The purpose of this session will be to familiarize the student with the interface and main sections of the tool so they can practice by themselves. The class will cover connection to data sources, Power BI Query editor, how to publish a dashboard and other main transformation processes.

Learning objective

1. Getting familiar with the Power BI environment
2. Practice the main data transformation features in Power BI Query Editor
3. Practice the main data visualization features in Power BI

The learning material will be uploaded to the platform prior to the class.

SESSION 12 (LIVE IN-PERSON)

Data viz Workshop 2

Hands-on advanced data visualization bootcamp using power BI. The objective of this practical session is to provide students with the most advanced skills in Microsoft PowerBI. At the end of this lesson participants should be able to use Microsoft Power BI to monitor and analyze data across any organization.

Learning objective

1. Hands-on training to training to develop dashboard with Power BI
2. Advanced Power BI Features to deploy and automatize professional dashboards with Power BI

The learning material will be uploaded to the platform prior to the class.

SESSION 13 (LIVE IN-PERSON)

Data viz Workshop 3

Hands-on advanced data visualization focused on Geographic Information systems. Merging data sets in Power BI and developing maps. Connecting Power BI to Kobo via API

Learning objective

1. Getting familiar with GIS concepts and the different type of geographic data
2. Practice data transformation with greographic files and learning how to produce maps.
3. Learning how to connect Power BI to external data sources via API

The learning material will be uploaded to the platform prior to the class.

SESSION 14 (LIVE IN-PERSON)

The Analysis workflow

Define the analysis flow and present all the different types of analysis: descriptive, explanatory, intepretative, anticipatory, and prescriptive analysis. Study the basics of reporting rules in order to make sure analytical statements are expressed accurately. Explore and study analytical biases and how to mitigate them.

Learning objective

1. Study the analysis flow and learn how to differentiate between all the different types of

analysis.

2. Learn how to produce accurate and efficient analytical outputs that are adapted to the need of the organization.
 3. Understand the nature of analytical biases and how to mitigate them.
- The learning material will be uploaded to the platform prior to the class.

SESSION 15 (LIVE IN-PERSON)

Intro to AI, ML and LLMs

Provide an overview of the theoretical principles underlying machine learning and artificial intelligence and to elaborate on concrete example and applications.

Learning objective

1. Understand the main concepts and definitions of AI
 2. Understand the other industries and components AI relies upon (hardware, algorithms and web applications)
 3. Learn about LLMs, its uses, risks and threats for social and government landscapes.
- The learning material will be uploaded to the platform prior to the class.

SESSION 16 (LIVE IN-PERSON)

Machine learning Workshop 1

Hands-on workshop focused on building a machine learning model to automate the analysis of large amounts of data

Learning objective

1. Understand how machine learning can be used to automate the processing and analysis of data.
2. Implement a machine learning model using ChatGPT.
3. Using the model to provide a concrete analytical output.

SESSIONS 17 - 18 (LIVE IN-PERSON)

Bootcamp 1 (Hackathon style) *Double session with session 18*

Bootcamp is a session where we present a problem to the students and they do all by themselves from A to Z. We are there to support them but we do not show how to do because they have already seen it. The bootcamp is also an opportunity to refine and practice what has been seen in class and in the workgroup assignment, but with a different use case, and maybe also in groups that are different from those of the assignment?

Learning objective

1. Apply everything seen in class in group in a new use case with limited guidance.
- The learning material will be uploaded to the platform prior to the class.

SESSION 19 (LIVE IN-PERSON)

Final exam and group presentations

Session dedicated for the individual final graded exam and group presentations.
The learning material will be uploaded to the platform prior to the class.

SESSION 20 (LIVE IN-PERSON)

Group presentations and debate

Session focused on the group presentations and debate involving all the concepts learnt during the course.

The learning material will be uploaded to the platform prior to the class.

EVALUATION CRITERIA

criteria	percentage	Learning Objectives	Comments
Final Exam	30 %		There will be an intermediate test (10% of course grade)
Individual work	20 %		
Group Work	40 %		
Class Participation	10 %		

FAILING GRADE AND REASSESSMENT

When students receive a Fail in a course, they have the opportunity to 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. For the purpose of 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.

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.