Course title	Problem Solving Programming with Machine Learning Techniques
Course code	DIS502
Course type	Compulsory
Level	Postgraduate
Year / Semester	1st / 2nd

ECTS	7.5		Lectures / week	1	Laboratories / week	1

Course purpose and objectives	C.O.[1].You will be able to understand the concept of different types of problems. C.O.[2].You will be able to explain what the appropriate machine learning methods are and how they are applied in relation to the problem being solved. C.O.[3].You will be able to search efficiently through bibliography and online sources for complex type of problems in the context of programming. C.O.[4]. You will be able to implement algorithmic strategies to diverse problems using programming and machine learning techniques. C.O.[5]. You will be able to understand supervised and unsupervised learning in terms of the types of applications they can implement. C.O.[6].You will be able to search and utilize Python's programming features for more efficient solving of real -life algorithmic problems. C.O.[7].You will be able to apply efficient algorithms within the context of artificial intelligence. C.O.[8].You will be able to document and present findings from programming and machine learning simulations in a structured report. C.O..[9]. You will be able to explain and apply key machine learning evaluation metrics, including confusion matrix, correlation, and accuracy, in the context of machine learning models. C.O.[10].You will be able to understand programming concepts of object, library, and modules. C.O.[11].You will be able to identify types of problems, design solutions, and implement them for a wide range of problems.

	C.O.[12].You will able to define artificial intelligence and describe its core techniques used in machine learning and problem-solving.
Learning outcomes	O1: Apply advanced tools and skills, exploiting emerging technologies, for designing, developing, managing, and implementing innovative solutions that address complex organizational and social problems. O2: Practice essential skills and knowledge to manage and lead digital innovation and transformation initiatives within organizations. O5: Utilise advanced data analytics and computational methods, including AI, to solve complex business problems. O7: Demonstrate research proficiency by applying advanced research methods to solve real-world information systems and digital innovation challenges.

Prerequisites	-	**Required**	-

Course content	- Introduction to Programming - Fundamental Programming Structures - Using Python - Functions and Modules - Lists, Dictionaries, Tuples, Sets - File Management - Pandas - Introduction to the SciKit Learn - Library Introduction to NumPy (Sorting, Searching) - Dynamic Programming vs Greedy Algorithm - Supervised Learning using SciKit, Pandas, Matplotlib - Supervised Learning using SciKit, Pandas, Matplotlib - Unsupervised Learning using SciKit, Pandas, Matplotlib - Unsupervised Learning using SciKit, Pandas, Matplotlib - Deep Learning - Neural Networks - Deep Learning - Neural Networks
Teaching methodology	Mix of interactive lectures, active learning techniques and activities. More precisely: - Interactive Lectures - Notes and PowerPoint Presentations in digital format through the electronic platform - Basic textbook(s) and additional bibliography - Assignments - Interactive Activities - Discussions in Forums through the electronic platform of real word case studies - Web links

	- Critical reflection on research article - Peer review on group working and discussion in forum - Educational videos on real world case studies and critical discussion in forum

Bibliography	- ***Free ebook: Learning Algorithm:***
	  https://riptutorial.com/ebook/algorithm
	- ***Free e-book: Machine Learning for Humans, 2017:***
	  https://medium.com/machine-learning-for-humans/why-machine-learning-matters-6164faf1df12
	- ***Free e-book: Python for everybody***
	  http://do1.dr-chuck.com/pythonlearn/EN_us/pythonlearn.pdf
	- ***Free e-book: Scikit-Learn (0.21.3), 2019:***
	  https://scikit-learn.org/0.21/_downloads/scikit-learn-docs.pdf

Assessment	- Interactive activity 1: 5% - Interactive activity 2: 5% - Interactive activity 3: 5% - Interactive activity 4: 5% - Semester assignment: 20% - Final exams: 60%
Language	English