

Data Analytics and Visualization

Course code	<i>FUN137</i>
Compulsory in the programmes	<i>...</i>
Level of studies	<i>Undergraduate</i>
Number of credits	<i>6 ECTS (48 in-class hours + 6 consultation hours + 2 exam hours, 104 individual work hours)</i>
Course coordinator (title and name)	<i>Assist. Prof. Dr. Simonas Čepėnas</i>
Prerequisites	<i>None</i>
Language of instruction	<i>English</i>

THE AIM OF THE COURSE:

The course aims to (1) familiarize students with the basics of data analytics, (2) concepts of data types, data gathering, wrangling, and cleaning, (3) linear regression and time-series modeling, and (4) R programming, which will be used to analyze and visualize data, models and forecasts. By the end of the course students will have empirical tools at their disposal to analyze real world problems.

MAPPING OF COURSE LEVEL LEARNING OUTCOMES (OBJECTIVES) WITH DEGREE LEVEL LEARNING OBJECTIVES (See Annex), ASSESMENT AND TEACHING METHODS

Course level learning outcomes (objectives)	Learning objectives for BSc in Business Management	Assessment methods	Teaching methods
CLO1. To understand the basic terminology and principles used in data analytics.	BLO1.1., BLO1.2.	Midterm, final exam, seminars	Lecture, Seminars
CLO2. To understand the basic concepts of data gathering, wrangling, and cleaning	BLO1.1., BLO1.2., BLO3.1.	Midterm, final exam, seminars, problem set	Lectures, Seminars
CLO3. Introduce students to key concepts of statistics.	BLO1.1., BLO1.2.	Midterm, final exam, seminars, problem set	Lectures, Seminars
CLO4. To understand the basics of linear regression.	BLO1.1., BLO1.2., BLO3.1.	Final exam, seminars, problem set	Lectures, Seminars
CLO5. To learn about forecasting using time-series data.	BLO1.1., BLO1.2., BLO3.1.	Final exam, seminars, problem set	Lectures, Seminars
CLO6. Visualize data, models, and forecasts.	BLO1.1., BLO1.2., BLO3.1., BLO3.2., BLO4.1.	Seminars, problem set, final exam.	Lectures, Seminars
CLO7. To learn about R programming and tools that make it more efficient, such as R Studio, and R	BLO1.2., BLO3.1.,	Seminars, problem set, final	Lectures, Seminars

Markdown.	BLO3.2.	exam	
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ACADEMIC HONESTY AND INTEGRITY

The ISM University of Management and Economics Code of Ethics, including cheating and plagiarism are fully applicable and will be strictly enforced in the course. Academic dishonesty, and cheating can and will lead to a report to the ISM Committee of Ethics.

COURSE OUTLINE

Topic	In-class hours	Readings
1. What is science? How social sciences differ from natural sciences?	4	Daniel E Lieberman, Upending the Expectations of Science ;
2. Introduction to R programming and main concepts: objects, vectors, lists, datasets	4	Grolemund, G., & Wickham, H [Ch. 2, 26]
3. Data and its characteristics: normality, population and sample, descriptive statistics	4	TBA
4. Datasets and R: gathering, wrangling, and cleaning of data	4	Grolemund, G., & Wickham, H [Ch. 4, 5, 6, 11]
5. Introduction to GGLOT and data visualization	4	Grolemund, G., & Wickham, H [Ch. 3]
6. Midterm examination	4	
7. Hypothesis testing: variance, correlation, t-test	4	TBA
8. Hypothesis testing in R: analysis and visualization	4	Grolemund, G., & Wickham, H [Ch. 22, 23, 24]
9. Introduction to regression analysis	4	TBA
10. Linear regression in R: analysis and visualization	4	Grolemund, G., & Wickham, H [Ch. 25]
11. Time series models and forecasting	4	TBA
12. Time series in R: analysis and visualization	4	TBA
	Total: 48 hours	
CONSULTATIONS	6	
FINAL EXAM	2	

FINAL GRADE COMPOSITION

Type of assignment	%
Individual assignments	100%
Attendance	10%
Problem Sets	20%
Midterm examination	35%
Final examination	35%
Group assignments	0%
Total:	100

DESCRIPTION AND GRADING CRITERIA OF EACH ASSIGNMENT

(Provide short descriptions and grading criteria of each assignment)

Attendance is extremely important for this class: we will study fundamental concepts and R programming, which means that even a single missed class will likely result in a significant knowledge gap. To incentivize your attendance, it makes up 10% of your grade.

Problem set will facilitate your learning of R programming and constitute 20% of your final grade. This will be a semester long homework assignment.

Midterm exam will consist of multiple-choice and modeling questions. It will comprise 35% of the final grade. The midterm will be based on topics 1-5.

During the final exam you will use R programming language to answer open-ended questions, clean the data, run statistical models, and visualize the results. It will make-up 35% of the final grade. The exam will be based on topics 6-12.

RETAKE POLICY

(Provide short description and percentage of the final grade)

In case of a negative final grade, students can sit for a retake exam. Such an exam will cover all course material. The weight of a retake is 70%. Grades from attendance and problem sets are not subject to a retake but their evaluation (if positive) will count towards the final grade with the retake exam.

ADDITIONAL REMARKS

The syllabus is subject to small changes. Specific chapters from the books are TBA. All readings will be available online on the course website.

READINGS

Grolemund, G., & Wickham, H. (2017). *R for Data Science*. O'Reilly Media.

ADDITIONAL READINGS

TBA

ANNEX

DEGREE LEVEL LEARNING OBJECTIVES

Learning objectives for the Bachelor of Business Management

Programmes:

*International Business and Communication,
Business Management and Marketing, Finance,
Industrial Technology Management*

Learning Goals	Learning Objectives
Students will be critical thinkers	BLO1.1. Students will be able to understand core concepts and methods in the business disciplines
	BLO1.2. Students will be able to conduct a contextual analysis to identify a problem associated with their discipline, to generate managerial options and propose viable solutions
Students will be socially responsible in their related discipline	BLO2.1. Students will be knowledgeable about ethics and social responsibility
Students will be technology agile	BLO3.1. Students will demonstrate proficiency in common business software packages
	BLO3.2. Students will be able to make decisions using appropriate IT tools
Students will be effective communicators	BLO4.1. Students will be able to communicate reasonably in different settings according to target audience tasks and situations
	BLO4.2. Students will be able to convey their ideas effectively through an oral presentation
	BLO4.3. Students will be able to convey their ideas effectively in a written paper

Learning objectives for the Bachelor of Social Science

Programmes:

*Economics and Data Analytics,
Economics and Politics*

Learning Goals	Learning Objectives
Students will be critical thinkers	ELO1.1. Students will be able to understand core concepts and methods in the key economics disciplines
	ELO1.2. Students will be able to identify underlying assumptions and logical consistency of causal statements
Students will have skills to employ economic thought for the common good	ELO2.1. Students will have a keen sense of ethical criteria for practical problem-solving
Students will be technology agile	ELO3.1. Students will demonstrate proficiency in common business software packages
	ELO3.2. Students will be able to make decisions using appropriate IT tools
Students will be effective communicators	ELO4.1. Students will be able to communicate reasonably in different settings according to target audience tasks and situations
	ELO4.2. Students will be able to convey their ideas effectively through an oral presentation
	ELO4.3. Students will be able to convey their ideas effectively in a written paper