INTRODUCTION TO PROGRAMMING

IE University
Professor: **LUIS VIVANCO DE MÁRIA Y CAMPOS**
E-mail: lvivanco@faculty.ie.edu

Academic year: 22-23
Degree course: FIRST
Semester: 2º
Category: COMPULSORY
Number of credits: 3.0
Language: English

PREREQUISITES

- A computer capable of running the latest version of Windows 10 or macOS Catalina (it must be fully up to date before coming to class). Computers that are out-of-date will not be acceptable.
- iPads and mobile devices are not sufficient to be able to take this course.
- Enough disk space to be able to install the software for the class (PyCharm and Python). For more information, see https://www.jetbrains.com/help/pycharm/installation-guide.html.

SUBJECT DESCRIPTION

Have you ever wondered how a computer works? Or how to develop the software your new start-up company needs?

Computers are one of the most configurable machines we humans have invented since the dawn of time yet most of its users are constrained to uses designed by others (third party software). In this course you will learn how to code computer programs that will allow you to expand your computer's functionality up to its full potential.

Knowing how to code is not something reserved for engineers or experts, everyone can write their own programs and if you combine your acquired business knowledge with the ability to write great software programs you could unleash a new set of opportunities for your career and boost your performance as an entrepreneur. If you are interested in knowing how to code software programs this course is for you.

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

OBJECTIVES AND SKILLS

The main objectives that the student will get are the following ones:

- Develop a logical thinking by carrying out programs.
- Be able to solve real problems through the use of programming languages.
- Get strong capabilities in programming with Python.

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 object-oriented programming and its importance in writing business software applications.
- You will be able to write fully functional console or GUI python programs.
- Basics of data science tasks in Python.

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 we have learned in class.

Finally you will develop a group project in order for you to familiarize with the concept of group programming as most of the real life software projects are implemented by a group of programmers so 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.

Teaching methodology	**Weighting**	**Estimated time a student should dedicate to prepare for and participate in**
Lectures	21.33 %	16 hours
Discussions	10.67 %	8 hours
Exercises	46.67 %	35 hours
Group work	10.67 %	8 hours
Other individual studying	10.67 %	8 hours
TOTAL	100.0 %	75 hours

PROGRAM

SESSION 1 (LIVE IN-PERSON)

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, compilers, etc…)

SESSION 2 (LIVE IN-PERSON)

Data types & variables

In this session we will learn how to store information in our programs using variables and what are the different data-types for variables in Python. We will program our first “Hello World” program in the Python language.

SESSION 3 (LIVE IN-PERSON)

Writing Programs

In this session, we will learn the process for planning and coding software

SESSION 4 (LIVE IN-PERSON)

Definite Loops and the Math library

In this session we will learn how to store information in our programs using variables and what are the different data-types for variables in Python. We will program our first “Hello World” program in the Python language.

SESSION 5 (LIVE IN-PERSON)

Decision Structures Part 1

In this session we will expand the functionality we can code with iterations, logic and flow control with if/else structures.

SESSION 6 (LIVE IN-PERSON)

Decision Structures Part 2

In this session we will expand the functionality we can code with iterations, logic and flow control with if/else structures.

SESSION 7 (LIVE IN-PERSON)

Indefinite Loops

In this session we will expand the functionality we can code with iterations, logic and flow control with indefinite loops.

SESSION 8 (LIVE IN-PERSON)

Boolean Algebra

In this session we will expand the functionality we can code with the boolean datatype and Boolean algebra.

SESSION 9 (LIVE IN-PERSON)

Functions, arguments and return types

In this session we will start encapsulating our code in methods that enable us to reuse the code preventing duplication and errors in large projects

SESSION 10 (LIVE IN-PERSON)

Lists and Strings

In this session we will learn how to store multiple items in lists in Python and process text (strings).

SESSION 11 (LIVE IN-PERSON)

Reading and Writing Files

In this session we will learn how to use files to store information on the long term memory

SESSION 12 (LIVE IN-PERSON)

GUI programming

In this session we will use the graphic library form PYTHON to develop our first simple GUI based program.

SESSION 13 (LIVE IN-PERSON)

GUI programming

In this session we will use the graphic library form PYTHON to develop our first simple GUI based program.

SESSION 14 (LIVE IN-PERSON)

GUI programming

In this session we will use the graphic library form PYTHON to develop our first simple GUI based program.

SESSION 15 (LIVE IN-PERSON)

Review: Lists, Functions and Files

SESSION 16 (LIVE IN-PERSON)

Pandas

In these sessions we will learn the basics of the Pandas library as this library is the core of the data science stack in Python

SESSION 17 (LIVE IN-PERSON)

Pandas

In these sessions we will learn the basics of the Pandas library as this library is the core of the data science stack in Python

SESSION 18 (LIVE IN-PERSON)

Matplotlib

In this session we will learn how to develop data visualizations

SESSION 19 (LIVE IN-PERSON)

Matplotlib

In this session we will learn how to develop data visualizations

SESSION 20 (LIVE IN-PERSON)

Final Exam

BIBLIOGRAPHY

Recommended

- John Zelle. (2016). *Python Programming: An introduction to computer Science.* 3rd. Franklin, Beedle & Associates inc.. ISBN 9781590282755 (Digital)

EVALUATION CRITERIA

1. Class participation – discussion

You are expected to attend every class and participate in the discussions and class activities (games, etc.). The basic criteria in grading your participation are: a) your presence in each session, b) your (quality) contributions to the group discussion c) submission of in-class activities. Lively discussions in the classroom are always encouraged, however, make sure that you provide constructive comments which contribute to the learning experience of the whole class.

