BACHELOR OF ECONOMICS
THAMMASAT UNIVERSITY

Course Outline

EE200 Data Science for Economic Analysis

Semester 1/2023 (August 15 - December 4, 2023)

Lecture Time: Monday 09.00-12.00 hours

Lecture Venue: Room 201

Teaching Materials Platform: Google Classroom 5zqvfpm

Instructor:

Name: Asst.Prof. Dr.Monthien Satimanon

Office Hours: By appointment

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Phone: 02-613-2478

Number of Credit: 3 Credits (3-0-6)

Prerequisite: 2nd year student or above.

Course description Learning to work with data. Topics include (1) data sampling and cleaning (2) data storage and management (3) exploratory data analysis (4) prediction based on statistical tools such as regression, classification and clustering (5) communication of results through visualization and summary statistics. .Students learn through real--world examples using programs such as advanced MS Excel, Python or R..

Prerequisite: 2nd year student or above. *(have taken at least 34 credits)*

Course objective:

In this course, students will learn to conduct data analysis and project on their topic of interest. Since this course focuses on economic issues, your topic and group project should be related to either microeconomics or macroeconomics. What the course will do is to stimulate an active-learning environment. Unlike most of the other classes you have attended, there won't be that many lectures.

My role in this class will be a coach and conductor, rather than a lecturer. This course divides into two significant parts. In the first part, I hope to introduce you to essential elements of a proper idea about data and data science.

To do this, we will discuss how to come up with meaningful linkages between business, economics, and data. We will then discuss different components of standard data (your team paper). This part includes an introduction, literature review,

theoretical framework, data acquisition, data management, prediction, and visualization of findings. You will be assigned to read and practice data science projects as well as past seminar papers. The students will work on the suggested data and coding project.
In the second part, you will gradually take more roles in class. Each of you and your time will take a turn to present your topic, related literature, theoretical framework, methodology, and findings.

Other students will pay close attention to your presentation. They will then come up with constructive comments and suggestions to improve your data science project. Occasionally, we will turn the class into individual meetings and team meetings. The course is where you discuss specific questions regarding your data science project and data skill with me.

Expected Learning Outcomes

1. Morality and Ethics EE200

Applicability	Expected Learning Outcomes	Evaluation Method
~	1. Be honest	
š	2. Be fair	
š	3. Be responsible for oneself and society	
~	4. Be disciplined	
š	5. Value morality and a profession's ethical conducts	
š	6. Be service-mind	

2. Knowledge

Applicability	Expected Learning Outcomes	Evaluation Method
~	1. Understand principles and theories in the field of studies	
~	2. Be able to analyze the case systematically	
~	3. Be able to apply the learned knowledge appropriately	
š	4. Be able to integrate the learned knowledge appropriately	

3. Intellectual Development

Applicability	Expected Learning Outcomes	Evaluation Method
~	1. Be able to search for data / information systematically	
~	2. Be able to analyze the problem, assess the choices, and give an advice and result appropriately	
š	3. Be creative and have positive Thinking	

~	4. Be commit to self-development upon the real situation	

4. Interpersonal Skills and Responsibilities

Applicability	Expected Learning Outcomes	Evaluation Method
~	1. Be able to listen to others' opinion and be able to accept the differences	
~	2. Possess good leadership, and have the courage to do the right things	
~	3. Be responsible to the assigned works	
~	4. Possess interpersonal intelligence, have patience, and be able to adjust / control oneself and emotion	
š	5. Know one's right and duties and possess good citizenship awareness	

5. Quantitative Analysis, communication, and information technology

Applicability	Expected Learning Outcomes	Evaluation Method
~	1. Be able to communicate efficiently both in Thai and foreign languages.	
~	2. Be able to properly use and apply information technology efficiently	
~	3. Possess mathematical skills	
~	4. Possess mathematical and statistical analytical skill, including the gathering of information and presentation	

Remark: ~ Primary expected outcome š Secondary expected

Textbooks:

There is no textbook for this course. However, I will post some useful articles on Google Classroom. There is also a list of readings that will be in Google classroom.

Suggested readings by topics will be available after knowing you guys:
1. Data Science: business, computer, and statistics and mathematics Data Literacy, Fact, and Truth.
Talk to me.
Design Thinking: OKRs: Designing Your Life: The Book of Why: 3 Dimensions of Data Science, Statistics, and Econometrics. https://clevertap.com/blog/data-science/ https://www.vox.com/the-highlight/2019/5/14/18520783/harvard-economics-chetty
Data Science (MIT Press Essential Knowledge series) Data for the People: How to Make Our Post-Privacy Economy Work for You by Andreas Weigend Everybody Lies: Big Data, New Data, and What the Internet Can Tell Us About Who We Really Are by Seth Stephens-Davidowitz
https://datarockie.com/free-data-science-books/
Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy

https://www.businessinsider.com/netflix-facebook-cambridge-analytica-documentary-trailer- great-hack-2019-7

2. Data Sampling and Cleaning
https://towardsdatascience.com/sampling-techniques-a4e34111d808
http://siteresources.worldbank.org/INTPOVRES/Resources/477227-1142020443961/2311843- 1142870725726/2337154-1328041661816/8405489-1342716080957/12-StataforSampling2012(KristenHimelein).pdf
https://www.tableau.com/learn/whitepapers/data-prep-best-practices

3. Data Storage and Management
http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.661.538&rep=rep1&type=pdf
https://www.bmc.com/blogs/data-lake-vs-data-warehouse-vs-database-whats-the-difference/

4. Exploratory Data Analysis: Describe or Explain
- Tabulation
- Excel
- Pivot
- Power BI
- Stata®
- R
- Python Book of Why Causal Inference in Statistics Angrist, Joshua D., and Jörn-Steffen Pischke. Mastering 'Metrics: The Path from Cause to Effect.
Princeton: Princeton University Press, 2015.

