Computer Education and Instructional Technology,
Faculty of Education

CEIT 720 Learning Analytics in Education

COURSE INSTRUCTOR:

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COURSE DESCRIPTION:

About Content

Learning analytics has been a very popular topic in the last years with the increasing availability of large educational data. Using proper data analytics techniques, meaningful inferences can be obtained from student behavior, which then inform decision-taking mechanism for better teaching and learning. There is an increasing need for data scientists in the job market worldwide.

This course is designed to teach the fundamentals of learning analytics by focusing on the applied data science methods for education. At the end of this course, students will be able to apply data analytics for deriving actionable insights from learner and learning data. Students will be able (1) to take the role of a data scientist to initiate and implement a data analytics project independently and (2) to write up the results to communicate main findings with the target audience. This course will make you a strong candidate for related jobs in the market.

Python will be used as the programming language, which is the most preferred language for data science. This course will not teach Python although some fundamentals will be covered in the second class. Therefore, prior programming experience in Python is strongly recommended.

Throughout this course *Google Colab* will be used as the development tool. No installation is required in your computer. It is a cloud service offered by Google.

Instructional Method

The lectures will be held face-to-face, preferably in a lab environment. While PowerPoint slides will be used to introduce and explain the concepts, most of the class time will involve writing Python code to illustrate the application of the topics in practice. Many hands-on coding will take place to enable the immediate application of the concepts in practice. The instructor will provide a detailed explanation of all covered topics and written codes and guide students to help them complete small programming tasks together with the whole class.

Labs will be implemented in an integrated way with the lectures during class time. As part of lab activities, students will work on a separate, rather comprehensive programming task while asking for help from peers and the instructor. The instructor will act as a facilitator and actively coach students during their coding efforts. Students will be responsible for submitting the completed activity codes by the given deadline. The labs will further enable students to put into practice what they have learned and sharpen their practical skills.

For this course, students are required to complete a learning analytics project. They will work with a provided learning dataset to investigate a specific research question. The final output will be a short academic paper that details your methodology and findings. Additionally, students will present the project during a brief session at the end of the semester. This is a chance to apply the concepts we've covered and contribute to the understanding of learning processes through data analysis.

Online discussions will be the main way for students to ask questions if they face difficulty while working on the programming exercises and assignments. Students are also highly recommended to respond to their peers' questions. Slack will be used to conduct online discussions. You can download it from this URL: https://slack.com/intl/en-tr/downloads/windows

COURSE OBJECTIVES

By the end of the course, students will be able to:

1. Understand the fundamentals of Python programming.
2. Use Jupyter notebooks for data analysis.
3. Work with Python's built-in data structures.
4. Perform data manipulation using NumPy and Pandas.
5. Load, clean, and process data from various sources.
6. Apply control flow with loops and conditional statements.
7. Perform data wrangling and reshaping tasks.
8. Aggregate and summarize data for analysis.
9. Create effective data visualizations.
10. Analyze and work with time series data.

WEEKLY PLAN

Per week, students will be assigned a scholarly work to read and discuss online asynchronously.

Week 1- Overview of the course
Week 2- Notebook and Python Language Basics.
Week 3- Built-in Data Structures in Python.
Week 4- NumPy Basics: Arrays and Vectorized Computation.
Week 5- Getting Started with Pandas.
Week 6- Data Loading, Storage, and File Formats.
Week 7- Loops, arrays, and lists.
Week 8- Data Wrangling: Join, Combine, and Reshape.
Week 9- Data Aggregation and Group Operations.
Week 10- Data Analysis Practice: Case #1
Week 11- Plotting and Visualization.
Week 12- Time Series.
Week 13 - Data Analysis Practice: Case #2
Week 14 – Visualization with Tableau

TEXTBOOK AND OTHER RESOURCES

McKinney, M. (2017). Python for Data Analysis, O'Reilly. ISBN 9781491957660.

George, N. (2021). Practical Data Science with Python, Packt Publishing. ISBN 978-1-80107-197-0.

** Scholarly readings will be shared weekly.*

GRADING

Evaluation and Grading	Points
Attendance	10
Discussions	15
Lab assignments	30
Project (a short paper)	45
Total	**100**

Grading method will be catalogue.

Letter Grade	Coefficient	Score intervals
AA	4,00	90-l00
BA	3,50	85-89
BB	3,00	80-84
CB	2,50	75-79
CC	2,00	70-74
DC	1,50	65-69
DD	1,00	60-64
FD	0,50	50-59
FF	0,00	0-49

CLASS POLICIES:

Academic Honesty - All academic work must meet the standards contained in Academic Integrity Guide. Students are responsible for informing themselves about those standards before performing any academic work.

Class Attendance

You should attend all classes regularly to benefit from the course at the maximum level. Attendance will be taken in each class. If you cannot attend the class due to some important reasons, then inform me certainly before the class via e-mail. Do not forget to compensate for notes, assignments, or tasks. If you are ill, report it to me officially.

Late Submission of Assignments

Lab assignments can be submitted till 23:59 on the lab day with a penalty of 30%.

Late submissions for the final project are allowed within 2 days after the deadline. Your score will be penalized at a rate of 15% per each passing day. After 2 days, submissions are NOT accepted.

Academic Honesty

The METU Honour Code is as follows: "Every member of METU community adopts the following honour code as one of the core principles of academic life and strives to develop an academic environment where continuous adherence to this code is promoted. The members of the METU community are reliable, responsible and honourable people who embrace only the success and recognition they deserve, and act with integrity in their use, evaluation and presentation of facts, data and documents."