2. Group assignment

A major part of this course's learning experience consists of a group project which will be focusing on designing and implementing an algorithmic solution to a business problem. The definition of the problem as well as the main requirements will be provided to you during the sessions, so that you have only to focus on designing and implementing the best solution. Remember, creativity is always rewarded!

3. Final exam

At the end of the course you will have to pass an individual exam. A minimum of 3.5 out of 10 on the final exam will be required to pass the course.This means that those students who obtain a grade lower than 3.5 in the final exam and their total final grade is higher than 5 out of 10, will still fail the course.

Criteria	**Percentage**	**Comments**
Class Participation	10 %	
Group Project	30 %	
Final Exam	40 %	
Intermediate Tests	20 %	

RE-SIT / RE-TAKE POLICY

Each student has four (4) chances to pass any given course distributed over two (2) consecutive academic years. Each academic year consists of two calls: one (1) ordinary call (during the semester when the course is taking place); and one (1) extraordinary call (or "re-sit") in June/July.

Students who do not comply with the 70% attendance requirement in each subject during the semester will automatically fail both calls (ordinary and extraordinary) for that Academic Year and have to re-take the course (i.e., re-enroll) during the next Academic Year.

The Extraordinary Call Evaluation criteria will be subject to the following rules:

- Students failing the course in the ordinary call (during the semester) will have to re-sit evaluation for the course in June / July (except those students who do not comply with the attendance rule, and therefore will not have that opportunity, since they will fail both calls and must directly re-enroll in the course during the next Academic Year).
- It is not permitted to change the format nor the date of the extraordinary call exams or deadlines under any circumstance. All extraordinary call evaluation dates will be announced in advance and must be taken into consideration before planning the summer (e.g. internships, trips, holidays, etc.)
- The June/July re-sit will consist of a comprehensive evaluation of the course. Your final grade for the course will depend on the performance in this exam or evaluation only. I.e., continuous evaluation over the semester (e.g. participation, quizzes, projects and/or other grade

components over the semester) will not be taken into consideration on the extraordinary call. Students will have to achieve the minimum passing grade of 5 and the maximum grade will be capped at 8.0 (out of 10.0) – i.e., “notable” in the extraordinary call.

- Re-takers: Students who failed the subject on a previous Academic Year and are now re-enrolled as re-takers in a course will need to check the syllabus of the assigned professor, as well as contact the professor individually, regarding the specific evaluation criteria for them as re-takers in the course during that semester (ordinary call of that Academic Year). The maximum grade that may be obtained as a retaker during the ordinary call (i.e., the 3rd call) is 10.0 (out of 10.0).

After exams and other assessments are graded by the professor (on either the ordinary or extraordinary call), students will have a possibility to attend a review session (whether it be a final exam, a final project, or the final overall grade in a given course). Please be available to attend the session in order to clarify any concerns you might have regarding your grade. Your professor will inform you about the time and place of the review session.

- Students failing more than 18 ECTS credits after the June/July re-sits will be asked to leave the Program. Please, make sure to prepare yourself well for the exams in order to pass your failed subjects.
- In case you decide to skip the opportunity to re-sit for an exam or evaluation during the June/July extraordinary call, you will need to enroll in that course again for the next Academic Year as a re-taker, and pay the corresponding tuition fees. As you know, students have a total of four (4) allowed calls to pass a given subject or course, in order to remain in the program.

PROFESSOR BIO

Professor: **LUIS VIVANCO DE MÁRIA Y CAMPOS**

E-mail: lvivanco@faculty.ie.edu

LUIS VIVANCO DE MÁRIA Y CAMPOS

Luis Vivanco is an Adjunct Professor of Operations and Supply Chain Management and of Decision Making at IE Business School.

He started his career as a SCM Engineer in 1989 after receiving a BSc in Industrial and Systems Engineering at Tec de Monterrey in Mexico and an MSc in Information Management from the University of Lancaster in the UK. In his role he was the in-site representative for a US range control manufacturer with their largest customer in Mexico, an alliance between GE Appliances and Mexico's MABE, dealing with logistics, production planning and quality issues.

In 1993 he did a Master in Business Administration at the International Institute for Management Development (IMD) in Switzerland. Following his MBA he worked in several strategy and business development roles with service MNCs. In parallel, since 1996, he has collaborated in research and consulting projects in SCM with companies like LEGO, Unilever, Harley-Davidson or Philips, writing cases on the subject, including one on Numico that deserved the Best Case recognition in the SCM category in the EFMD Case Writing Competition. He was also a participant in the Value Chain 2020 Forum organized by IMD with the sponsoring of companies like Nestle, Philips, GSK, Shell, LEGO or Grundfos, among other. The Forum looked at the value chain challenges facing companies over the next decade. He is the co-author of “The Value Chain Shift”, which was published as the result of this forum.

Academic Background

- Master in Business Administration, IMD International, Switzerland.

- MSc in Information Management, Lancaster University, UK.
- BSc in Industrial Engineering, Tecnológico de Monterrey, Mexico.
- Strategic Negotiations Program, Harvard Business School, USA.

Academic Experience

Since 1996, Research Associate (external), IMD International. Over 15 written cases on Value Chain Management, Strategy and Change Management. Co-Author of “The Value Chain Shift” with focus on managing resource scarcity and on corporate social responsibility through the value chain.

Corporate Experience

- Consultant on Strategic development, decision making processes and value chain management. Clients include The LEGO Group, Unilever, Sigma Alimentos (owner of Campofrio) and MABE Appliances.
- Director of Strategy and International Business at British Telecom. SCM Specialist at GE Appliances.

OTHER INFORMATION

OFFICE HOURS - CONTACT INFORMATION

Office hours: Live tutorials available by previous appointment.

Contact details: e-mail: lvivanco@faculty.ie.edu