University of Sana'a
Faculty of Engineering
Department: Biomedical Engineering
Title of the Program: Biomedical Engineering

Course Specification of Artificial Intelligence

Course Code(BE475)

I. Course Identification and General Information:							
1	**Course Title:**	**Artificial Intelligence**					
2	**Course Code & Number:**	BE475					
3	**Credit hours:**	C.H				TOTAL	
		Th.	Seminar	Pr	Tr.		
		2	--	2	--	3	
4	**Study level/ semester at which this course is offered:**	Level / 5th Semester 1					
5	**Pre –requisite (if any):**	Computer Programming II					
6	**Co –requisite (if any):**	None					
7	**Program (s) in which the course is offered:**	Biomedical Engineering Program					
8	**Language of teaching the course:**	English					
9	**Location of Teaching the Course:**	Faculty of Engineering					
10	**Prepared by:**	Prof. Ahmed Sultan Al-Hegami					
11	**Reviewed by:**	Dr. ----					
12	**Date of Approval:**						

I. Course Description:

The course aims to help student understanding concepts of artificial intelligence in order to solve various problems in different fields. The course focus on Problem representation and reduction, Search techniques and Heuristics, Reasoning and the rules of inference , Learning and Machine Learning, methodology of Science in Learning, Applications of intelligent information systems , Advanced topics in Artificial intelligence such as fuzzy logic, genetic algorithms and neural networks.

III. Course Intended learning outcomes (CILOs) of the course (maximum 8CILOs)		**Referenced PILOs** (Only write code number of referenced Program Intended learning outcomes)
Knowledge and Understanding: Upon successful completion of the undergraduate Biomedical Engineering Program, the graduates will be able to:		
a1	Recognize of fundamental and advanced concepts of Artificial Intelligence, its applications.	A1 Describe and explain the underlying mathematical methods and theories; life scientific-principles; and engineering core concepts related to the Biomedical Engineering context.
a2	Describe the techniques of intelligent systems.	A2 Clarify the design principles and techniques and the engineering materials characteristics and how these are relevant to the developments and technologies in a biomedical systems context.
B. Cognitive/ Intellectual Skills: Upon successful completion of the undergraduate Biomedical Engineering Program, the graduates will be able to:		
b1	Formulate artificial intelligence tasks for real-world data.	B1 Apply engineering principles; basic of life-science; mathematical theories; and modern tools professionally in modelling, analyzing, designing, and constructing physical digital systems; devices and/or processes relevant to Biomedical Engineering fields.

b2	Assess the applicability of the technology for a particular scientific problem area, and develop the scientific methods used.	B2 Identify, formulate and solve the complex problems related to the Biomedical Engineering fields in a creative and innovative manner by using a systematic and analytical thinking methods.
C.Professional and Practical Skills: Upon successful completion of the undergraduate Biomedical Engineering Program, the graduates will be able to:		
c1	Follow development and research in the area to solve real artificial intelligence problems by using the right tools and algorithms.	C1 Apply integrally knowledge of mathematics, life science, IT, design, business context and engineering practice to solve problems and to design systems/processes relevant to Biomedical Engineering.
c2	Apply Implement the main algorithms in artificial intelligence in a computationally efficient way	C2 Use a wide range of analytical tools, techniques, IT, modern engineering tools, software packages and develop required computer programs to solve, modeling and analyzing Biomedical Engineering problems.
D. Transferable Skills: Upon successful completion of the undergraduate Biomedical Engineering Program, the graduates will be able to:		
d1	Conduct a research in the area of study according to rigorous criteria to peers and the community.	D1 Lead and motivate individuals, show capability to work in stressful environments and within constraints, collaborate effectively within multidisciplinary team.
d2	Inspect the technical knowledge and skills to develop and implement computer program solutions to a given problem.	D2 Acquire entrepreneurial skills and effectively manage tasks, time, processes and resources.
d3	Evaluate the relevant information to write reports to recommend appropriate artificial intelligence tools.	D5 Demonstrate efficient IT capabilities and communicate effectively both orally and in writing technical reports.

