# AYDIN ADNAN MENDERES UNIVERSITY
# COURSE INFORMATION FORM

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|---|---|---|---|---|---|---|---|---|---|
| Course Title | Advanced Artificial Intelligence | | | | | | | | |
| Course Code | MTK637 | | Couse Level | | Third Cycle (Doctorate Degree) | | | | |
| ECTS Credit | 7.5 | Workload | 189 *(Hours)* | Theory | 3 | Practice | 0 | Laboratory | 0 |
| Objectives of the Course | The purpose of this course is to introduce and to understand the significance of artificial intelligence in computer science, and the course aims to gain the ability of researching using modern approaches in this field in both theoretically and practically. | | | | | | | | |
| Course Content | Introduction to Artificial Intelligence, Knowledge representation, Production rules, inclusion hierarchies, prepositional and predicate calculus, Knowledge representation, Rules of inference, frames, semantic networks, constraints and syntactic approaches, Searching Algorithms, Learning Algorithms, Decision trees, Neural networks, Genetic algorithms, Expert systems, robotics, computer vision, natural language processing, speech recognition. | | | | | | | | |
| Work Placement | N/A | | | | | | | | |
| Planned Learning Activities and Teaching Methods | Explanation (Presentation), Discussion, Individual Study, Problem Solving | | | | | | | | |
| Name of Lecturer(s) | | | | | | | | | |

| Assessment Methods and Criteria | | |
|---|---|---|
| Method | Quantity | Percentage (%) |
| Midterm Examination | 1 | 30 |
| Final Examination | 1 | 50 |
| Assignment | 1 | 20 |

| Recommended or Required Reading | |
|---|---|
| 1 | Artificial Intelligence: A Modern Approach, Stuart Russell , Peter Norvig, 3rd edition, 2009 |

| Week | Weekly Detailed Course Contents | |
|---|---|---|
| 1 | Theoretical | Introduction to AI |
| 2 | Theoretical | Programming languages |
| 3 | Theoretical | Knowledge representation: Production rules, inclusion hierarchies, prepositional and predicate calculus |
| 4 | Theoretical | Knowledge representation: Rules of inference, frames, semantic networks, constraints and syntactic approaches. |
| 5 | Theoretical | Searching: Hypothesis and test, depth-first search, breadth-first search |
| 6 | Theoretical | Searching: Heuristic search, optimal search |
| 7 | Theoretical | Searching: Game trees and adversarial search: minimax search and alpha-beta pruning |
| 8 | Theoretical | Learning: Decision trees |
| 9 | Intermediate Exam | Midterm exam |
| 10 | Theoretical | Learning: Neural nets, perceptrons |
| 11 | Theoretical | Learning:Genetic algorithms |
| 12 | Theoretical | Expert systems, robotics, computer vision, natural language processing, speech recognition |
| 13 | Theoretical | Expert systems, robotics, computer vision, natural language processing, speech recognition |
| 14 | Theoretical | Expert systems, robotics, computer vision, natural language processing, speech recognition |
| 15 | Final Exam | Final exam |

| Workload Calculation | | | | |
|---|---|---|---|---|
| Activity | Quantity | Preparation | Duration | Total Workload |
| Lecture - Theory | 14 | 3 | 3 | 84 |
| Assignment | 1 | 20 | 1 | 21 |
| Midterm Examination | 1 | 35 | 2 | 37 |

| | | | | |
|---|---|---|---|---|
| Final Examination | 1 | 45 | 2 | 47 |
| | | | Total Workload (Hours) | 189 |
| | | | [Total Workload (Hours) / 25*] = **ECTS** | 7.5 |
| **25 hour workload is accepted as 1 ECTS* | | | | |

| **Learning Outcomes** | |
|---|---|
| 1 | Ability to have fundamental knowledge of artificial intelligence |
| 2 | Ability to design  intelligent systems |
| 3 | Ability to use artificial intelligence techniques |
| 4 | To be able to gain the skill of interpreting some interrelations among these concepts |
| 5 | To be able to use mathematical concepts in solving certain types of problems |

| **Programme Outcomes** *(Mathematics Doctorate)* | |
|---|---|
| 1 | To be able to develop the current and advanced knowledge of mathematics domain to expertise level by an original idea or research, based on the level of its knowledge at the graduate level, and to be able to reach original definitions that will bring innovation to Mathematics. |
| 2 | To be able to comprehend the interdisciplinary interaction associated with Mathematics. |
| 3 | To be able to use and evaluate the new knowledge in the field of Mathematics with a systematic approach. |
| 4 | To be able to develop an idea, a method, a design or an application that will bring  innovation to Mathematics, to use well known ideas, methods, designs or applications on a different research area, or to search, comprehend, design, adapt and apply an original subject matter. |
| 5 | To be able to criticize, analyze, synthesize and evaluate new and complex ideas. |
| 6 | To be able have high-level skills in research methods related to studies on Mathematics. |
| 7 | To be able to expand the frontiers knowledge in the field of Mathematics via generating or interpreting an original study, or publishing at least a scientific paper in national/international refereed journals. |
| 8 | To be capable of leadership in the positions that require the analyses of problems related to the field of Mathematics. |
| 9 | To be able to defend his/her original ideas among the experts in the discussion of math related issues, and  to be able to communicate effectively to show his/her competence in the field of Mathematics. |
| 10 | To be able to contribute to the solution of the social, scientific, cultural and ethical problems related to the Mathematics, and to be able to support the development of social, scientific, cultural and ethical values. |
| 11 | To be able to have both oral and written communication using a foreign language. |

**Contribution of Learning Outcomes to Programme Outcomes** *1:Very Low, 2:Low, 3:Medium, 4:High, 5:Very High*

| | L1 | L2 | L3 | L4 | L5 |
|---|---|---|---|---|---|
| P1 | 5 | 4 | 4 | 4 | 4 |
| P2 | 4 | 4 | 5 | 5 | 5 |
| P3 | 5 | 4 | 5 | 5 | 5 |
| P4 | 4 | 5 | 5 | 5 | 4 |
| P5 | 4 | 4 | 5 | 5 | 5 |
| P6 | 4 | 5 | 5 | 5 | 4 |
| P7 | | | 3 | 3 | 3 |
| P9 | 3 | | 3 | 3 | |
| P11 | 3 | | 3 | 3 | 3 |