

SYLLABUS

Date/ Revision	March 26, 2017 / 1.0
Faculty	Engineering
Approval	Dean Faculty of Engineering

SUBJECT : ARTIFICIAL INTELLIGENCE (ARIN-3000)

1. Identification of Subject:

Name of Subject	: ARTIFICIAL INTELLIGENCE
Code of Subject	: ARIN-3000
SKS / ECTS	: 3
Semester	: 6
Study Program	: INE, MTE
Lecturer	: to be appointed

2. Competency

After having the course, students are expected to:

- understand the methods of constructing Artificial Intelligence
- understand how to use those methods, such as Knowledge-Based Systems, Expert Systems, Artificial Neural Network, Fuzzy Logic, and Genetic Algorithm
- knowing the applicative domain of those methods, and their combinations
- knowing how to build those application using programming language such as Java, or C++

3. Description of Subject:

Artificial Intelligence course discusses the history of Artificial Intelligence (AI), knowledge based systems and/or Expert systems, Neural Network, Fuzzy Logic, Genetic Algorithm methods to be implemented within industrial environment. This course introduces some software tools for explaining the methods.

4. Learning Approach

Approach	: Combination of Expository - inquiry and colaborative
Method	: Discussions, Questions/answers, Sample problems/cases, Group works
Student Task	: Presentation, Application Development
Media	: LCD projector

5. Evaluation

a) Absence maximum	: 25%
b) Participation in discussion	: 10 points
c) Homework, Classwork	: 10 points
d) Presentation, Simulation	: 10 points
e) Daily Quiz	: 10 points
f) Final Examination	: 60 points

Total : 100 points

6. Contents/ Topics of Lecturing:

Week	Topics	Content	Remark
1	Introduction to knowledge-based intelligent systems	Intelligent machines, the history of artificial intelligence, or from the 'dark-ages' to knowledge-based systems	Chapter 1
2	Rule-based expert systems	Introduction – what is knowledge? Rules as a knowledge representation technique, the main players in the expert system development team, structure of a rule-based expert system, fundamental characteristics of an expert system, forward chaining and backward chaining inference techniques, conflict resolution, advantages and disadvantages of rule-based expert systems	Chapter 2
3	Uncertainty management in rule-based expert systems	Definition of uncertainty, basic probability theory, Bayesian reasoning, Bayesian accumulation of evidence, Bias of the Bayesian method, certainty factors theory and evidential reasoning, an application of certainty factors, comparison of Bayesian reasoning and certainty factors	Chapter 3
	Review on C++ programming		
4	Fuzzy Expert Systems	What is fuzzy thinking ? Fuzzy sets, linguistic variables and hedges, operations of fuzzy sets, fuzzy rules, fuzzy inference, building a fuzzy expert system	Chapter 4
4,5	Frame Based Expert System	What is a frame ? Frames as a knowledge representation technique, inheritance in frame-based systems, methods and demons, interaction of frames and rules, example of frame based expert system	Chapter 5
6	Project FL :	Starting to developed Fuzzy Logic using C++ programming language	group
7	Artificial Neural Network	How the brain works, the neuron as a simple computing element, the perceptron, multilayer neural networks, accelerated learning in multilayer neural networks, the Hopfield network, bidirectional associative memory, self-organising neural networks	Chapter 6
8	Mid term qualification		
	Project ANN :	Starting to developed simple application using C++ programming language for ANN	
9	Evolutionary computation	Can evolution be intelligent ? Simulation of	Chapter 7

		natural evolution, genetic algorithm, why genetic algorithms work, example, evolution strategies, genetic programming	
10	<i>Hybrid Intelligent Systems</i>	<i>How to combine German mechanics with Italian love, Neural Expert Systems, Neuro-Fuzzy systems, Adaptive Neuro-Fuzzy Inference System, Evolutionary Neural Networks, Fuzzy Evolutionary Systems</i>	Chapter 8
11	<i>Knowledge Engineering</i>	<i>What is knowledge engineering, will an expert system work for my problem ? Will a fuzzy expert system work for my problem ? Will a neural network work for my problem ? Will genetic algorithms work for my problem ? Will hybrid intelligent system work for my problem ?</i>	Chapter 9
12	Data Mining and knowledge discovery	What is data mining ? Statistical methods and data visualization, Principle component analysis, Relational databases and database queries, The data warehouse and multidimensional data analysis, Decision trees, Association rules and market basket analysis	Chapter 10
13, 14, 15	<i>Project Presentation</i>		
16, 17	<i>Final Examination</i>		

7. Book Reference:

- a) Michael Negnevistky, Artificial Intelligence : a guide to intelligent systems, 3rd ed., Pearson, 2011, ISBN 978-1-408-22574-5