MIDDLE EAST TECHNICAL UNIVERSITY Fall 2019
DEPARTMENT OF BUSINESS ADMINISTRATION

BA 4318 – BUSINESS DATA PROCESSING WITH PYTHON
Course Schedule (Wednesday 08:45 – 11:30, TradeMaster Lounge – Computer Lab)

Instructor:	Bora GÜNGÖREN
Office:	FEAS Building B
Phone:	+90 533 5462073
E-mail:	borag@metu.edu.tr
Office Hours:	By appointment
Course Web Page:	ODTUClass Course Page will be used extensively

Course Description:

Modern business people need to know when and how to be analytical about business problems. This involves being able to identify problems and the information necessary to solve them. This course mainly teaches how to process business data, and also covers important subjects such as how to identify data sources, sharing data, and how to modify a business' data work flow so that data becomes usable.

Course Student Learning Objectives: (CSLOs)

Upon successful completion of this course, students should be able to:

Course Specific Skills:

1. Identify types of business data and understand the types of data processing
2. Analyze and classify a data processing problem
3. Develop simple Python programs to manipulate and process data to assist business decision making problems
4. Learn modern tools and formats to share and process business data sets

Discipline Specific Skills:

5. Develop a data-intensive decision making problem from a given business problem definition
6. Understand the data quality requirements to make business decisions

Personal and Key Skills:

7. Analytical and problem solving skills
8. Written communication

Learning and Teaching Methods:

The course will be applied, and all sessions will be conducted in a computer lab equipped with necessary software. Each week students will be programming for a specific problem in the lab.
As for assessment there will be occasional individual programming assignments, two lab tests and one team project. The team project will be counting towards a final exam so there will be no final exam.

Required Reading:

Ceder, N. 2018. "The Quick Python Book. 3rd Ed." Manning. (Also available as DRM-free e-book).
A number of journal papers will be distributed in some weeks.

Suggested Reading:

Ceder, N. 2018. "Exploring Data with Python." Manning. (Free e-book).
Pilgrim, M. 2009. "Dive into Python 3." Apress. (Free e-book with CC-license)
Björgvinsson, T. 2017. "The Art of Data Usability." Manning. (Also available as DRM-free e-book)
Cielen, D, et a. 2016. "Introducing Data Science." Manning. (Also available as DRM-free e-book)

Assessment and Grading:				
Form of Assessment	% Contribution	Size of the assessment	CSLOs covered by the assessment	Feedback Method
Lab work	10	Short 20-40 minute task in the lab	1,2,3,5,7	Written and oral (in class)
Homework assignments	20	Requiring 2-4 hours of individual study for each assignment	All	Written and oral (in class)
Test 1	20	60-90 minute applied exam in the lab	1,2,3,4,5,7	Written and oral (in class)
Test 2	20	60-90 minute applied exam in the lab	1,2,3,4,5,7	Written and oral (in class)
Team Project	30	Requiring 10-20 hours individual study and	All	Written and oral (in class and in project meetings by appointment)

Course Policies:

Student Disabilities: Any student, who, because of a disabling condition, may require special arrangements in order to meet course requirements, should contact the instructor as soon as possible. Students should present the appropriate documentation from the university's Disability Support Office (Engelsiz ODTÜ Birimi, ODTÜ Kütüphanesi, Solmaz İzdemir Salonu, Tel: 210.7196; engelsiz@metu.edu.tr) verifying their disability, and outlining the special arrangements required. Please note that no accommodations will be provided to the disabled students prior to the completion of this approved University process.

Academic Dishonesty: The Department of Business Administration has no tolerance for acts of academic dishonesty. Such acts damage the reputation of METU, the department and the BA/MBA/MS degree and demean the honest efforts of the majority of the students. The minimum penalty for an act of academic dishonesty will be a zero for that assignment or exam.

