<table>
<thead>
<tr>
<th>Course Title</th>
<th>Intelligent Systems</th>
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<tbody>
<tr>
<td>Course Code</td>
<td>ECE 421</td>
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<tr>
<td>Course Type</td>
<td>Elective</td>
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<tr>
<td>Level</td>
<td>Undergraduate</td>
</tr>
<tr>
<td>Year / Semester</td>
<td>4th Year/ 1st Semester</td>
</tr>
<tr>
<td>Teacher's Name</td>
<td>Stelios Timotheou</td>
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</tbody>
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<tr>
<th>ECTS</th>
<th>Lectures / week</th>
<th>2 x 1.5 hours (lectures) + 1 hour (recitation) per week</th>
<th>Laboratories / week</th>
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**Course Purpose and Objectives**

This course aims to introduce the main principles, methods and tools towards the development of Intelligent Systems. Major emphasis will be placed on knowledge representation, learning and decision making. The ideas and concepts are drawn from the areas of computational intelligence, machine learning and mathematical optimization. The objectives are to:

1) Present the core principles of knowledge representation and reasoning.
2) Explain the methods and tools of the main categories of machine learning including supervised, unsupervised and reinforcement learning.
3) Describe various techniques for making effective decisions using mathematical programming and metaheuristic techniques.
4) Demonstrate the effectiveness of the examined algorithmic models in real-world application examples.

The course requires good programming skills and a very good mathematical background.

**Learning Outcomes**

- Demonstrated knowledge and understanding of optimization methods, machine learning algorithms and knowledge representation techniques.
- Ability to evaluate the effectiveness of various algorithms for the solution of practical machine learning problems.
- Ability to formulate and solve optimization problems.

**Prerequisites**

Required

**Course Content**

This course aims to introduce the main principles, methods and tools towards the development of Intelligent Systems. Topics include: basic principles of mathematical optimization; supervised learning (neural networks, radial basis functions, support vector machines, decision trees); unsupervised learning (clustering and dimensionality reduction); reinforcement learning; bio-inspired algorithms for problem solving (e.g., ant colony optimization, particle swarm intelligence, genetic algorithms); techniques for knowledge representation and reasoning. MATLAB will be used as the programming platform.

**Teaching Methodology**

- Lectures
- Programming Assignments
- Design project
### Bibliography

### Assessment
- Midterm examination
- Final examination
- Programming Assignments
- Design project

| Language | Greek |