

GAU, Faculty of Engineering

Course Unit Title	Python Programming	
Course Unit Code	CEN488	
Type of Course Unit	Technical elective for CEN	
Level of Course Unit	4th year BSc	
National Credits	3	
Number of ECTS Credits Allocated	6	
Theoretical (hour/week)	3	
Practice (hour/week)	0	
Laboratory (hour/week)	0	
Year of Study	4	
Semester when the course unit is delivered	8	
Mode of Delivery	Face to face, E-learning	
Language of Instruction	English	
Prerequisites		
Corequisites		
Recommended Optional Programme Components	Programming Languages	
Objectives of the Course:		
<ul style="list-style-type: none"> • This course aims to develop students' proficiency in Python programming by covering its core syntax, semantics, and programming constructs. • CEN488 introduces fundamental data structures and functions to support problem-solving and efficient program design. • This course seeks to enhance students' ability to use Python libraries, modules, and file-handling techniques for real-world applications. • Python programming course emphasizes object-oriented programming principles to enable students to design and implement scalable, maintainable software systems. 		
Learning Outcomes		
When this course has been completed the student should be able to		Assess.
1	Apply the basic syntax and semantics of the Python programming language to develop correct and efficient programs.	1,3,6
2	Utilize Python-specific data structuresâ including lists, dictionaries, tuples, and setsâ to solve computational problems effectively.	1,3,6
3	Design and implement reusable Python functions to support modular and structured programming practices.	1,3,6
4	Incorporate built-in modules, libraries, and regular expressions to extend Python functionality and perform file system operations.	1,3,6
5	Analyze and apply object-oriented programming (OOP) concepts in Python to develop scalable and maintainable software solutions.	1,3,6
Assessment Methods: 1. Written Exam, 2. Assignment, 3. Project/Report, 4. Presentation, 5. Lab Work		
Course's Contribution to Program		
		CL
1	Ability to understand and apply knowledge of mathematics, science, and engineering	2
2	Ability to design and conduct experiments as well as to analyze and interpret	2
3	Ability to work in multidisciplinary teams while exhibiting professional responsibility and ethical conduct	1
4	Ability to apply systems thinking in problem solving	3

5	Knowledge of contemporary issues while continuing to engage in lifelong learning	3
6	Ability to use the techniques, skills and modern engineering tools necessary for engineering practice	3
7	Ability to express their ideas and findings, in written and oral form	2
8	Ability to design and integrate systems, components or processes to meet desired needs within realistic constraints	2
9	Ability to approach engineering problems and effects of their possible solutions within a well structured, ethically responsible and professional manner	2
10	To apply fundamental concepts of software design, database design, data processing and artificial intelligence in the modeling, designing, implementing, testing and deploying software solutions	4
11	Ability to analyse and design hardware systems by applying the principles of embedded systems, microprocessors, computer networks, distributed systems and data communication	4

CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5: Very High)

Course Contents

Week	Chapter	Subject	Exams
1		Introduction to Python	
2		Python Basics	
3		Functions and Program Structure	
4		Built-in Data Structures	
5		Built-in Data Structures	
6		Object-Oriented Programming concepts	
7		Object-Oriented Programming in Python	
8			Midterm
9		Strings and File Handling	
10		Strings and File Handling	
11		Libraries for Engineering Applications: NumPy, SciPy, and matplotlib	
12		Libraries for Engineering Applications: NumPy, SciPy, and matplotlib	
13		Libraries for Engineering Applications: Pandas	
14		Libraries for Engineering Applications: Scikit-learn	
15			Final

Recommended Sources

- Introduction to Computation and Programming Using Python with Application to Computational Modelling and Understanding Data, MIT Press, 2021, 3rd Edition, John V. Guttag
- Python for Science and Engineering, Hans-Petter Halvorsen, 2020
- Introduction to Python for Science and Engineering, CRC Press, 2019, David J. Pine

Assessment

Midterm exam	30 %
Final exam	45 %
Assignments (elearning)	20 %
Attendance	5 %

ECTS Allocated Based on the Student Workload

Activities	Number	Duration (hour)	Total Workload (hour)
In-class lecture (including exam weeks)	15	3	45
Midterm exam	1	1.5	1.5
Midterm exam preparation	1	20	20

Final exam	1	1.5	1.5
Final exam preparation	1	20	20
Quiz	2	3	6
Assignment	5	4	20
Project/presentation/report writing	0	0	0
Lab and tutorial	10	1.5	15
Self-study	15	3	45
Total Workload			174.00
Total Workload / 30 (h)			5.80
ECTS Credit of the Course			6