Cheating: All university, faculty/institute, and department principles on academic honesty will be strictly enforced. The usual consequence for academic dishonesty is failure of the course and referral of the case to the Dean of the Faculty/Institute for additional disciplinary action. Examinations are individual and are to be completed without outside assistance of any sort. Persons observed cheating during examinations will receive a failing grade in the course. Homework assignments are individual, unless otherwise specified by the instructor, and are to be completed without outside assistance of any sort, as well. Persons observed cheating in their homework assignments will receive a score of zero for the portion of the semester grade that is allocated to such assignments.

Plagiarism: The instructor assumes that students will do their own work. By placing their names on assignments (individual or team), students are affirming that the contents are their original work. Any previous work available from files or past students, as well as materials available on the internet may be used only as a suggestive model. Violation of this provision will be considered as unethical behavior,

subject to disciplinary action. If you have any doubt about the use of a specific material, see the instructor ahead of time. Any material used from outside sources should be referenced appropriately.

Course Requirements. The students will be are expected to come to class prepared by reviewing last week's content. This course builds up quickly on past weeks, so following behind will negatively impact student learning in class.

Attendance is mandatory in this class. Past experience repeatedly demonstrated that students who regularly attend programming classes perform significantly better than students who have an intermittent attendance.

Use of Github: All students will open a free account on Github. This is mandatory because the submission of homeworks will be through Github only. Github also allows communication and collaboration, so team projects will be also conducted through Github. The site shows who has committed to which parts in code, therefore contribution to team projects will be made more visible throughout the semester. For example if you pull an all-nighter, and publish half of the code in your project, it will be noticed.

Team Project: Teams of 3 to 5 students will be formed to define and solve a business data problem. You can access and use datasets from all sorts of online sources. What qualifies as a business data problem will be discussed in class and project proposals will be submitted accordingly.

Sample Projects: There will be two sample projects similar to the larger, in-depth cases covered in other courses. These projects will both teach the tools of the trade and using Python to process data, and at the same time demonstrate the process of designing a business data processing application.

Semester Plan

The following table gives the tentative schedule for the semester. The lectures will stress the most important and/or most difficult material. Appendices are required only if they are assigned. The students are required to read the chapters and appendices before they are covered in class.

Note: Because of conferences during the semester, your instructor may not be able to attend some weeks so makeups might be organized in Saturdays. Such makeups will be announced.

Month	Day	Topic	Reading/ Assignment
Sep	25	**Introduction to course.** • Data intensive problems in business, and the structure of a data project. Examples of problems about descriptive statistics and problems that require further processing. • Discussing the toolset for data sharing and processing. • Using Github site for sharing datasets. • Sites with sample datasets. **Discussing the business data problem.**	
Oct	2	**Python Step 1** • Indentation and block structuring, • Variables, assignments, expressions, • String and numbers, • Operators, • The None value, • Getting input from the command line	
	9	**Python Step 2** • Tuples and Lists • Strings and dictionaries, • Control flow, • Functions	Teams should be formed
	16	**Python Step 3** • Modules and Scoping, • Accessing the file system, • Accessing files, • Processing structured files • Using Pandas to access columnar data files	
	23	**Python Step 4 – Data Sets and Preprocessing** • Types of Business Data • Where to get data sets • Problems with data quality • Preprocessing concepts • Basic techniques to prepare data (dropping, imputation, etc)	Project proposals due
	30	**Python Step 5 – Plotting Data** • Types of plots and where to use them • Introduction to Matplotlib library • Typical data set related problems in plot generation	
Nov	6	**TEST 1 (Class Hours)**	
	13	**Sample Project 1 – Time Series Forecasting for OM** • Understanding the business problem, • Review of forecasting concepts (point vs interval estimation, defining error, signal to noise ratio, trend and seasonality, correlation and causality within the data set, stationarity, use of transformations, etc) • Using Pandas data frames to prepare your data set • Using basic techniques like moving average smoothing • Seasonal decompositions, • Simple exponential smoothing, • Holt and Holt-Winter smoothing,	

