Course Code: MED2056

Course Name: Medical Data Analysis with Python

SYLLABUS[1]

Instructor

Office : Bahçeşehir University, School of Medicine, B block, -1st floor
E-Mail : huseyin.tunc@bau.edu.tr
Office Hours: : Monday at 14:00-17:00
CV (link) :

Course Information

Period : Spring
Time : Friday at 13:30 – 15:30
Course Credit / ECTS : 3/4
Classroom : MS Teams
Mode of Delivery: : Synchronous
Course type : Elective
Course ECTS Page Link :

Prerequisite (If Available)

Basic knowledge of statistics and mathematics is required to better understand the topics discussed during the course. You do not need to have any programming background.

Course Objectives

The aim of this course is to teach the use of Python programming language to analyze the medical data and to construct predictive models. Common uses of data analysis in health sciences will be explained and practical examples with real data will be studied. Python is one of the most powerful programming languages today and the first parts of the course are based on teaching basic programming logic through this language. Many useful libraries in the Python program will be introduced and how they can be used in health sciences will be taught.

Course Learning Outcomes

At the end of the course, you will be able to:

1. Understands basic programming principles;
2. Use Python program;
3. Perform data analysis in health sciences;
4. Predict the factors affecting any disease with the data;
5. Construct regression and classification models.

[1] 1 It is essential that the syllabus announced at the beginning of the term is not changed except when necessary. When a requirement occurs, the syllabus can be changed by the instructor of the course by notifying this situation in writing or verbally beforehand. It is students' responsibility to follow the current syllabus.

Contribution of the Course to the Program

This course contributes to the medical school program by teaching the fundamentals of data analysis and inferential modeling in medicine.

Course Structure

The lectures of the course will be held online. Students will be able to attend from the virtual classroom and are expected to follow the course online on the scheduled time.

Course Policies

Communication Channels and Methods:

Students are expected to check e-mail on a frequent and regular basis in order to stay current with university-related communications, recognizing that certain communications may be time-critical. You can choose to communicate with me via e-mail (above given e-mail address) or using Itslearning system to send messages. While writing your e-mail, be conscious of your language, i.e. do not use chat language and spell-check your e-mails.

Usage of Digital Tools:

Mobile Technologies: Mobile technologies such as mobile phones, tablet computers, laptop computers can only be used for teaching purposes. Please respect the lecturer and your friends by turning off the volume or turning off your mobile phone.

Cell Phone: Your cell phones should be muted or turned off before class and not be tampered with during the class. There may be some important situations in our lives (health, family, personal) in such cases, please turn your phone to vibration and if you really need to talk, leave the class and talk outside and come back to the lesson.

Assignments and Project Deadline:

Students are required to page though the book chapter of specific topic before lectures.

Students are expected to develop a project on real medical data with Python modules, which will be explained in depth throughout the course, and report it in a scientific format.

- It will be given as a project work to be delivered over the MS Teams system.
- You can contact me about the project content.
- If you are unable to submit your assignment on time, contact me to report your situation.
- The deadline for your homework will be stated during the lectures and will also be announced via course communication protocol.
- Submission of the assignments should be on time, before the deadline. Late submission will cause a reduction in your grade by 10% (per day).

Attendance:

Students are expected to actively participate to 70 % of the online lectures. Attendance and participation will be taken at every lecture. If you are going to be absent from a course, please inform me that you will not be attending the lesson by e-mail or using another communication method.

Disabled Student Support:

You can contact me directly regarding the issues that may be an obstacle for you (vision, hearing, etc.). In addition to this, there is a Disabled Student Unit in order to minimize the difficulties that our disabled students will encounter due to their disabilities and to eliminate the obstacles. You should contact this unit regarding your situation. Click to access the web page of this unit.

Oral and Written Communication Ethics:

You are expected to express yourself respectfully in your communication with your friends and with me. In addition, you are responsible for maintaining this respect in discussions, homework and correspondence on the online platform.

Privacy and Copyright:

In accordance with the Personal Data Protection Law, the courses will be recorded on the online platform within the scope of your approval and knowledge. In addition, it is strictly forbidden to register the participants (students and instructors) during the course.

Course ReBooks

Book 1: H. Bhasin, Python Basics, A Self-Teaching Introduction, 2019
Book 2: James R. Parker, Python : An Introduction to Programming, 2016
Book 3: Alberto Boschetti, Luca Massaron, Python Data Science Essentials - Second Edition, 2016

Other course materials such as lecture notes and additional reading material will be uploaded to MS Teams course group. If you cannot access any material, please contact me.

Grading and Evaluation

The following grading system will be applied for this course.

