COMPUTER PROGRAMMING II

IE University
Professor: **JUAN JOSE MANJARIN COLON**
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Academic year: 23-24
Degree course: SECOND
Semester: 2º
Category: COMPULSORY
Number of credits: 3.0
Language: English

PREREQUISITES

Knowledge of “programming thinking” will be a help, but not a must.

SUBJECT DESCRIPTION

Python is a general-purpose language that is becoming more and more important for companies and researchers around the world. In this course we will explore the main properties of the language from its base library and then see how use external modules that are important to expand its capabilities to deal with new data structures and methods needed in the analysis of data.

OBJECTIVES AND SKILLS

In this course you will learn the basic tools of one the most relevant programming languages of today, used in many different business areas. This includes

- Understanding the base Python programming
- Understanding Functional Programming and how its versatility can be used to build your own applications
- How to control your codes by tracing errors
- Understand the basics Python modules
- Create custom classes and objects

METHODOLOGY

Since the only way to learn to code is coding, all the sessions will be a mixture of explanations and direct applications of the concepts in problems that will allow the student to gain confidence with the tools and methods of Python. The first units deal with the basic Python and then we will see how to load and use external modules. Each new problem we face will incorporate previous knowledge and we will go building over the previous units and so the problems will also face new situations.

Once the Anaconda environment is installed and set up, the student will be responsible of maintaining it clean and usable. All needed libraries will be installed and used during the applications and examples made during the lectures so that any new concept can be immediately coded and studied.

Readings of the recommended books in advance will allow you to get the most out of each lecture. When reading the textbook portions prior to each lecture, you must look at the examples, but you do not need to solve them. Those readings may also raise doubts that can be solved during the lectures.

Participation and involvement are important. This includes the solution of the different exercises that will be proposed along the lectures.

Teaching methodology	Weighting	Estimated time a student should dedicate to prepare for and participate in
Lectures	20.0 %	15 hours
Discussions	13.33 %	10 hours
Exercises	13.33 %	10 hours
Group work	26.67 %	20 hours
Other individual studying	26.67 %	20 hours
TOTAL	100.0 %	75 hours

PROGRAM

UNIT I: INTRODUCTION

SESSION 1 (FACE TO FACE)

- About the course
- Syllabus objectives
- Setting up the environment: Jupyter and Spyder in Anaconda
- An introduction to Python: PurposeOrganization of a Python programBasic SyntaxStatements and OperatorsAssigning Values;

UNIT II: TYPES OF DATA

SESSION 2 (VIDEOCONFERENCE)

- Numbers;
- Strings;
- for-loop and if-statement

SESSION 3 (FACE TO FACE)

- Lists
- Tuples

SESSION 4 (NON-CLASS LEARNING)

Lists and Tuples: Exercises

SESSION 5 (FACE TO FACE)

- Dictionaries
- Sets

SESSION 6 (NON-CLASS LEARNING)

Dictionaries and Sets: Exercises

UNIT III: FUNCTIONS AND FUNCTIONAL PROGRAMMING

SESSION 7 (FACE TO FACE)

- Functions in Python;
- Custom Functions;
- Arguments;

SESSION 8 (NON-CLASS LEARNING)

Basics of Functions: Exercises

SESSION 9 (VIDEOCONFERENCE)

Midterm Exam

SESSION 10 (FACE TO FACE)

- Control Statement: if-else-if (elif) statementsbreak-continueOther control statements

SESSION 11 (FACE TO FACE)

- Loops:
  for-loopwhile-loop

SESSION 12 (NON-CLASS LEARNING)

Decision and Control Statements: Exercises

SESSION 13 (FACE TO FACE)

- Global and Local Variables;
- Lambda Functions;

SESSION 14 (NON-CLASS LEARNING)

Advanced Functions: Exercises

UNIT III: INTRODUCTION TO THE OBJECT ORIENTED PROGRAMMING

SESSION 15 (VIDEOCONFERENCE)

- Classes in Python Modules in PythonDefinition of a classthe *self* reference

SESSION 16 (FACE TO FACE)

- Object Oriented Programming: Organizing a Python programThe main() function

SESSION 17 (NON-CLASS LEARNING)

Object Oriented Programming: Exercises

SESSION 18 (VIDEOCONFERENCE)

Final Case Exam

BIBLIOGRAPHY

Compulsory

- John Zelle. (2017). *Python Programming: An Introduction to Computer Science.* 3rd. Franklin, Beedle. ISBN 9781590282755 (Printed)

- David Diez, Mine Çetinkaya-Rundel, Christopher Barr. (2019). *Openintro Statistics.* 4th. OpenIntro, Inc. ISBN 1943450072 (Electronic)
Free pdf available at https://www.openintro.org/book/os/.
- Thomas Haslwanter. (2016). *An Introduction to Statistics with Python: With Applications in the Life Sciences.* 1st. Springer. ISBN 3319283154 (Electronic)

