الجامعة الافتراضية السورية
SYRIAN VIRTUAL UNIVERSITY

Expert Systems

Course Definition

Information

Technology

Engineering

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Syrian Arab Republic		الجمهورية العربية السورية
Ministry of Higher Education		وزارة التعليم العالـــي
Syrian Virtual University		الجامعة الافتراضية السورية

1. Basic Information:

Course Name	Expert Systems
Course Code	**AES601**
Number of Presentational Sessions*	32
Number of Synchronous Sessions**	16
Number of Shorter Tests***	4
Number of Exams***	1
Theoretical Sessions Work Load (hrs.)	48
Practical Sessions Work Load (hrs.)	24
Credit Hours	5

***Each presentational session comprises both recorded lecture (1.5 hrs.) and interactive learning content (1.5 hrs.).**

****Each synchronous session comprises the interactive lecture carried out in real time in a virtual class (1.5 hrs.).**

*****Each shorter test is 0.5 hr. long. The final exam is 2 hrs. long.**

N.B.

Generally, each chapter requires two presentational sessions: one for the recorded content and one for the interactive content (unless the chapter is too long, in which case it may require more sessions (. This note applies to synchronous sessions as well, where each chapter requires one synchronous session generally.

2. Prerequisites courses:

Course	Code
Artificial Intelligence	BAI501

3. Course Objectives:

The main aims of this course "Expert Systems" are:

- Applying logical inferences on real problems using Python, Prolog and CLIPS.
- Study and implement planning technics.
- Study and implement uncertainty handling technics.
- Study and implement making decisions technics.

4. Learning Outcomes (LO):

By the end of this course, the learner is expected to acquire and learn the following subjects:

- Design and implement rules-based expert systems.
- Mastering forward and backward expert systems shells.
- Implement planning algorithms in Python.
- Design and implement Bayes networks.
- Design and implement decision networks

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5. Assessment Results:

Chapter Number	Chapter Title	General Objectives	Assessment Type				
			Interactive Content & Recorded Sessions	Applied Activities (Synch. Sessions)	Final Exam*/ Shorter Tests**	Presentations and Interviews***	Reports****
CH1	Intelligent Agents	Comprehension –Analytical Thinking –Tools and Application Hands– On	√	√	√	√	√
CH2	Knowledge and reasoning	Comprehension –Analytical Thinking –Tools and Application Hands– On	√	√	√	√	√
CH3	Planning	Comprehension –Analytical Thinking –Tools and Application Hands– On	√	√	√	√	√
CH4	Handling uncertainty	Comprehension –Analytical Thinking –Tools and Application Hands– On	√	√	√	√	√
CH5	Decisions	Comprehension	√	√	√	√	√

	Making	–Analytical Thinking –Tools and Application Hands– On					

***The final exam is two hours long and is given at the end of the course.**

****Shorter tests are about 30 minutes long and are given after three or four lectures throughout the semester during synchronous sessions.**

*****Presentations, interviews, and reports are submitted once after each three or four lectures throughout the semester during synchronous sessions.**

6. Course Syllabus:

Chapter	Subject	Content	Number of Learning Objects	Number of synchronous Learning Objects
CH1	Intelligent Agents	1. Agent 2. Rational agent 3. PEAS model 4. Environment properties 5. Agent design 6. Simple reflex agent 7. Model-based reflex agent 8. Goal-based agent 9. Utility-based agent 10. Learning agent		
CH2	Rules-based expert systems	1. Forward chaining 2. Backward chaining 3. CLIPS 4. Prolog 5. Experta from Python 6. pyDatalog from Python		
CH3	Knowledge representation	1. Ontology 2. Planning		

	and Planning	3. STRIPS 4. Forward planning 5. Backward planning 6. Applications using Python		
CH4	Handling uncertainty	1. Bayes reasoning 2. Certainty factor 3. Bayes networks 4. Reasoning with time 5. Markov Models 6. Hidden Markov models 7. Applications using Python		
CH5	Decisions Making	1. Decision making under uncertainty 2. Utility function 3. Decisions networks 4. Applications using Python		

7. Practical Activity:

- **Tools and Labs:**

Tool Name	Description
CLIPS	Expert system shell
Prolog	Expert system shell
Python	Programming language

- **Practical Activities per Chapters:**

Chapter	Activities Type	Remarks

CH1	☑ Exercises ☑ Homework ☐ Webinars ☐ Project ☐ Experiment ☐ Other	
CH2	☑ Exercises ☑ Homework ☐ Webinars ☐ Project ☐ Experiment ☐ Other	
CH3	☑ Exercises ☑ Homework ☐ Webinars ☐ Project ☐ Experiment ☐ Other	
CH4	☑ Exercises ☑ Homework ☐ Webinars ☐ Project ☐ Experiment ☐ Other	
CH5	☑ Exercises ☑ Homework	

	☐ Webinars ☐ Project ☐ Experiment ☐ Other	

8. References:

- Artificial Intelligence: A Modern Approach 3rd Edition. Stuart J. Russell and Peter Norvig
- Expert Systems: Principles and Programming, Fourth Edition 4th Edition: Joseph C. Giarratano , Gary D. Riley