# Model No.12
## Course Specifications : Artificial intelligence

## A- Basic Information

**Course Title**: Artificial Intelligence    **Code**: ECE412C

**Lecture**: 3                 **Tutorial**: 2                 **Total: 5**
**Program on which the course is given:** B.Sc. Electrical Engineering (computer engineering)
**Major or minor element of program:**  Major.
**Department offering the program:**    Electrical Engineering Department
**Department offering the course:**     Electrical Engineering Department
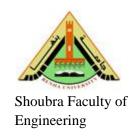**Academic year / level:**              **fourth** Year / **first** Semester
**Date of specifications approval:**    20/6/2010

## B- Professional Information

**1- Overall aims of course**:

  For students undertaking this course, the aims are to:

   1.1- Gain the basic knowledge of most important systems over the last five decades.

   1.2- Describes different techniques of introducing intelligence to machines.

   1.3- The practical part of the course introduces a non-algorithmic PROLOG language

**2- Intended Learning Outcomes of Course (ILOS)**

**a- Knowledge and Understanding**

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On completing this course, students will be able to:

A-1. Describe  the basics artificial intelligence

A-2  Understand the different problem solving and searching techniques.

A-3 know the different methodologies of knowledge representation.

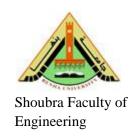A-4 Understand the principles of learning systems.

**b-  Intellectual Skills**

At the end of this course, the students will be able to:

b-1 Think in a creative and innovative way in problem solving and searching.

b-2 Combine, and assess knowledge from different sources in the field of artificial intelligence.

b-3 Solve artificial intelligence problems, often on the basis of limited and possibly contradicting information.

b-4 Select the appropriate mathematical tools, computing methods, design techniques for modeling and analyzing intelligent systems.

b-5 Identify symptoms in problematic situations in the field of artificial intelligence.

b-6 Innovating solutions based on non- traditional thinking and the use of latest technologies in the field of artificial intelligence.  .

**c-  Professional Skills**

On completing this course, the students are expected to be able to:

c-1 Apply knowledge of mathematics, science, information technology, design, business context and engineering practice

to artificial intelligence problems.

c-2Create and/or re-design a process, component or system, and carry out specialized engineering designs.

c-3 Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer programs in the field of artificial intelligence.

c-4 Write computer programs on professional levels achieving acceptable quality measures in software development in the field of artificial intelligence..

**d- General Skills**

At the end of this course, the students will be able to:

d-1 Demonstrate efficient IT capabilities.

d-2 Effectively manage tasks, time, and resources.

d-3 Search for information and engage in life-long self learning discipline.

**4- Course Contents**

| No. | Topics | No. of hours |
|-----|--------|--------------|
| 1 | The Foundations of Artificial Intelligence | 10 |
| 2 | Problem Solving and Searching Techniques | 10 |
| 3 | Knowledge Representation | 10 |

| 4 | Reasoning Systems | 5 |
|---|---|---|
| 5 | Learning Systems | 10 |
| 6 | Neural Networks | 5 |
| 7 | Expert Systems | 5 |
| 8 | Natural Language Processing | 5 |
| 9 | Genetic Algorithms | 5 |

**5- Teaching and Learning Methods**

5.1- Lectures

5.2- Modified lectures

5.3- Practical training / laborat

5.4- Seminar / workshop

5.5- Class activity

5.6- Case study

5.7- Assignments / homework

**6- Teaching and Learning Methods of Disables**

6.1- None

**7- Student Assessment**

**a- Student Assessment Methods**

| | |
|---|---|
| 1 | Assignments   to assess   knowledge and intellectual skills. |
| 2 | Quiz   to assess   knowledge, intellectual and professional skills. |
| 3 | Mid-term exam   to assess   knowledge, intellectual, professional and general skills. |
| 4 | Oral exam   to assess   knowledge and intellectual skills |
| 5 | Final exam   to assess   knowledge, intellectual, professional and general skills. |