EVALUATION CRITERIA

EVALUATION

Asynchronous

The evaluation of the asynchronous sessions will come from different sources

- Forum Participation: Under some threads of the course forum, you will have the opportunity to add content: ideas or questions related to a topic proposed by the professor. Consider that the quality and relevance of the posts is the most important part of this evaluation. However, a minimum of 2 posts is required to receive a grade in this part
- Videos visualizations: Some of the videos will contain interactive questions which will have to be done individually.
- Online Quizzes: randomized individual questions for each student, regarding the topics of the session, either from the lectures or from the videos (in case these last were not interactive).

The total weight for the final grade from these activities is the 30%. An will be computed as the average of all the previous aforementioned contributions.

Midterm Exam

The midterm exam accounts for the 35% of the final grade. It will be completed alone and will consist on a Multiple Choice part (30% of the grade) and then a few questions based on the ideas seen up to that point (70% of the grade).

Note that the date of this exam cannot be changed under any circumstance: it will be on the session number 9, as established in this syllabus. Consider this before making any plans that may affect your attendance.

Criteria	**Percentage**	**Comments**
Class Participation	10 %	
Midterm Exam	25 %	
Final Case Exam	35 %	
Asynchronous	30 %	

Final Case Exam

The Final Exam, which accounts for the 25% of the grade, will be completed alone. Each student will receive a case and will have to code the optimum Python solution for it. The exam must be submitted to the campus online within the session time.

In this case the student will have to write both, the codes designed to perform the analysis and the explanations. The evaluation of this report is divided in two: 30% the explanations and 70% the codes, all considering the following criteria

Criteria	Weights
Program Design (25%)	- 25% if the solution well thought out - 15% if the solution is partially planned out - 5% if the program is “designed at the keyboard”
Program Execution (20%)	- 20% if the program runs correctly - 10% if the program produces correct output some of the times - 5% if the program runs but mostly incorrectly - 0% if the program does not run at all
Specification Satisfaction (25%)	- 25% if the program satisfies the specifications completely and correctly - 12% if parts of the specifications are not implemented - 5% if the program does not satisfy the specifications
Coding Style (20%)	- 20% for well-formatted, understandable code - 12% for code hard to follow in one reading - 5% for incomprehensible code
Comments (10%)	- 10% for concise, meaningful, well-formatted comments - 5% for partial, poorly written or poorly formatted comments - 2% for wordy, unnecessary, incorrect, or badly formatted comments - 0% if no comments at all
Extra Credit (10%)	- 4% for programs that usefully extend the requirements - 3% for programs that use a particularly good algorithm - 3% for programs that are written or use the capabilities of the language particularly well

Class Participation

Class participation will be evaluated based on the following criteria:

Quality (not quantity) of your participation in class discussion: The most important dimension of participation concerns what it is that you are saying. A high-quality comment reveals depth of insight, rigorous use of case evidence, consistency of argument, and realism. Frequency refers to the attainment of a threshold quantity of contributions that is sufficient for making a reliable assessment of comment quality.

The logic is simple: if contributions are too few, one cannot reliably assess the quality of your remarks. However, once threshold quantity has been achieved, simply increasing the number of times you talk does not automatically improve your evaluation. Beyond the threshold, it is the quality of your comments that must improve. In particular, one must be especially careful that in claiming more than a fair share of “airtime”, quality is not sacrificed for quantity. Finally, your attempts at participation should not be such that the instructor has to “go looking for you”. You should be attempting to get into the debate on a regular basis.

You might want to avoid being classified as one of the following types of students:

- Repeaters, i.e., students that, consciously or unconsciously, make comments that are just repeats/rephrasing of what has already been said (by other students, or you). This wastes time and adds nothing to learning.
- Ramblers, i.e., students that take a lot of time to say simple things or they may tell long personal/professional stories, or they roam into topics that are not relevant, or simply make low-quality comments just to participate. They waste valuable time and prevent other students from being able to participate.
- Students that have been distracted (by Facebook, etc.) or who have stopped paying attention and then, later, when they realized they have missed a term or concept, they ask you about it.

RETAKE POLICY

Any student whose weighted final grade is below 5 will be required to sit for the retake exam to pass the course (except those not complying with the attendance rules, whom are banned from this possibility).

Grading for retakes will be subject to the following rules:

- The retakes will consist of a comprehensive exam. The grade will depend only on the performance on this exam; continuous evaluation over the semester will not be taken into account.
- The exam will be designed bearing in mind that the passing grade is 5 and the maximum grade that can be attained is 8 out of 10.
- Dates and location of the retakes will be posted in advance and will not be changed.

