2024

TP-153

Course Specification

(Bachelor)

Course Title: **Computer Programming for Science**	
Course Code: **CS 1248**	
Program: **Bachelor of Science in Actuarial and Financial Mathematics**	
Department: **Computer Science**	
College: **Computer Science**	
Institution: **Imam Mohammad Ibn Saud Islamic University**	
Version: **2024 – V1**	
Last Revision Date: **None**	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (4)					
3 (2 Lectures, 2 labs, 0 Tutorials)					
2. Course type					
A.	☐University	☒ College	☐Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 4 / Year 2)					

4. Course general Description:

The course introduces essential computer programming skills and knowledge that are required for students in the different fields of studies. Topics include algorithms and problem-solving strategies, control statements (sequence, selection, and repetition), fundamental data types, data structures, and introduction to object-oriented programming. The course uses Python programming language, which is the preferable choice for science and data analysis due to its huge collection of libraries and built-in data Visualization and analysis tools.

5. Pre-requirements for this course (if any)**:**

MAT 1244

6. Co-requisites for this course (if any)**:**

None

7. Course Main Objective(s):

The main purpose of this course is to provide key programming skills and techniques that enable students to design solutions to nontrivial problems and implement those solutions in Python programming language. The course aims to teach students how to write computer programs, debug and fix errors, use data Visualization and analysis tools in Python, and execute programs to solve problems.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning	0	0%
3	Hybrid • Traditional classroom • E-learning	0	0%
4	Distance learning	0	0%

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify)**	0
Total		**60**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Describe the uses of primitive and compound data types in programming languages	**K2**	Lectures Class Exercises Lab Tutorials	Direct: Written exams and assignments
1.2	Identify problem-solving strategies	**K2**	Lectures Class Exercises Lab Tutorials	Direct: Written exams and assignments
1.3	Recall the compile-time and run-time errors in programming languages	**K2**	Lectures Class Exercises Lab Tutorials	Direct: Written exams and assignments, and lab exams
2.0	**Skills**			
2.1	Develop, and test a program that implements an algorithm using the appropriate fundamental programming constructs	**S2**	Class Tutorials Lab Tutorials Lectures	Direct: Written and lab exams
2.2	Analyze the syntax errors to execute the program and achieve intended objectives	**S2**	Class Tutorials Lab Tutorials Lectures	Direct: Written and lab exams
2.3	Implement functions, object-oriented concepts, and python tools to solve particular problem	**S2**	Class Tutorials Lab Tutorials Lectures	Direct: Written and lab exams
3.0	**Values, autonomy, and responsibility**			
3.1	Debate effectively in a team to achieve computer programming tasks	**V1**	Tutorials Lectures Group assignments	Direct: Group Project and lab assignments

C. Course Content

No	List of Topics	Contact Hours
1.	**Algorithms & Problem Solving**	**5**
2.	**Data Types, Variables, Operators**	**5**

3	Conditional Control Structures	5
4	Iterative control Structures	5
5	Defining Functions	5
6	Strings, lists, list comprehensions	5
7	Recursion	5
8	Tuples, dictionaries, common python mistakes	5
9	Classes and Objects	5
10	Data Visualization in Python	5
11	Data Analysis Tools in Python	10
Total		60

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes/ Assignments	During the term	20%
2.	Lab Exams	Week 7	10%
3.	Midterm Exam	Week 10	20%
4.	Group Project	Week 14	10%
5.	Final Exam	Week 16	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Gowrishankar S, Veena A, 2018, “Introduction to Python Programming”, 1st Edition, CRC Press. ISBN-13: 978-0815394372
Supportive References	Jake VanderPlas, 2016, “Python Data Science Handbook: Essential Tools for Working with Data”, 1st Edition, O'Reilly Media. ISBN-13: 978-1491912058 Downey, Allen, Jeffrey Elkner, and Chris Meyers. How to Think Like a Computer Scientist: Learning with Python. Green Tea Press, 2002, ISBN: 9780971677500 Yves Hilpisch (2019) Python for Finance: Mastering Data-Driven Finance 2nd Edition.
Electronic Materials	A gentle introduction to programming using python (https://ocw.mit.edu/courses/electrical-engineering-and-

	computer-science/6-189-a-gentle-introduction-to-programming-using-python-january-iap-2011/) Blackboard Learning Management System
Other Learning Materials	None

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms (or conference video call for girls) with at least 35 seats and teaching board. Computer programming lab with at least 35 PC and required software (operating system, Python, Editors, ... etc).
Technology equipment (projector, smart board, software)	Projector, and smart boards
Other equipment (depending on the nature of the specialty)	**None**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	1. Students feedback (collected through surveys) as per university policy/procedure 2. Teacher's Course report
Effectiveness of Students assessment	Students Instructors	1.Faculty Members Survey 2. Students feedback (collected through surveys) as per university policy/procedure 3. Teacher's Course report
Quality of learning resources	Students	1. Students feedback (collected through surveys) as per university policy/procedure 2. Teacher's Course report
The extent to which CLOs have been achieved	Students Instructors Course Coordinator	1. Faculty Members Survey 2. Students feedback (collected through surveys) as per university policy/procedure 3. Teacher's Course report 4. Course Report
Other	**None**	

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	CS QUALITY COMMITTEE
REFERENCE NO.	
DATE	