**b- Assessment Schedule**

| No. | Assessment | Week |
|---|---|---|
| 1 | Home Assignments | 2, 5, 9, 11 |
| 2 | Quizzes | 4, 6, 10, 12 |
| 3 | Mid-term exam | 8 |
| 4 | Oral Exam | 14 |
| 5 | Final exam | 15 |

**c- Weighting of Assessments**

# Model No.12
## Course Specifications : Artificial intelligence

| Assessment | Weight |
|---|---|
| Mid_Term Examination | 10 % |
| Final_Term Examination | 60 % |
| Oral Examination | 20 % |
| Practical Examination | 0 % |
| Semester work | 5 % |
| Other types of assessment | 5 % |
| Total | 100 % |

**8- List of References**

**b- Books**

1- Stuart j. Russell and Peter Norvig, "ARTIFICIAL INTELLIGENCE A MODERN APPROACH" ,
Prentice Hall, Englewood Cliffs, new jersey,2008.

2- Lvanb Bratko,"PROLOG PROGRAMMING FOR ARTIFICIAL INTELLIGENCE", 4th Edition
,Addison-Wesley Pub,2011

**c- Recommended Books**

ne Rich and Kevin Knight,,"Artificial Intelligence", b McGraw Hill companies Inc,2006

# Model No.12
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**Matrix of Knowledge and Skills of the course**

| No. | Topics | week | Basic Knowledge | Intellectual Skills | Professional Skills | General Skills |
|-----|--------|------|-----------------|---------------------|---------------------|----------------|
| 1 | The Foundations of Artificial Intelligence | 1 | a1, a4 | b1,b2 | | |
| 2 | Problem Solving and Searching Techniques | 2 | a1, a4 | b1, b2 | c3, c15 | |
| 3 | Problem Solving and Searching Techniques | 3 | a1, a4 | b1, b2 | c3, c15 | |
| 4 | Knowledge Representation | 4 | a1, a4 | b1, b2, b4 | | |
| 5 | Knowledge Representation | 5 | a1, a4 | b1, b2, b4,b6 | | |
| 6 | Reasoning Systems | 6 | a1, a4 | b1, b2, b4,b5 | c3, c15 | |

| 7 | Reasoning Systems | 7 | a1, a4 | b1, b2, b4,b5 | c3, c15 | |
| 8 | midterm exam | 8 | | | | |
| 8 | Learning Systems | 9 | a1, a4 | b1, b2, b4 | c3, c15 | |
| 9 | Learning Systems | 10 | a1, a4 | b1, b2, b4 | c3, c15 | |
| 10 | Neural Netwrks | 11 | a1, a2,a4 | b1, b2, b4 | c3, c15 | d3,d4 |
| 11 | Expert Systems | 12 | a1, a2,a3 | b1, b3, b4 | c3, c15 | d3, d4 |
| 12 | Natural Language Processing | 13 | a1, a2,a4 | b1, b3, b4,b5 | c3, c15 | d3, d4 |
| 13 | Genetic Algorithms | 14 | a1,a2, a3,a4 | b1, b2, b4,b6 | c3, c15 | d4 |
| 14 | Learning Systems | 15 | a1, a13,a14 | b1, b3, b4 | c3, c15 | d4 |

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**-course ILOS VS  Program ILOS:**