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1. Recognize of fundamental and advanced concepts of Artificial Intelligence, its applications.	• Interactive lectures & examples, • Tutorials, • Videos demonstrations, • Presentation/seminar, • Interactive class discussions, • Case studies, • Exercises and home works, • Laboratory/Practical experiments based session, • Computer laboratory-based sessions, • Workshops practices, • Directed self- study, • Problem based learning, • Team work (cooperative learning), • Field visits/training, • Mini/major project.	• Written tests (mid and final terms and quizzes), • Oral exams, • Short reports, • Lab\Project report • Practical lab performance assessment, • Coursework activities assessment, • Home works and assignments, • Presentations.
a2. Describe the techniques of intelligent systems.	• Interactive lectures & examples, • Tutorials,	• Written tests (mid and final terms and quizzes), • Oral exams,

	• Videos demonstrations, • Presentation/seminar, • Interactive class discussions, • Case studies, • Exercises and home works, • Laboratory/Practical experiments based session, • Computer laboratory-based sessions, • Workshops practices, • Directed self- study, • Problem based learning, • Team work (cooperative learning), • Field visits/training, • Mini/major project.	• Short reports, • Lab\Project report • Practical lab performance assessment, • Coursework activities assessment, • Home works and assignments, • Presentations.

(B) Alignment Course Intended Learning Outcomes of Intellectual Skillsto Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1. Formulate artificial intelligence tasks for real-world data.	• Interactive lectures & examples, • Tutorials, • Videos demonstrations, • Presentation/seminar, • Interactive class discussions,	• Written tests (mid and final terms and quizzes), • Oral exams, • Short reports, • Lab\Project report • Practical lab performance

	• Case studies, • Exercises and home works, • Laboratory/Practical experiments based session, • Computer laboratory-based sessions, • Workshops practices, • Directed self- study, • Problem based learning, • Team work (cooperative learning), • Field visits/training, • Mini/major project.	assessment, • Coursework activities assessment, • Home works and assignments, • Presentations.
b2. Assess the applicability of the technology for a particular scientific problem area, and develop the scientific methods used.	• Interactive lectures & examples, • Tutorials, • Videos demonstrations, • Presentation/seminar, • Interactive class discussions, • Case studies, • Exercises and home works, • Laboratory/Practical experiments based session, • Computer laboratory-based sessions, • Workshops practices,	• Written tests (mid and final terms and quizzes), • Oral exams, • Short reports, • Lab\Project report • Practical lab performance assessment, • Coursework activities assessment, • Home works and assignments, • Presentations.

	• Directed self- study, • Problem based learning, • Team work (cooperative learning), • Field visits/training, • Mini/major project.	

(C)Alignment Course Intended Learning Outcomes of Professional and Practical Skillsto Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1. Follow development and research in the area to solve real artificial intelligence problems by using the right tools and algorithms.	• Interactive lectures & examples, • Tutorials, • Videos demonstrations, • Presentation/seminar, • Interactive class discussions, • Case studies, • Exercises and home works, • Laboratory/Practical experiments based session, • Computer laboratory-based sessions, • Workshops practices, • Directed self- study, • Problem based learning, • Team work (cooperative learning), • Field visits/training,	• Written tests (mid and final terms and quizzes), • Oral exams, • Short reports, • Lab\Project report • Practical lab performance assessment, • Coursework activities assessment, • Home works and assignments, • Presentations.

	• Mini/major project.	
c2. Apply Implement the main algorithms in artificial intelligence in a computationally efficient way	• Interactive lectures & examples, • Tutorials, • Videos demonstrations, • Presentation/seminar, • Interactive class discussions, • Case studies, • Exercises and home works, • Laboratory/Practical experiments based session, • Computer laboratory-based sessions, • Workshops practices, • Directed self- study, • Problem based learning, • Team work (cooperative learning), • Field visits/training, • Mini/major project.	• Written tests (mid and final terms and quizzes), • Oral exams, • Short reports, • Lab\Project report • Practical lab performance assessment, • Coursework activities assessment, • Home works and assignments, • Presentations.