5. Prediction
- Machine Learning basic form.
https://bruegel.org/2018/11/machine-learning-and-economics/
Criteria for prediction
- Is it about causation?
http://www.equality-of-opportunity.org/bigdatacourse_stanford/
Mullainathan, Sendhil, and Jan Spiess. 2017. "Machine Learning: An Applied Econometric Approach." Journal of Economic Perspectives 31 (2): 87-106.
Stock, James H. and Mark W. Watson. Introduction to Econometrics. 4th Edition. Boston: Pearson, 2018. Note: earlier editions and all international editions printed in English are acceptable.

6. Communication and Visualization
- Storytelling with data
- Show and Tell
- Draw to Win
- Dashboard White Paper from Tableau
- Ted Talk by Han Rosling
- Ted Talk by Simon Sinek
Other teaching materials: If there is any PowerPoint presentation, the file(s) will be on Google Classroom.

Evaluation:
1. Group Review of Literature AKA book review 10%
2. Group Presentations on software and coding comparison on Gartner 10%
3. Group presentations of project and coding requirement 10%
4. Group work on data visualization or dashboard: 20%
5. Group work on Python or R 10%
6. Final data science project and Communication 40%

Data Science Projects: A vital element of the course will be five small data projects, and final data science project, which will give students hands-on experience in working with data. We recommend and will support using the statistical software program like Stata® and Excel® for these projects, but students are welcome to use other applications (e.g., Power BI, R, Python, Tableau, RapidMiner, Alteryx), provided that their code and workflow are clear. The group projects are designed to be more substantial than traditional problem sets and will include significant coding, reading, and writing elements that will give students a sense of how data scientists work.

Collaboration Policy: Discussion and the exchange of ideas and works are essential to data science work. You and your teams are encouraged to consult and discuss with your classmates on the data projects and to share resources and codes. However, you should ensure that any work you submit for evaluation is the result of your work and that it reflects your integrity. You should also understand and practice the standard citation practices, and please cite any books, articles, websites, lectures, etc. that have helped you with your work. If you receive any help with your work (e.g., feedback on drafts, help with code, or programming), you must also acknowledge and give credit for this assistance.

Your final Data Science Project The project should be between a 20-25 pages long presentation, including graphs, tables, dashboards, and figures (excluding bibliography and appendices). The paper should be composed of 5 main parts: 1) introduction 2) literature review 3) theoretical framework and methodology, and 4) findings 5) conclusion. We will discuss each section in more detail in class.

Class	Topics
21 Aug	Introduction - Review of Course and Data Science Resource. Identification of your project and install your tools. Conduct Group Meetings to identify your topics, relevant literature, and Data Science Tool.
28 Aug	Introduction - Review of Course and Data Science Resource. Identification of your project and install your tools. Conduct Group Meetings to identify your topics, relevant literature, and Data Science Tool.
4 Sep	*Book Review presentation*
11 Sep	*Workshop on Excel*

18 Sep	*Group presentation of Dashboard.*
25 Sep	*Workshop on Tableau or Power BI*
— **Midterm Exam: Submission of Data Science Project Interim Report**	
9 Oct	*Workshop on Tableau or Power BI*
16 Oct	*Workshop - R or Python*
30 Oct	*Workshop - R or Python*
6 Nov	*Workshop - R or Python*
13 Nov	*Workshop - R or Python* Class Canceled_Makeup Date TBA
20 Nov	*Machine Learning on Python*
27 Nov	*Orange for Machine Learning or Holiday.*
4 Dec	*Orange for Machine Learning*
— **Final Project Presentation: TBA**	

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ACADEMIC CALENDAR & HOLIDAY
SEMESTER 1/2023

Semester 1/2023 (August 15 – December 4, 2023)	
the TU Office of the Registrar (TU REG) will process the registration (semester 1/2023) for all BE students who have completed the pre-registration via BE Portal.	July 17 – 20, 2023
Tuition Fee Payment Period (Via TU Greats App)	July 21 – August 11, 2023
Create Plan from Quota via TU Greats App (*ID.66)	August 1 - 9, 2023
Registration via TU Greats App (*ID.66)	August 10, 2023
Classes Begin	August 15, 2023
Add-drop period	August 15 – 28, 2023 *(from 9.00 AM of August 15 to 10.30 PM of August 28)*
Tuition Fee Payment Period (Via TU Greats App)	August 15 – 29, 2023 *(9 AM - 10.30 PM)*
Mid-term Examination Period	October 1 – 7, 2023
*H.M. King Bhumibol Adulyadej The Great Memorial Day**	*October 13, 2023*
*King Chulalongkorn's Day**	*October 23, 2023*
Withdrawal period with "W" on record	September 4 – October 22, 2023 *(from 9.00 AM of September 4 to 10.30 PM of October 22)*
Special Withdrawal with "w" on record	October 24 – November 20, 2023
Last day of class for Semester 1/2023	December 4, 2023
Final exam period	December 12 – 23, 2023
*H.M. King Bhumibol Adulyadej The Great's Birthday**	*December 5, 2023*
*Constitution Day**	*December 10, 2023*
*Substitution for Constitution Day**	*December 11, 2023*
Submitting Forms for Degree Conferral	August 15 – 28, 2023

Remark * Holiday, No classes during this period
Updated: July 24, 2023