|     | A2 | A4 | A5 | A13 | B3 | B4 | B7 | B13 | B16 | B17 | C1 | C3 | C6 | C15 | D4 | D6 | D7 |
|-----|----|----|----|-----|----|----|----|-----|-----|-----|----|----|----|-----|----|----|----|
| A1  | √  |    |    |     |    |    |    |     |     |     |    |    |    |     |    |    |    |
| A2  |    | √  |    |     |    |    |    |     |     |     |    |    |    |     |    |    |    |
| A3  |    |    | √  |     |    |    |    |     |     |     |    |    |    |     |    |    |    |
| A4  |    |    |    | √   |    |    |    |     |     |     |    |    |    |     |    |    |    |
| B1  |    |    |    |     | √  |    |    |     |     |     |    |    |    |     |    |    |    |
| B2  |    |    |    |     |    | √  |    |     |     |     |    |    |    |     |    |    |    |
| B3  |    |    |    |     |    |    | √  |     |     |     |    |    |    |     |    |    |    |
| B4  |    |    |    |     |    |    |    | √   |     |     |    |    |    |     |    |    |    |
| B5  |    |    |    |     |    |    |    |     | √   |     |    |    |    |     |    |    |    |
| B6  |    |    |    |     |    |    |    |     |     | √   |    |    |    |     |    |    |    |
| C1  |    |    |    |     |    |    |    |     |     |     | √  |    |    |     |    |    |    |
| C2  |    |    |    |     |    |    |    |     |     |     |    | √  |    |     |    |    |    |
| C3  |    |    |    |     |    |    |    |     |     |     |    |    | √  |     |    |    |    |
| C4  |    |    |    |     |    |    |    |     |     |     |    |    |    | √   |    |    |    |
| D1  |    |    |    |     |    |    |    |     |     |     |    |    |    |     | √  |    |    |
| D2  |    |    |    |     |    |    |    |     |     |     |    |    |    |     |    | √  |    |
| D3  |    |    |    |     |    |    |    |     |     |     |    |    |    |     |    |    | √  |

# Matrix of course content and ILO's

| Course content | 2.a.1 | 2.a.2 | 2.a.3 | 2.a.4 | 2.b.1 | 2.b.2 | 2.b.3 | 2.b.4 | 2.b.5 | 2.b.6 | 2.c.1 | 2.c.2 | 2.c.3 | 2.c.4 | 2.d.1 | 2.d.2 | 2.d.3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| The Foundations of Artificial Intelligence | ✓ | | | | | ✓ | | | | | ✓ | | | | ✓ | | |
| Problem Solving and Searching Techniques | | | ✓ | ✓ | ✓ | | ✓ | | | | ✓ | | ✓ | | | | ✓ |
| Knowledge Representation | | | ✓ | ✓ | ✓ | | ✓ | | | | ✓ | | ✓ | ✓ | | | ✓ |
| Reasoning Systems | | | | ✓ | ✓ | ✓ | ✓ | | ✓ | | | ✓ | | ✓ | ✓ | | |
| Learning Systems | | | | ✓ | ✓ | ✓ | ✓ | | ✓ | | | ✓ | | ✓ | ✓ | | |
| Neural Netwrks | | ✓ | | ✓ | ✓ | | ✓ | ✓ | | | ✓ | ✓ | | ✓ | | | ✓ |
| Expert Systems | | ✓ | | ✓ | ✓ | | ✓ | ✓ | | | ✓ | ✓ | | ✓ | | | ✓ |
| Natural Language Processing | | ✓ | ✓ | ✓ | ✓ | | ✓ | | | ✓ | ✓ | ✓ | | | | ✓ | ✓ |
| Genetic Algorithms | | ✓ | ✓ | ✓ | ✓ | | ✓ | | | ✓ | ✓ | ✓ | | | | ✓ | |

# Course Specifications : Artificial intelligence

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## Matrix of course aims and ILO's

| Course aims | 2.a .1 | 2.a .2 | 2.a .3 | 2.a .4 | 2.b .1 | 2.b .2 | 2.b .3 | 2.b .4 | 2.b .5 | 2.b .6 | 2.c .1 | 2.c .2 | 2.c .3 | 2.c .4 | 2.d .1 | 2.d .2 | 2.d .3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| gain the basic knowledge of most important systems over the last five decades | ✓ | ✓ | | | ✓ | ✓ | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| describes different techniques of introducing intelligence to machines | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ |
| The practical part of the course introduces a non-algorithmic PROLOG language | | | ✓ | ✓ | ✓ | | ✓ | | | | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |

- **Course Coordinator :**   **Ass. Prof. Abdelwahab kamel elsammak**

- **Head of Department :**   **prof. Sayed A. Ward**