(D) Alignment Course Intended Learning Outcomes of Transferable Skillsto Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1. Conduct a research in the area of study according to rigorous criteria to peers and the community.	• Interactive lectures & examples, • Tutorials,	• Written tests (mid and final terms and quizzes), • Oral exams,

	• Videos demonstrations, • Presentation/seminar, • Interactive class discussions, • Case studies, • Exercises and home works, • Laboratory/Practical experiments based session, • Computer laboratory-based sessions, • Workshops practices, • Directed self- study, • Problem based learning, • Team work (cooperative learning), • Field visits/training, • Mini/major project.	• Short reports, • Lab\Project report • Practical lab performance assessment, • Coursework activities assessment, • Home works and assignments, • Presentations.
d2. Inspect the technical knowledge and skills to develop and implement computer program solutions to a given problem..	• Interactive lectures & examples, • Tutorials, • Videos demonstrations, • Presentation/seminar, • Interactive class discussions, • Case studies, • Exercises and home works, • Laboratory/Practical experiments based	• Written tests (mid and final terms and quizzes), • Oral exams, • Short reports, • Lab\Project report • Practical lab performance assessment, • Coursework activities assessment,

	session, • Computer laboratory-based sessions, • Workshops practices, • Directed self- study, • Problem based learning, • Team work (cooperative learning), • Field visits/training, • Mini/major project.	• Home works and assignments, • Presentations.
d3. Evaluate the relevant information to write reports to recommend appropriate artificial intelligence tools.	• Interactive lectures & examples, • Tutorials, • Videos demonstrations, • Presentation/seminar, • Interactive class discussions, • Case studies, • Exercises and home works, • Laboratory/Practical experiments based session, • Computer laboratory-based sessions, • Workshops practices, • Directed self- study, • Problem based learning, • Team work (cooperative learning),	• Written tests (mid and final terms and quizzes), • Oral exams, • Short reports, • Lab\Project report • Practical lab performance assessment, • Coursework activities assessment, • Home works and assignments, • Presentations.

	• Field visits/training, • Mini/major project.	

IV. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	contact hours
1	**Introduction and Philosophy of Artificial Intelligence (AI)**	a1, a2	■ Characteristics of AI problem. ■ Tools and applications of AI ■ The Methodologies of knowledge based systems ■	1	2
2	**Problem solving techniques of AI**	a2, b2, c1, c2 ,d1,d2	■ The methodologies of intelligent systems ■ Search process in AI ■ Brute force search ■ Heuristic search	1	2
3	**Game Playing and AI**	a2, b1, c1, c2, d1	■ Components of game-playing programs ■ Game playing strategies	1	2
4	**Intelligent systems (Expert Systems)**	a1, b1, c1,d3	■ Architecture of intelligent systems ■ Inference engine ■ Design of Intelligent Systems ■ Applications of intelligent systems	2	4
5	**Learning and Machine Learning**	a2, b1, c1, d1,d2,d3	■ Methodology of Science in Learning ■ Self learning computers ■ Concept Learning ■ Types of Learning. ■ Issues related to Learning algorithms	2	4
7	**Machine Learning**	a1,a2, b1, c1, d1,d3	■ Classification ■ Prediction	1	2
8	**Fuzzy logic**	a2, b1, c1, d1,d3	■ Classical sets ■ Fuzzy sets ■ Linguistic variables	1	

			■ Membership functions ■ Logical operations ■ Inference fuzzy		**2**
9	**Neural networks**	a1, a2, b1, b2,c1, c2, d1,d2	■ Perceptron ■ Artificial Neural Network ■ Backpropagation	**2**	**4**
10	**Genetic Algorithms**	a2, b1, c1, d1,d3	■ Components of a GA ■ GA Framework ■ Fitness Functions ■ Generations, Selection, Crossover, Mutation ■ Genetic Algorithms for search and optimization.	**2**	**4**
11	**Seminar**	b1,c1,c3,d2,d3	Students present their work.	**1**	**2**
Number of Weeks /and Units Per Semester				**14**	**32**

B - Practical Aspect: (if any)

Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes
1	Introduction to Prolog, Syntax of Prolog program, List , Operators, Arithmetic,	**2**	**4**	a1, a2
2	Input , Output, Backtracking, Cut, and Negation	**2**	**4**	a1, a2
3	More built –in predicates, Programming style and technique, and Operations on data structures	**2**	**4**	a1, a2
4	Basic Problem-Solving Strategies, DFS , BFS	**2**	**4**	a1, a2,c1,c2

