

COMPUTER PROGRAMMING

Course code	<i>IT103</i>
Compulsory in the programmes	<i>Entrepreneurship and Innovation</i>
Level of studies	<i>Undergraduate</i>
Number of credits	<i>6 ECTS (48 in-class hours + 2 hours of examination, 112 individual work hours)</i>
Course coordinator (title and name)	<i>Kristina Aldošina</i>
Prerequisites	-
Language of instruction	<i>English</i>

THE AIM OF THE COURSE

This course introduces students to the fundamentals of programming using Python language. It is designed to develop computational thinking and problem-solving skills, with a focus on practical applications relevant to the social sciences. Students will learn how to write efficient algorithms and apply them to real-world scenarios.

To support hands-on learning, the course incorporates LEGO programmable robots as simplified models of manufacturing robots. These tools help illustrate core programming concepts in an accessible and engaging way. By the end of the course, students are expected to demonstrate their understanding through individual or group final projects.

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

Course level learning outcomes (objectives)	Learning objectives for BSc in Business Management	Assessment methods	Teaching methods
CLO1. To be able to process information and operate at multiple levels of abstraction.	BLO4.1. Students will be able to communicate reasonably in different settings according to target audience tasks and situations.	Tests, midterm, projects	Lectures, seminars, individual and group work
CLO2. To be able to decompose IT problems into parts and solve them efficiently.	BLO4.3. Students will be able to convey their ideas effectively in a written paper.	Tests, midterm, projects	Lectures, seminars, individual and group work
CLO3. To be able to demonstrate proficiency in a software development environment.	BLO3.2. Students will be able to make decisions using appropriate IT tools.	Tests, midterm, projects	Seminars, individual and group work
CLO4. To be able to assess the correctness, design, and style of code.	BLO3.2. Students will be able to make decisions using appropriate IT tools.	Tests, midterm, projects	Seminars, group work
CLO5. To be able to evaluate the project's complexity and estimate required resources.	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.	Projects	Group work

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. With regard to remote learning, ISM remind students that they are expected to adhere and maintain the same academic honesty and integrity that they would in a classroom setting.

COURSE OUTLINE

Topic	In-class hours	Readings
<i>Introduction to the course: course structure, requirements, assignments, LEGO programmable robots.</i> Python: introduction, variables. General information about programming languages, number systems, code conversion, algorithms. Primitive data structures: integers, floats, strings, booleans.	6	Lecture notes https://www.w3schools.com/python/default.asp (intro – operators)
<i>Test 1.</i> Python: collections. Non-primitive data structures and their properties: tuples, lists, dictionaries, sets.	6	Lecture notes https://www.w3schools.com/python/default.asp (lists – dictionaries)
<i>Test 2.</i> Python: loops. “If...”, “while...”, “for...” loops.	6	Lecture notes https://www.w3schools.com/python/default.asp (if, while, for)
<i>Test 3.</i> Python: functions. Built-in functions, defining and calling your own functions, lambda functions, error handling.	6	Lecture notes https://www.w3schools.com/python/default.asp (functions, lambda)
<i>Test 4.</i> Python: modules. Overview of modules, built-in modules, “import...”.	2	Lecture notes https://www.w3schools.com/python/python_modules.asp
MIDTERM ASSESSMENT	2	
LEGO Spike Prime 3 sets. Hub, sensors, motors. Programming environment, basic commands.	4	https://primelessons.org/en/PyLessons.html
Creative mini project 1: robot-artist. <i>Project showcase.</i>	2	
Creative mini project 2: delivery robot. <i>Project showcase.</i>	4	
Creative mini project 3: quality control robot. <i>Project showcase.</i>	4	
Final project. <i>Project showcase.</i>	6	
Total:	48	

FINAL GRADE COMPOSITION

Type of assignment	%
<i>Individual Components 60%</i>	
Test 1 (variables)	5
Test 2 (collections)	5
Test 3 (loops)	5
Test 4 (functions, errors)	5
Midterm assessment (variables, collections, loops, functions, errors, modules)	40
<i>Group Components 40%</i>	
Creative mini project 1	5

Creative mini project 2	10
Creative mini project 3	10
Final project	15
Total:	100

DESCRIPTION AND GRADING CRITERIA OF EACH ASSIGNMENT

The overall assessment of the course (total maximum of 100% is possible) will be composed of evaluations of multiple tasks which are described as follows:

