

FACULTY OF ECONOMICS AND BUSINESS

# SYLLABUS ECEU601303 – Introduction to Data Science Odd Semester of 2022/2023

### A. General Information

Term	5
Credit Points (SKS)	2
Prerequisites	Mathematics for Economics & Business 1 Advanced Statistics Introduction to Econometrics
Classes	10 sessions - 150 minutes per session
Lecturers	Dr. Eng. Arie Wahyu Wijayanto (Reg A & B) Amanah Ramadiah, PhD. (Reg C & D) Rezzy Eko Caraka, PhD. (KKI)

## **B.** Learning Objective

After attending this course, students should gain an understanding of data science concepts and be capable of applying data science skills and interpret data science results. Students should be able to perform data science processing, such as data import, data analysis, data visualization, and data modelling using R programming language. Moreover, students should be able to perform critical and skillful thinking in choosing variations of data science methods, including (i) regression, (ii) forecasting, (iii) classification and (iv) cluster analysis to solve various problems associated with economics. Finally, this course also provides an introduction to advanced topics in data science such as neural networks and deep learning.

#### **C. Reading Materials**

- [1] James et al. (2021). An Introduction to Statistical Learning: With applications in R. 2nd ed. Springer.
- [2] Zumel, N. and Mount, J. (2020). Practical Data Science with R. 2nd ed. Manning Publications.
- [3] Ramasubramanian, K., & Singh, A. (2017). Machine learning using R (No. 1). New Delhi, India: Apress.
- [4] Wickham, H. and Grolemund, G. (2016). R for Data Science. O'Reilly Media, Inc.,
- [5] Shmueli, G. and Lichtendahl JR. (2016). Practical Time Series Forecasting with R. 2nd ed. Axelrod Schnall Publishers.

# D. Topics & Schedule

Sessio n	Week of	Topics	Reading(s)		
1	08/29	<ul> <li>Introduction to Data Science and Machine Learning</li> <li>Data science process &amp; required competencies</li> <li>Foundational concepts of statistics and machine learning</li> <li>Application of data science in economics (e.g., recent research and its development)</li> </ul>	[1] - 1 [2] - 1 [3] - 1		
2	09/05	Data Science with R Programming	[4] [3] - 4		
3	09/12	Regression and Forecasting in Data Science: <i>Regression analysis</i>	[1] - 3		
4	09/19	Regression and Forecasting in Data Science: <i>Time series analysis</i>	[5] - 4, 5, 6, 7		
5	09/26	<ul> <li>Classification in Data Science:</li> <li>Introduction to classification</li> <li>Logistic regression</li> <li>Evaluating models</li> <li>Dealing with imbalanced datasets</li> </ul>	[1] - 4 [3] - 7		
Mid-Term Exam (10/15 - 10/25)					
6	10/31	<ul> <li>Classification in Data Science:</li> <li>Naive Bayes</li> <li>Tree and forest</li> <li>Support vector machine</li> </ul>	[1] - 4.4, 8.1, 9.1 [3] - 6.6, 6.7, 6.8		
7	11/07	<ul> <li>Classification in Data Science:</li> <li>Exploring advanced classification methods</li> <li>Introduction to neural networks and deep learning</li> </ul>	[1] - 10.1, 10.2 [3] - 6.11		
8	11/14	Unsupervised Learning in Data Science: Cluster Analysis	[1] - 12.1, 12.4 [3] - 6.9		
	Final Project (11/21)				

9	11/28	Final Project Presentation			
10	12/05	Final Project Presentation			
Final-Term Exam (12/14 - 12/14)					

# E. Evaluation

No	Components	Weight (%)
1	Participation / PCL	10
2	Quiz(zes) / Assignment(s)	20
3	Mid-Term Evaluation	35
4	Final Project	35