**BAHIR DAR UNIVERSITY**

**SCHOOL OF COMPUTING AND ELECTRICAL ENGINEERING**

**COURSE GUIDE BOOK**

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| **Course Title**: Introduction to Artificial Intelligence  **Course code**: \_\_\_\_  **Credits points :** 3  **Lecture ፡** 2  **Lab:** 3  **Tut** 3  **Lecture day ፡**  **Prerequisites:**  **Class Room:**  **Academic year:** 2011 G.C | Instructor’s Name: Alemu K  Students: CSE - Year V  Lab Assistant : Adane B.  Lab class : Project LAB  **Office Location:** Electrical Lab 3 |

**Course description**

The purpose of this course is to give students an understanding of Artificial Intelligence methodologies, techniques, tools and results. Students will use at least one AI-language [Lisp, Prolog]. Students will learn the theoretical and conceptual components of this discipline and firm up their understanding by using AI and Expert System tools in laboratory sessions, projects and home assignments

**Course Objective**:

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

* Understand reasoning, knowledge representation and learning techniques of artificial intelligence
* Evaluate the strengths and weaknesses of these techniques and their applicability to different tasks
* Assess the role of AI in gaining insight into intelligence and perception
* know classical examples of artificial intelligence
* know characteristics of programs that can be considered "intelligent"
* understand the use of heuristics in search problems and games
* know a variety of ways to represent and retrieve knowledge and information
* know the fundamentals of artificial intelligence programming techniques in a modern programming language
* consider ideas and issues associated with social technical, and ethical uses of machines that involve artificial intelligence

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| **Content** | **Week** | **Reference book** |
| CHAPTER 1:   1. Introduction to AI    1. Objectives/Goals of AI    2. What is AI?    3. Approaches to AI – making computer:       1. Think like a human ( Thinking humanly)       2. Act like a human (Acting humanly)       3. Think rationally (Thinking rationally)       4. Act rationally (Acting rationally)    4. The Foundations of AI    5. Bits of History and the State of the Art | week 1 and 2 | Russell, S. and P. Norvig (1995) Artificial Intelligence: A Modern Approach Prentice-Hall. |
| CHAPTER 2:   1. Intelligent Agents    1. Introduction    2. Agents and Environments    3. Acting of Intelligent Agents (Rationality)    4. Structure of Intelligent Agents    5. Agent Types       1. Simple reflex agent       2. Model-based reflex agent       3. Goal-based agent       4. Utility-based agent       5. Learning agent    6. Important Concepts and Terms | weeks 3 and 4 | Russell, S. and P. Norvig (1995) Artificial Intelligence: A Modern Approach Prentice-Hall. |
| CHAPTER 3:   1. Solving Problems by Searching and Constraint Satisfaction Problem    1. Problem Solving by Searching    2. Problem Solving Agents    3. Problem Formulation    4. Search Strategies    5. Avoiding Repeated States    6. Constraint Satisfaction Search    7. Games as Search Problems | Weeks 5,6,7 and 8 | Russell, S. and P. Norvig (1995) Artificial Intelligence: A Modern Approach Prentice-Hall. |
| CHAPTER 4:   1. Knowledge and Reasoning    1. Logical Agents    2. Propositional Logic    3. Predicate (First-Order)Logic    4. Inference in First-Order Logic    5. Knowledge Representation    6. Knowledge-based Systems | Weeks 9 and 10 | Russell, S. and P. Norvig (1995) Artificial Intelligence: A Modern Approach Prentice-Hall. |
| 1. **Uncertain Knowledge and Reasoning (optional)**    1. Quantifying Uncertainty    2. Probabilistic Reasoning    3. Probabilistic Reasoning over Time    4. Making Simple Decisions    5. Making Complex Decisions | weeks 11 and 12 | Russell, S. and P. Norvig (1995) Artificial Intelligence: A Modern Approach Prentice-Hall. |
| **Chapter 5:**   1. Learning    1. Learning from Examples/Observation    2. Knowledge in Learning    3. Learning Probabilistic Models    4. Neural Networks | Weeks 13 and 14 | Russell, S. and P. Norvig (1995) Artificial Intelligence: A Modern Approach Prentice-Hall. |
| 1. **Communicating, Perceiving, and Acting**    1. Natural Language Processing    2. Natural Language for Communication    3. Perception    4. Robotics | weeks 15 and 16 | Russell, S. and P. Norvig (1995) Artificial Intelligence: A Modern Approach Prentice-Hall. |

# Methodology

The course will be delivered in lectures (with a participatory approach with particular attention to encourage students in asking questions and answering), present their assignment and actively participate in the lab session.

**Assessment Method:**

* Assignment----------------------20%
* Lab exam-------------------------10%
* Project------------ ----------------25%
* Final examination---------------45%

**Course Policy**

All students are expected to abide by the code of conduct of students (article 166 and 166.1.1, of The Senate Legislation of Bihar Dar University May 20, 2005) throughout this course. Academic dishonest including cheating, fabrication, and plagiarism will not be tolerated at any stage during your studies and will be reported to concerned bodies for action. If you need it you can get a copy (to be copied by yourself) of it from your academic advisor.

It is expected that all work handed in by a student will be original work that has been done by the individual. If it is not, then this act of intellectual dishonesty will be dealt with severely.

While students are expected to work reasonably independently, I do not expect you to work in isolation. Often you learn best when working with others on an assignment. So what degree of collaboration is expected and, indeed, encouraged, and what is deemed to be cheating?

If you are having problems with the assignments or tests, contact the instructor as soon as possible. It will NOT be possible to earn extra credit to improve a poor grade at the end of the semester.

In general, we encourage things like bouncing ideas off one another, discussing which of two alternate solutions might be better (and why), and getting another's ideas on how to resolve a difficulty that you have already spent time on. However, you should not be working so closely together that someone else's solution becomes incorporated into your answer, computer program or other submission. These general guidelines apply to any type of assignment.

You are expected to attend class regularly. I will take attendance on random days during the semester to ensure that the students are coming to class and if you miss class repeatedly, your grade will be affected. If you miss more than 85% of the class attendance you will not sit for final exams. Please try to be on time for class. I will not allow you enter if you are late for more than five minutes.

If you MUST bring a cell phone to class, set it to the vibrate mode and step out of the room to take any necessary calls. PLEASE limit this to emergency/critical situations only.

**Text Book**

Russell, S. and P. Norvig (1995) Artificial Intelligence: A Modern Approach Prentice-Hall.

# References

1. **Luger, G. (2002) Artificial Intelligence, 4th ed. Addison-Wesley.**
2. **Bratko, Ivan (1990) PROLOG Programming for Artificial Intelligence, 2nd ed. Addison-Wesley, 1990**
3. **Winston, P.H. (1992) Artificial Intelligence Addison-Wesley.**
4. **Ginsberg, M.L. (1993) Essentials of Artificial Intelligence. Morgan Kaufman.**

**Software Requirement**: PROLOG, LISP and PYTHON