	Best-First Heuristic Search.			
5	Mid Practical Exam	**1**	**2**	a1, a2,b1,c1,c2
6	Constraint-logic programming, and Recursion Programming	**2**	**4**	a1, a2,c1,c2,b1,d1,d2
7	Representing Knowledge with If-Then Rules, Forward and Backward Chaining in Rule-based Systems	**2**	**4**	a1, a2,c1,c2,b1,b2,d2,d3
8	Grammar Rules in Prolog	**1**	**2**	a1, a2,c1,c2,b1,b2`,d1,d3
9	**Final Practical Exam**	**1**	**2**	**All**
Number of Weeks /and Units Per Semester		**15**	**30**	

C. Tutorial Aspect:

No.	Tutorial	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1				
Number of Weeks /and Units Per Semester				

V. Teaching Strategies of the Course:

V. Teaching Strategies of the Course:

- Interactive lectures & examples,
- Tutorials,
- Videos demonstrations,
- Presentation/seminar,
- Interactive class discussions,
- Case studies,
- Exercises and home works,
- Laboratory/Practical experiments based session,
- Computer laboratory-based sessions,
- Workshops practices,
- Directed self- study,
- Problem based learning,
- Team work (cooperative learning),
- Field visits/training,
- Mini/major project.

VI. Assessment Methods of the Course:

- Written tests (mid and final terms and quizzes),
- Oral exams,
- Short reports,
- Lab\Project report
- Practical lab performance assessment,
- Coursework activities assessment,
- Home works and assignments,
- Presentations.

VI. Assessment Methods of the Course:

VII. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1	**Exercises & Home works (Assignment 1)**	**a1, a2,b1 ,b2,c2, d1**,d2**,d3**	**Weekly**	**5**
2	**Project (single\group) (Assignment 2)**	**a1,a2,b1,b2**	**Quarter**	**10**
Total				15

VIII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	**Exercises & Home works (Assignment 1)**	**Weekly**	**5**	**5%**	**a1, a2,b1 ,b2,c2, d1**,d2**,d3**
2	**Project (single\group) (Assignment 2)**	**Quarter**	**10**	**10%**	**a1,a2,b1,b2**
3	**Participation**	**Weekly**	**5**	**5%**	**b1,c1,c2**,d2**, d3**
4	Mid Practical Exam	**Week 9**	**10**	**10%**	a1, a2,b1,c1,c2
5	**Quizzes**	**End of a topic**	**5**	**5%**	**a1, a2,b1 ,b2,c2, d1,d3**
6	**Mid-Term Exam**	**Week 8**	**10**	**10%**	a1, a2, b1,d3

7	**Final Exam (theoretical)**	**Week 16**	**40**	**40%**	**All CILOs**
8	**Final Exam (practical)**	**Week 15**	**15**	**15%**	**All CILOs**
Total			**100**	**100%**	

IX. Learning Resources:

- *Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).*

Example

1- Niku, Saeed B., 2011, **Introduction to Robotics: Analysis, Control, Applications**, 2nd Edition, USA, Wiley.

1- Required Textbook(s) (maximum two).

1. Russell, S. and Norvig, P. (2020), *Artificial Intelligence: A Modern Approach*, 4th Edition, Pearson Education Pte. Ltd., India.
2. Ivan Bratko , (2012), Prolog Programming for Artificial Intelligence 4th edition, http://www.aw-bc.com/catalog/academic /product/ 0,1144,0201403757,00.html….

2- Essential References.

1. George F. Luger, (2016), *Artificial Intelligence: structure and strategies for complex problem solving*, 6th Edition, Delhi, India, Pearson Education Ltd.
2. Rich, E. and Knight, K. (2010), *Artificial Intelligence*, 3rd Edition, New York, NY: McGraw Hill
3. Web Data Mining: Exploring Hyperlinks, Content, and Usage Data, by Bing Liu, 2nd Edition, , Springer, 2011.
4. Chris Pal , Ian Witten, Eibe Frank, and Mark Hall, (2016), Data Mining: Practical Machine Learning Tools and Techniques (4th Edition). Morgan Kaufmann.
5. Patterson, D. W. (2005), *Introduction to Artificial Intelligence and Expert Systems*, 2nd Edition, Prentice-Hall, India.

3- Electronic Materials and Web Sites *etc*.

