

Module Title: Computational Methods for Decision Making

- **Type of Module:**

X	PC (Prescribed Core Module)
	PS (Prescribed Stream Module)
	ES (Elective Stream Module)
	E (Elective Module)

- **Level of Module: MSc**

- **Year of Study**

- **Semester**

- **Number of credits allocated**

- **Name of lecturer / lecturers : Jan Jantzen / Nikolaos Ampazis**

- **Description:**

This course introduces students to algorithms and techniques for automated computational methods and information systems that support decision making. Emphasis is given on information processing methods that can successfully and securely execute a variety of missions in complex environments while exploiting multiple sources of sensor and open domain data. Case studies are presented, along with the lectures, in areas such as resource optimization, renewable sources of energy, financial analysis and web content personalization such as recommender systems.

- **Prerequisites: None**

- **Module Contents (Syllabus):**

#	Contents
1	<ul style="list-style-type: none">• Introduction to decision making - Decision examples of engineering projects related to renewable energy
2	<ul style="list-style-type: none">• Decision Support and Cumulative Cash-Flow Diagrams
3	<ul style="list-style-type: none">• Decisions Based in Engineering Economy Principles - Case Study: "Ground Heat"
4	<ul style="list-style-type: none">• Decision Making using Fuzzy Logic - Non technical Barriers and their influence in real world decisions

5	<ul style="list-style-type: none"> Regression Models – Training/Test/Validation in Data Analysis – Case Studies: Home Energy Efficiency & Home Energy Savings
6	<ul style="list-style-type: none"> Decisions Based in Cluster Analysis and Fuzzy C-Means
7	<ul style="list-style-type: none"> Algorithms for statistical classification – Case studies in continuous and discrete problems
8	<ul style="list-style-type: none"> Computational intelligence methods (neural networks – genetic algorithms)
9	<ul style="list-style-type: none"> Financial data predictions
10	<ul style="list-style-type: none"> Recommender Systems

- Recommended Reading:**

- 1) Principal Reference:**

- 2) Additional References:**

- Teaching Methods:**

In class teaching, case studies, decision making software hands-on

- Assessment Methods:**

- Final Exam 100%

- Language of Instruction:** English / Greek

- Module Objective (preferably expressed in terms of learning outcomes and competences):**

- Understand the process of decision making
- Have a working knowledge of different decision making tools and techniques.
- Have an understanding of various methods for decision making through the use of classification and clustering algorithms
- Be able to effectively apply a number of algorithms to solve decision making problems from various problem domains, e.g. Financial Engineering.
- Be familiar with several successful applications of decision mining in renewable energy systems.