1. **Tests** are 30 minutes long in-class written (on paper) closed-book individual assignments taken in the beginning of a lecture. Students will have to answer several multiple-choice and/or open questions. The number of questions and the proportion of different type questions may vary.
2. **Midterm assessment** is 90 minutes long in-class open-book individual examination. Students will have to solve one complex coding task. Detailed rules (how to complete, how to ensure academic honesty, where to upload, evaluation criteria, etc.) will be announced on e-learning.
3. **Creative mini projects** are group tasks, which will require a group of students to build and program LEGO robot, which must be able to perform the given task. During the project showcase each group will have to demonstrate how robots perform the given task. Detailed rules (division into groups, exact requirements, evaluation criteria, etc.) will be announced on e-learning.
4. **Final project** is group work, which will require a group of students to build and program LEGO robot, that solves one problem a group would like to solve. During the **defense** of the final project each group will have to: (a) explain motivation for building specific robot, (b) demonstrate robot's performance, and (c) orally answer lecturer's questions on the robot's code. Detailed rules (division into groups, tasks for robots, exact requirements, defense rules, evaluation criteria, etc.) will be announced on e-learning.

RETAKE POLICY

In case of a negative final evaluation, retake is possible. It will cover the same material as the midterm assessment and will comprise **60%** of the final grade. Marks earned for tests and midterm assessment will be annulled, and marks earned for mini projects and the final project will remain. Retake is 180 minutes long in-class open-book individual examination. Students will have to answer 20 test-like questions, and to solve one complex coding task. Detailed rules (how to complete, how to ensure academic honesty, where to upload, evaluation criteria, etc.) will be announced on e-learning.

COURSE SPECIFIC AI GUIDELINES

All course participants must comply with the ISM University of Management and Economics Artificial Intelligence Policy published on the e-learning platform.

Individual project:

Students may use AI tools to support their technical learning and project workflow. AI tools may be used to clarify Power BI, Power Query, data modelling, visualization, DAX, SQL, Python, and dashboard design concepts; troubleshoot errors; suggest data transformations; generate or improve DAX measures, calculated columns, Power Query steps, SQL queries, Python code, or other technical components; improve dashboard layout; and improve the clarity of labels, explanations, and presentation notes.

For the individual project, fully or partially AI-generated technical solutions are allowed, including code, formulas, queries, measures, or transformation steps. However, the final Power BI report remains the student's own responsibility. The student must understand the structure of the report, the data model, relationships, transformations, visuals, filters, measures, calculated columns, and every command, function, formula, or query used in the submitted work. AI-generated suggestions must be critically checked against the data, Microsoft documentation, course materials, and the student's own testing in Power BI.

Group project:

Students may use AI tools to brainstorm dashboard topics, identify possible data sources, discuss analytical questions, suggest report structure, generate technical solutions, improve visual design, troubleshoot DAX or Power Query issues, and prepare for the presentation and defense. Fully or partially AI-generated technical components are allowed.

However, the group is responsible for selecting valid data, verifying its credibility, preparing the report, interpreting results, and defending all analytical and technical decisions. Students must be able to explain the complete structure of the report and every AI-assisted or AI-generated element included in it. If students cannot explain the data model, transformations,

visuals, formulas, queries, or analytical conclusions, this may negatively affect the project evaluation. AI-generated information is not considered a reliable academic or data source and must not be cited as such. AI must not be used to fabricate data, sources, analysis, or conclusions. Any substantial use of AI tools must be acknowledged according to the ISM AI Policy and assignment instructions.

ADDITIONAL REMARKS

Precision of composite evaluations is left intact (up to 2 decimal places) until the end of semester and only the final evaluation will be subject to rounding.

REQUIRED READINGS

1. Lecture notes.
2. <https://www.w3schools.com>
3. <https://primelessons.org/en/PyLessons.html>

ADDITIONAL READINGS

1. Effective Python: 59 specific ways to write better Python, Brett Slatkin, 2015, ISBN 978-0-13-403428-7
2. Learning Python, Fifth edition, Mark Lutz, 2013, ISBN: 978-1-449-35573-9
3. Python Cookbook, Third Edition, David Beazley and Brian K. Jones, 2013, ISBN: 978-1-449-34037-7
4. Python Crash Course, Eric Matthes, 2016, ISBN-10: 1-59327-603-6

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, Entrepreneurship and Innovation*

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