

**THE CYPRUS INTERNATIONAL INSTITUTE OF MANAGEMENT**

**COURSE UNIT DESCRIPTION**

<b>Course Unit Title</b>	<b>Programming for Business Analytics</b>	
Course Unit Code	BI420	
Type of Unit	Core	
Level of Course Unit	Second cycle	
Year of Study	First/second year	
<b>Number of ECTS Credits</b>	6.0 ECTS	
<b>Class Contact Hours</b>	28	
<b>Minimum Learning Effort (In Hours)</b>	150	
<b>Course Unit Objectives</b>	<p>This course will introduce the students to the world of programming and teach them the fundamentals underpinning the theory of algorithms, programming and data structures. It includes a fast-paced introduction to the fundamentals of a scripting language (e.g., Python) which is widely used in the area of data science. During the class a lot of emphasis will be given on programming from scratch of well-known machine learning algorithms, for both clustering and classification, as used in data-science.</p> <p>By completion of this course students will be in a position to use the programming language they learned to develop programs in order to perform specific tasks. For example, mine, clean, analyze and visualize datasets and thus solve business-oriented problems efficiently.</p>	
<b>Learning Outcomes</b>	The students completing the course should be able to	
	CILO 1	Understand how to characterize data in terms of quality in the context of data-driven decision making.
	CILO 2	Learn to program efficiently in a scripting language (e.g., Python) widely used in data science for both mining and visualization purposes.
	CILO 3	Understand the basic concepts used in programming and algorithms.
	CILO 4	Demonstrate an understanding of how to select appropriate data structures and algorithmic procedures for addressing a problem of interest.
	CILO 5	Understand how to scrape, cleanse and de-dupe data making them suitable for analysis using techniques such as regular expressions.
	CILO 6	Program from scratch fundamental data-science classification algorithms such as Naive Bayes, Simple Linear Regression, Multiple Regression, Logistic Regression etc.
	CILO 7	Program of clustering algorithms such as k-Nearest Neighbours.
<b>Name of Lecturer(s)</b>	Dr Kyriacos Pavlou	

Mode of delivery	Face to Face	
Prerequisites or co-requisites	None	
Course Content	1. Introduction to data types and data science; data quality and analysis problems.	CILO 1,4
	2. Introduction to algorithms and computational complexity	CILO 1,3
	3. Scripting language fundamentals: modules, arithmetic, functions, strings, exceptions	CILO 2,3
	4. Data structures: lists, tuples, dictionaries, sets, hashtables	CILO 2,3
	5. Control Flow Statements: for, while, if-else	CILO 2,3
	6. Data Visualization using Python	CILO 2,3
	7. The gradient descent algorithm for data science	CILO 6,7
	8. Machine learning. Problems of over-fitting, under-fitting, correctness, bias-variance trade-off	CILO 1,5
	9. Python Task 1: k-Nearest neighbors	CILO 7
	10. Python Task 2: Simple and Multiple Regression	CILO 6
Recommended or required reading	<p><b>Required Reading:</b></p> <ol style="list-style-type: none"> <li>Joel Grus. <i>Data Science from Scratch</i>. O'Reilly, 1<sup>st</sup> edition, 2015.</li> </ol> <p><b>Recommended Reading:</b></p> <ol style="list-style-type: none"> <li>Wes McKinney. <i>Python for Data Analysis</i>. O'Reilly, 1<sup>st</sup> edition, 2012.</li> <li>Luciano Ramalho. <i>Fluent Python</i>. O'Reilly 1<sup>st</sup> edition, 2015.</li> </ol>	
Planned learning activities and teaching methods	lectures, group work, lab work, role playing, project-based learning, homework	
Assessment methods and criteria	Class participation: 10% Assignments: 50% In-class examination: 40%	
Language of Instruction	English	
Work Placement(s)	Not applicable	