PROFESSOR BIO

Professor: **JUAN JOSE MANJARIN COLON**

E-mail: jjmanjarin@faculty.ie.edu

Short Bio

Prof. Juanjo Manjarín received the highest grade for his Ph.D. in Theoretical Physics in String Theory and M-Theory from the Universdad Autónoma de Madrid (UAM), after earning an Advanced Studies Diploma (DEA) in Theoretical Physics from the Universdad Autónoma de Madrid (UAM).

His teaching experience includes different international universities where he lectured on Complex Variable Analysis, Theoretical Mechanics or Classical Electrodynamics. In the IE University he has been teaching Mathematics, Statistics, Econometrics, R and Python Programming and Social Media Analytics, receiving two awards for Excellence in Teaching in Mathematics II and Statistics. He is also proffesor of Math and Stats in R and Python at the Bootcamp for Data Science in the IE Exponential Learning. He has published a number of papers on international journals on mathematics and theoretical physics and was reviewer for Mathematical Reviews from 2003 to 2005 and during 2016 he also worked in El Pais in the realization of some divulgative science materials.

He has also corporate experience on different TV and cinema production companies: Gestmusic Endemol, 7 y Acción S.L., Hill Valley S.L., 100 Balas S.L. or Zebra Producciones in TV shows such as “El Hormiguero” or “Esto es vida!”, receiving prize Ondas and Rose d'Or in 2008 and 2009. He has worked as director, producer and post-producer of different short films and now as director of E8 Producciones is recording a documentary film on gender equality

OTHER INFORMATION

OFFICE HOURS; CONTACT INFORMATION

Office hours: Right after the designated classes (upon appointment)

Contact details:

E-mail: jjmanjarin@faculty.ie.edu

GENERAL OBSERVATIONS

Each student has four attempts over two consecutive academic years to pass this course. Dates and location of the final exam will be posted in advance and will not be changed. Students must attend at least 70% of the sessions. Students who do not comply with the 70% attendance rule will receive a 0.0 on their first and second attempts and go directly to the third one (they will need to enroll in this course again the following academic year). Students who are in the third or fourth attempt should contact the professor during the first two weeks of the course.

ATTENDANCE

Attendance is mandatory at IE University, as it is an essential factor of IE´s learning methodology. While we do closely monitor attendance in each course, we also consider our students responsible for their own agenda and commitments, as adult university students. With that in mind, each student may miss up to 30% of the sessions within a given course and still maintain the possibility of passing that given course. This 30% “buffer” is to be used for any absences, such as: illnesses, personal emergencies, commitments, official/governmental matters, business and/or medical appointments, family situations, etc. Students should manage their various needs, and situations that may arise, within that 30% buffer. If a student is absent to more than the allowed 30% of the sessions (regardless of the reason), s/he will obtain a 0.0 grade for that course in both the ordinary and extraordinary calls of the current academic year, and s/he will have to retake the course during the following academic year. Having established the rule, we strongly discourage to use this buffer as granted, we highly recommend to attend 100% of the classes as it will improve your learning outcomes, it will increase the class performance and it might improve your participation grade.

Extreme cases involving emergencies such as: extended hospitalizations, accidents, serious illnesses and other contexts involving force majeure, are to be consulted with the Program Management team for assessment of the situation and corresponding documentation, so that Program Management can support and guide each student optimally.

PLAGIARISM / ACADEMIC HONESTY

Plagiarism is the dishonest act of presenting another person’s ideas, texts or words as your own. This includes in order of seriousness of the offense:

- providing faulty sources;
- copy-pasting material from your own past assignments (self-plagiarism) without the instructor's permission;
- copy-pasting material from external sources even while citing them;
- using verbatim translations from sources in other languages without citing them;
- copy-pasting material from external sources without citing them;
- and buying or commissioning essays from other parties.

IEU students must contact the professor if they don't know whether the use of a document constitutes plagiarism. The professor will advise the student on how to present said material. All written assignments have to be submitted through Turnitin, which produces a similarity report and detects cases of plagiarism. Professors are required to check each student's academic work in order to guarantee its originality. If the originality of the academic work is not clear, the professor will contact the student in order to clarify any doubts. In the event that the meeting with the student fails to clarify the originality of the academic work, the professor will inform the Director of the Bachelor Program about the case, who will then decide whether to bring the case forward to the Academic Ethics Committee. Very high similarity scores will be automatically flagged and forwarded to the Academic Ethics Committee. Plagiarism constitutes a very serious offense and may carry penalties ranging from getting a zero for the assignment to expulsion from the university depending on the severity of the case and the number of times the student has committed plagiarism in the past.

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”.
   Only students that notify that they have a special reason to leave the session early will be granted an exception (at the discretion of the professor).
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. It 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.