1. Visual Prolog download: http://www.visual-Prolog.com/vip6/download/
2. CLIPS: http://clipsrules.sourceforge.net/
3. Wikipedia: http://en.wikipedia.org/wiki/Expert_system
4. http://www.amzi.com/ExpertSystemsInProlog/xsipfrtop.htm
5. http://www.sciencedirect.com/
6. http://dl.acm.org/dl.cfm
7. http://ieeexplore.ieee.org/Xplore/guesthome.jsp

	8. http://www.emeraldinsight.com 9. http://link.springer.com/ 10. http://search.proquest.com/

X. Course Policies:

1	**Class Attendance:** A student should attend not less than 75 % of total hours of the subject; otherwise he/she will not be able to take the exam and will be considered as exam failure. If the student is absent due to illness, he/she should bring a proof statement from university Clinic. If the absent is more than 25% of a course total contact hours, student will be required to retake the entire course again.
2	**Tardy:** For late in attending the class, the student will be initially notified. If he repeated lateness in attending class, he/she will be considered as absent.
3	**Exam Attendance/Punctuality:** A student should attend the exam on time. He/she is permitted to attend an exam half one hour from exam beginning, after that he/she will not be permitted to take the exam and he/she will be considered as absent in exam
4	**Assignments & Projects:** In general one assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time, mostly one week after given the assignment.
5	**Cheating:** For cheating in exam, a student will be considered as fail. In case the cheating is repeated three times during his/her study the student will be disengaged from the Faculty.
6	**Plagiarism:** Plagiarism is the attending of a student the exam of a course instead of another student. If the examination committee proofed a plagiarism of a student, he/she will be

	disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Council Affair of the university or according to the university roles.
7	**Other policies**: -Mobile phones are not allowed to use during a class lecture. It must be closed; **otherwise** the student will be asked to leave the lecture room. - Mobile phones are not allowed in class during the examination. - Lecture notes and assignments might be given directly to students using soft or hard copy.

Template for Course Plan (Syllabus)

Artificial Intelligence
BE475

I. Course Identification and General Information:					
1	**Course Title:**	**Artificial Intelligence**			
2	**Course Code & Number:**	BE475			
3	**Credit Hours:**	**Credit Hours**	**TheoryHours**		**Lab. Hours**
			Lecture	**Exercise**	
		3	2	--	2
4	**Study Level/ Semester at which this Course is offered:**	Level / 5th Semester 1			
5	**Pre –Requisite (if any):**	Computer Programming II			
6	**Co –Requisite (if any):**	None			
7	**Program (s) in which the Course is Offered:**	Bachelor of Biomedical Engineering			
8	**Language of Teaching the Course:**	English			

University of Sana'a
Faculty of Engineering
Department: Biomedical Engineering
Title of the Program: Biomedical Engineering

I. Course Identification and General Information:		
9	**Location of Teaching the Course:**	Faculty of Engineering
10	**Prepared by:**	Prof. Ahmed Sultan Al-Hegami
11	**Reviewed by:**	Dr. ----
12	**Date of Approval:**	

II. Course Description:

The course aims to help student understanding concepts of artificial intelligence in order to solve various problems in different fields. The course focus on Problem representation and reduction, Search techniques and Heuristics, Reasoning and the rules of inference , Learning and Machine Learning, methodology of Science in Learning, Applications of intelligent information systems , Advanced topics in Artificial intelligence such as fuzzy logic, genetic algorithms and neural networks.

III. Course Intended Learning Outcomes (CILOs): (مخرجات تعلم المقرر)

A. Knowledge and Understanding: Upon successful completion of the course, students will be able to:	
a1	Recognize of fundamental and advanced concepts of Artificial Intelligence, its applications.
a2	Describe the techniques of intelligent systems.
B. Intellectual Skills: Upon successful completion of the course, students will be able to:	
b1	Formulate artificial intelligence tasks for real-world data.
b2	Assess the applicability of the technology for a particular scientific problem area, and develop the scientific methods used.
C. Professional and Practical Skills: Upon successful completion of the course, students will be able to:	
c1	Follow development and research in the area to solve real artificial intelligence problems by using the right tools and algorithms.
c2	Apply Implement the main algorithms in artificial intelligence in a computationally efficient way

III. Course Intended Learning Outcomes (CILOs): (مخرجات تعلم المقرر)	
D. Transferable Skills: Upon successful completion of the course, students will be able to:	
d1	Conduct a research in the area of study according to rigorous criteria to peers and the community.
d2	Inspect the technical knowledge and skills to develop and implement computer program solutions to a given problem.
d3	Evaluate the relevant information to write reports to recommend appropriate artificial intelligence tools.