		• Testing stationarity • Discussion of ARIMA models	
	20	**Python Step 6 – Networks and Databases** • Simple data communications over the network. • Using Pandas to access online data sets • Accessing Databases in Python • Converting database content to Pandas dataframes	
	27	**Sample Project 2 – Anomaly Detection for Credit Card Fraud** • Classes of anomalies. • Outliers vs Novelties. • Density based anomaly detection using K-Nearest Neighbor (KNN) and Local Outlier Factor (LOF). • Clustering based anomaly detection using K-Means. • Exploring the Credit Card Fraud Detection dataset from Kaggle. • Discussing actual fraud detection conditions.	
Dec	4	**Sample Project 3 – Business Rules** • The concept of a rule engine • Discovering Rules - Association Rule Mining, Concpets such as Support, Confidence, Lift, Affinity, Leverage • Association Rule Mining Example in FMCG	
	11	**TEST 2 (Class hours)**	
	18	**Sample Project 4 – Recommenders** • Types of Recommender Systems: Collaborative vs Content Based Methods • Models, bias and variance • How to Evaluate Recommender Performance • Simple Python RecommendatIon System Engine: Surprise	
	25	**Data Quality and Data Usability** • Basic Definitions • Designing a Data Workflow to Feed Your Program High Quality Data Sets	Projects are due

METU HONOR CODE

Every member of METU community adopts thefollowing honor code as one of the core principles ofacademic life and strives to develop an academic environment where continuous adherence to this code ispromoted.

"The members of the METU community are reliable, responsible and honorable people whoembrace onlythe success and recognition they deserve, and act with integrity in their use, evaluation and presentationof facts, data and documents."

CIVILITY IN THE CLASSROOM: Students are expected to assist in maintaining a classroom environment whichis conducive to learning. In order to assure that all students have an opportunity to gain from time spent inclass, unless otherwise approved by the instructor, students are prohibited from using laptop computersand cellular phones, making offensive remarks, reading newspapers, sleeping, or engaging in any other form of distraction. Inappropriate behavior in classroom shall result, minimally, in a request to leave class.

Past observations showed that the METU classroom experience is improved when the following are true:

- Students arrive on time.Timely arrival ensures that classes are able to start and finish at the scheduledtimes. Timely arrival shows respect for both fellow students and faculty and it helps to create a betterlearning environment by reducing avoidable distractions.
- Students are fully prepared for each class.Much of the learning in this course takes place during classroomdiscussions. When students are not prepared, they cannot contribute to the learning process. This affectsnot onlythe individual but also the classmates who count on them.
- Students respect the views and opinions of their colleagues.Disagreement and debate are encouraged;however, intolerance for the views of others is unacceptable.
- Laptops, phones and wireless devices are turned off unless needed for class activities.

STUDENT EXCUSES: In case you cannot attend one of the examinations, if and only if you can present an official (dean's or president's office approved) excuse or METU Medical Center certified Health Report, you will be eligible to take a make-up examination. There will be one single, comprehensive and essay type make-up examination during the final period and it will be counted towards whichever exam(s) you are missing.

KNOW YOUR RIGHTS AND RESPONSIBILITIES: http://oidb.metu.edu.tr/en/academic-rules-and-regulations

NOTE THE IMPORTANT DATES ON THE ACADEMIC CALENDAR:
http://oidb.metu.edu.tr/en/academiccalendar

The instructor assumes that students who attend the next class have understood and accepted to agree with all the requirements and rules of this course.

Notes:

- Usage of cell phones is strictly prohibited during class. Please be courteous to your classmates and me and make sure that your phones are on silent mode before the class begins.
- Please arrive on time and do not enter the classroom if I already have closed the classroom doors. If you have to leave early, please inform your instructor in advance.
- Please turn in the homework assignments on time and note that no late assignments (no matter how late) will be accepted.
- Please make an appointment with me via e-mail. For quick questions that you may have, note that e-mailing is a very effective means of communicating with me.