Have you ever wondered the whole amount of Terabytes of data that are generated per hour? Nowadays all the companies are starting to take decisions and to define the future strategies basing on data. All of them are creating Advance Analytics departments and composing data units to manage the huge amount of data.

In this course we will explain the basics in order to extract conclusions and to take decisions based on data. We will learn how we can analyze data and create all kind of visualizations using some of the most demanded programming languages currently.

This is a course for beginners! Students joining this course should not have any previous coding experience as the course is designed for students learning how to code for the first time.

In this course you will learn programming terminology and will obtain a solid grasp of the basic mechanics of programming. This includes:

- Introduction to problem solving for programming (i.e., "how to think about solving the problem" including techniques such as pseudo-code or flowcharts)
- Understand programming languages and its importance in writing business software applications
- You will be able to write fully functional console or R programs
- Basics of data science tasks and visualization in R
OBJECTIVES AND SKILLS

METHODOLOGY

The course is mainly a practical hands-on course. During the sessions we will mix theoretical lecturing with practical assignments. The course is designed for you to always have a laptop with you in class so you can code directly the exercises during the sessions. Approximately 50% of the time in the sessions we will have class discussions and theoretical lecturing together with small exercises to be completed during the session.

Additionally you will have individual coding assignments that will help you reflect on what you have learned in class.

Finally you will develop a group project in order for you to familiarize yourself with the concept of group programming. Since most of the real life software projects are implemented by a group of programmers, it is good for you to be familiar with organizing work and interacting with other coders.

The last grade component will be your final exam during the last session

<table>
<thead>
<tr>
<th>Teaching methodology</th>
<th>Weighting</th>
<th>Estimated time a student should dedicate to prepare for and participate in</th>
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<tr>
<td>Lectures</td>
<td>6.67 %</td>
<td>5 hours</td>
</tr>
<tr>
<td>Discussions</td>
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<td>Exercises</td>
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<td>Group work</td>
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<tr>
<td>Other individual studying</td>
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<tr>
<td>TOTAL</td>
<td>100.0 %</td>
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PROGRAM

SESSION 1
Course introduction and overview of the computer programming environment
In this session we will review the course logistics and organization together with the computer programming environment (IDEs, R, RStudio, etc...)

SESSION 2
Data types & variables
In these sessions we will learn how to store information in our program using variables and what are the different data-types for variables in R.

SESSION 3
Flow control statements, logic, scope and constants
In these sessions we will expand the functionality we can code with iterations, logic and flow control with if/else structures.

SESSIONS 4 - 5
Lists and DataFrames
In these sessions we will learn how to store multiple items in lists and dataFrames in R

SESSIONS 6 - 7
Reading and Writing Files
In these sessions we will learn how to use files to store information on the long term memory

SESSIONS 8 - 10
EDA: Exploratory Data Analysis
In these sessions we will learn the basics for a descriptive analysis in order to extract conclusions and to take decisions based on data

SESSIONS 11 - 12
Data Visualization
In these sessions we will learn how to develop data visualizations with some visualization packages such as Ggplot2 finding hidden patterns in our data

SESSIONS 13 - 14
Introduction to Tableau

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In these sessions we will learn how to solve problems with numerical analysis and graphs using Tableau

SESSION 15
Final exam
BIBLIOGRAPHY
Mandatory textbooks:

There is no mandatory reading for the course because we will review step by step the mechanics and concepts of programming in class but it would be helpful to have a R language reference book to ease you in your programming assignments.

There are many introductory books on R programming but we recommend:

RECOMMENDED
Title: R for Data Science
Author: Hadley Wickham & Garrett Grolemund
Publisher / Edition / Year: O’Reilly/ 2017
ISBN / ISSN:

EVALUATION CRITERIA

<table>
<thead>
<tr>
<th>Criteria</th>
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<th>Comments</th>
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<tbody>
<tr>
<td>Final Exam</td>
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<tr>
<td>Workgroups</td>
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<tr>
<td>Class Participation</td>
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PROFESSOR BIO

Professor: PABLO MONFORT VINUESA
E-mail: pmonfort@faculty.ie.edu

Pablo is a Senior Data Scientist, who has worked for McKinsey for 3 years after obtaining his PhD in Mathematics. In 2017 he founded his own company focused on Advance Analytics.

He is a specialist in mathematical modeling, clustering, machine learning and data mining. He has been supporting several major client engagements by developing predictive models and data analysis. Pablo worked at the National Institute of Statistics (INE) as well.

Examples of his work include:
- Implementation of 4G telephony for a company leading Asian telecommunications.
- Clustering client base card of a major European bank.
- Prediction model for churned clients in Latin America telephone company.
- Sales analysis of a prominent Spanish textile company by segmenting its costume base and launch a product recommendation engine.

BIBLIOGRAPHY
CODE OF CONDUCT IN CLASS

1. **Be on time**: Students arriving more than 5 minutes late will be marked as “Absent”. Only students that notify in advance in writing that they will be late for a specific session may be granted an exception (at the discretion of the professor).

2. **If applicable, bring your name card and strictly follow the seating chart**. It helps faculty members and fellow students learn your names.

3. **Do not leave the room during the lecture**: Students are not allowed to leave the room during lectures. If a student leaves the room during lectures, he/she will not be allowed to re-enter and, therefore, will be marked as “Absent”.

4. **Do not engage in side conversation**. As a sign of respect toward the person presenting the lecture (the teacher as well as fellow students), side conversations are not allowed. If you have a question, raise your hand and ask it. If you do not want to ask it during the lecture, feel free to approach your teacher after class.

   If a student is disrupting the flow of the lecture, he/she will be asked to leave the classroom and, consequently, will be marked as “Absent”.

5. **Use your laptop for course-related purposes only**. The use of laptops during lectures must be authorized by the professor. The use of Social Media or accessing any type of content not related to the lecture is penalized. The student will be asked to leave the room and, consequently, will be marked as “Absent”.

6. **No cellular phones**: IE University implements a “Phone-free Classroom” policy and, therefore, the use of phones, tablets, etc. is forbidden inside the classroom. Failing to abide by this rule entails expulsion from the room and will be counted as one absence.

7. **Escalation policy: 1/3/5**. Items 4, 5, and 6 above entail expulsion from the classroom and the consequent marking of the student as “Absent.” IE University implements an “escalation policy”: The first time a student is asked to leave the room for disciplinary reasons (as per items 4, 5, and 6 above), the student will incur one absence, the second time it will count as three absences, and from the third time onward, any expulsion from the classroom due to disciplinary issues will entail 5 absences.