IV. Course Contents:

A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
1	**Introduction and Philosophy of Artificial Intelligence (AI)**	■ Characteristics of AI problem. ■ Tools and applications of AI ■ The Methodologies of knowledge based systems ■	**W1**	**2**
2	**Problem solving techniques of AI**	■ The methodologies of intelligent systems ■ Search process in AI ■ Brute force search ■ Heuristic search	**W2**	**2**
3	**Game Playing and AI**	■ Components of game-playing programs ■ Game playing strategies	**W3**	**2**
4	**Intelligent systems (Expert Systems)**	■ Architecture of intelligent systems ■ Inference engine ■ Design of Intelligent Systems ■ Applications of intelligent systems	**W4-W5**	**4**

IV. Course Contents:

A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
5	**Learning and Machine Learning**	■ Methodology of Science in Learning ■ Self learning computers ■ Concept Learning ■ Types of Learning. ■ Issues related to Learning algorithms	**W6-W7**	**4**
6	**Mid-Term Exam**	Exam	**W8**	**2**
7	**Machine Learning**	■ Classification ■ Prediction	**W9**	**2**
8	**Fuzzy logic**	■ Classical sets ■ Fuzzy sets ■ Linguistic variables ■ Membership functions ■ Logical operations ■ Inference fuzzy	**W10**	**2**
9	**Neural networks**	■ Perceptron ■ Artificial Neural Network ■ Backpropagation	**W11-W12**	**4**
10	**Genetic Algorithms**	■ Components of a GA ■ GA Framework ■ Fitness Functions ■ Generations, Selection, Crossover, Mutation ■ Genetic Algorithms for search and optimization.	**W13-W14**	**4**
11	**Seminar**	Students present their work.	**W15**	**2**
12	**Final Theoretical Exam**	Exam	**W16**	**2**
Number of Weeks /and Units Per Semester			**16**	**32**

B. Case Studies and Practical Aspect:

No.	Tasks/ Experiments	Number of Weeks	Contact Hours
1	Introduction to Prolog, Syntax of Prolog program, List , Operators, Arithmetic,	2	4
2	Input , Output, Backtracking, Cut, and Negation	2	4
3	More built –in predicates, Programming style and technique, and Operations on data structures	2	4
4	Basic Problem-Solving Strategies, DFS , BFS Best-First Heuristic Search.	2	4
5	Mid Practical Exam	1	2
6	Constraint-logic programming, and Recursion Programming	2	4
7	Representing Knowledge with If-Then Rules, Forward and Backward Chaining in Rule-based Systems	2	4
8	Grammar Rules in Prolog	1	2
9	**Final Practical Exam**	1	2
Number of Weeks /and Units Per Semester		**15**	**30**

C. Tutorial Aspect:

No.	Tutorial	Number of Weeks	Contact Hours
1			
Number of Weeks /and Units Per Semester			

V. Teaching Strategies of the Course:

- Interactive lectures & examples,
- Tutorials,
- Videos demonstrations,
- Presentation/seminar,
- Interactive class discussions,

V. Teaching Strategies of the Course:

- Case studies,
- Exercises and home works,
- Laboratory/Practical experiments based session,
- Computer laboratory-based sessions,
- Workshops practices,
- Directed self- study,
- Problem based learning,
- Team work (cooperative learning),
- Field visits/training,
- Mini/major project.

VI. Assessment Methods of the Course:

- Written tests (mid and final terms and quizzes),
- Oral exams,
- Short reports,
- Lab\Project report
- Practical lab performance assessment,
- Coursework activities assessment,
- Home works and assignments,
- Presentations.