Assignment	Description	Scoring	Weight (%)
* **Midterm**	You will have a midterm exam where you are responsible for the topics of the first 7 weeks (Week1-Week7) of the course.	100	30
* **Active Participation in Class**	Your active participation and contributions in class will affect your end-of-year score.	100	10
***Project**	You will prepare a project with a final report on the topics discussed during the course.	100	30
* **Final Exam**	You will have a final exam where you are responsible for all the topics throughout the course	100	30
TOTAL		100	100

Course Calendar

Week/Place	Course Topic	To Do	Assignments & Deadline*
W1 ON	Introduction to Python Programming Language	• Discussion of the Syllabus • Python installation and introduction • Variables, operators and data types • String expressions	Book 1 Chapter 1
W2 ON	List - Tuple - Dict Structures	• List structures and functions • Tuple data types • Disct data types • Set data types	Book 1 Chapter 2 Book 2 Chapter 3
W3 ON	Conditional Expressions (If -Elif-Else Structure)	• Conditional expressions • Nested conditional statements • Logical operators	Book 1 Chapter 3
W4 ON	Loops (For-While Structure)	• For loops • Nested for loops • While loops • Nested while loops	Book 1 Chapter 4 Book 2 Chapter 2
W5 ON	Functions	• Function structure • Loops and conditional expression in functions • Recursive functions	Book 1 Chapter 5 Book 2 Chapter 4
W6 ON	Class Structure: Object Oriented Programming	• Class structures • Class attributes • Class functions • Basic object-oriented programming	Book 1 Chapter 9 Book 2 Chapter 6
W7 ON	Numpy Module	• Introduction to numpy • Numpy functions • Slicing and indexing	Book 3 Chapter 2
W8 ON	Pandas Module	• Introduction to Pandas • Reading excel, csv, txt files • Data preprocessing • Data writing	Book 3 Chapter 2
W9 ON	Matplotlib and Seaborn Modules	• Data visualization with Matplotlib • Data visualization with Seaborn	Book 3 Chapter 6

W10 ON	Medical Data Analysis 1	• Medical data preprocessing • Descriptive statistics: Reading data • Data analysis • Data visualization • Finding outliers	
W11 ON	Medical Data Analysis 2	• Medical data preprocessing • Descriptive statistics: Reading data • Data analysis • Data visualization • Finding outliers	
W12 ON	Medical Modeling: Regression	• Introduction to the Scikitlearn module • Basic regression models • Inferential models • Model evaluation metrics	Book 3 Chapter 4
W13 ON	Medical Modeling: Classification	• Basic classification models • Disease prediction • Classification performance metrics	Book 3 Chapter 4
W14 ON	Student Project Presentations	• Project Presentations	

Matters Needing Attention

- Make sure you read all weekly course materials and look through the chapters that will be discussed in the lecture before class to have an idea about the topic.
- Attend the classes actively every week and/or watch the recordings of lectures.
- Participate positively in classroom activities and discussions.

I hope you enjoy the topics and lectures. All the best wishes!

Academic Integrity, Cheating and Plagiarism

Hexham (2005) defines plagiarism as a planned deliberate action to deceive the reader by pretending to be someone's word or words. Academic plagiarism is also in the form of an author's use of more than four words in his own research, without using quotation marks from a written Book, without a precise reference to the original Book published before, or in the form of similar fraudulent behavior in scholarship-application forms he wrote to contribute to his research. defines.

• Actions that can be defined as contrary to publication ethics in the scientific community are defined as follows;

- plagiarism, - cheating, - paraphrasing,

- fabrication and falsification of data,
-to help copying and plagiarism, -To prevent others from accessing a Book or data,
- Appearing as a writer in joint studies without contributing,
-Use of widely known / anonymous information, -No regular attribution,
-Self plagiarism etc.
• Not everything on the Internet is public and cannot be obtained without permission or reference.
• Studies conducted without proper reference are graded with a score of zero.
• Large amounts of manuscripts copied without being quoted will be considered plagiarism and you will be responsible.
• Please be aware that the penalties for plagiarism can range from grading homework to dropping you out of class.
• If you copied, plagiarized or copied / pasted, do not expect the instructor of the course to write you a reference letter or to be your advisor.
• ***How is plagiarism penalized?***
If it is revealed that you have overcame the course, the instructor of the course will refer to the program coordinator. Depending on the seriousness of the situation, the Program Coordinator decides with the committee the appropriate penalty from giving a grade of 0 from the homework grade to leaving the course. In any case, the student has the right to defend himself.

ARTICLE 25 – (1) *In case it is doubled that a student cheats or attempts to cheat, commits plagiarism or similar violations defined in the applicable disciplinary regulation in any exam, assignment or other assessment activities, a disciplinary proceeding is brought against the student. Such activity is not assessed during the proceedings. A student who is found guilty is assigned zero point in addition to the disciplinary punishment. If the student is found innocent as a result of disciplinary proceeding, the exam taken by the student shall be assessment or a make-up exam or activity is provided.*
You can access Bahçeşehir University and Higher Education Institution Regulations by clicking this sentence.

Hüseyin Tunç
08.03.2023