VII. Assignments:

No.	Assignments	Week Due	Mark
1	**Exercises & Home works (Assignment 1)**	**Weekly**	**5**
2	**Project (single\group) (Assignment 2)**	**Quarter**	**10**

VII. Assignments:

No.	Assignments	Week Due	Mark
Total			**15**

VIII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1	**Exercises & Home works (Assignment 1)**	**Weekly**	**5**	**5%**
2	**Project (single\group) (Assignment 2)**	**Quarter**	**10**	**10%**
3	**Participation**	**Weekly**	**5**	**5%**
4	Mid Practical Exam	**Week 9**	**10**	**10%**
5	**Quizzes**	**End of a topic**	**5**	**5%**
6	**Mid-Term Exam**	**Week 8**	**10**	**10%**
7	**Final Exam (theoretical)**	**Week 16**	**40**	**40%**
8	**Final Exam (practical)**	**Week 15**	**15**	**15%**
Total			**100**	**100%**

IX. Learning Resources:

- *Written in the following order:*

- *Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).*

Example

- Niku, Saeed B., 2011, **Introduction to Robotics: Analysis, Control, Applications**, 2nd Edition, USA, Wiley.

IX. Learning Resources:

1- Required Textbook(s) (maximum two):

1. Russell, S. and Norvig, P. (2020), *Artificial Intelligence: A Modern Approach*, 4th Edition, Pearson Education Pte. Ltd., India
2. Ivan Bratko , (2012), Prolog Programming for Artificial Intelligence 4th edition, http://www.aw-bc.com/catalog/academic /product/ 0,1144,0201403757,00.html….---.

2- Essential References:

1. George F. Luger, (2016), *Artificial Intelligence: structure and strategies for complex problem solving*, 6th Edition, Delhi, India, Pearson Education Ltd.
2. Rich, E. and Knight, K. (2010), *Artificial Intelligence*, 3rd Edition, New York, NY: McGraw Hill
3. Web Data Mining: Exploring Hyperlinks, Content, and Usage Data, by Bing Liu, 2nd Edition, , Springer, 2011.
4. Chris Pal , Ian Witten, Eibe Frank, and Mark Hall, (2016), Data Mining: Practical Machine Learning Tools and Techniques (4th Edition). Morgan Kaufmann.
5. Patterson, D. W. (2005), *Introduction to Artificial Intelligence and Expert Systems*, 2nd Edition, Prentice-Hall, India.---.

3- Electronic Materials and Web Sites etc.:

1. Visual Prolog download: http://www.visual-Prolog.com/vip6/download/
2. CLIPS: http://clipsrules.sourceforge.net/
3. Wikipedia: http://en.wikipedia.org/wiki/Expert_system
4. http://www.amzi.com/ExpertSystemsInProlog/xsipfrtop.htm
5. http://www.sciencedirect.com/
6. http://dl.acm.org/dl.cfm
7. http://ieeexplore.ieee.org/Xplore/guesthome.jsp
8. http://www.emeraldinsight.com
9. http://link.springer.com/
10. http://search.proquest.com/

X. Course Policies:

1	**Class Attendance:**

	A student should attend not less than 75 % of total hours of the subject; otherwise he/she will not be able to take the exam and will be considered as exam failure. If the student is absent due to illness, he/she should bring a proof statement from university Clinic. If the absent is more than 25% of a course total contact hours, student will be required to retake the entire course again.
2	**Tardy:** For late in attending the class, the student will be initially notified. If he repeated lateness in attending class, he/she will be considered as absent.
3	**Exam Attendance/Punctuality:** A student should attend the exam on time. He/she is permitted to attend an exam half one hour from exam beginning, after that he/she will not be permitted to take the exam and he/she will be considered as absent in exam
4	**Assignments & Projects**: In general one assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time, mostly one week after given the assignment.
5	**Cheating**: For cheating in exam, a student will be considered as fail. In case the cheating is repeated three times during his/her study the student will be disengaged from the Faculty.
6	**Plagiarism**: Plagiarism is the attending of a student the exam of a course instead of another student. If the examination committee proofed a plagiarism of a student, he/she will be disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Council Affair of the university or according to the university roles.
7	**Other policies**: -Mobile phones are not allowed to use during a class lecture. It must be closed; **otherwise** the student will be asked to leave the lecture room. - Mobile phones are not allowed in class during the examination.

	- Lecture notes and assignments might be given directly to students using soft or hard copy.