Republic of Yemen

Ministry of Higher Education & Scientific Research

Council of Academic Accreditation & Quality

Assurance of Higher Education (CAQA)

21 September University for medical and Applied Science

Faculty of Engineering and Computer

Department of Information Technology

Program of Information Technology

Course Specification of

Elective 1 (Artificial Intelligence)

Course Code. (07.01. 730)

2024

T4: This Template is Developed and Approved by CAQA-Yemen, 2023

Prepared by:	Reviewed by:	Head of the Department:	Quality Unit:	Dean
Assoc. Prof. Farouk Al-Fahaidy	Dr. -----			

I. General Information:

1.	Course Title:	Elective 1 (Artificial Intelligence)				
2.	Course Code:	07.01. 730				
3.	Credit Hours:	Credit Hours	Theory Contact Hours		Practical Contact Hours	
			Lecture	Tutorial/ Seminar	Lab	Clinical
		3	2	--	2	--
4.	Level/ Semester at which this Course is offered:	4th Level / 1st Semester				
5.	Pre –Requisite (if any):	Object-Oriented Programming (07.01. 706)				
6.	Co –Requisite (if any):	------				
7.	Program (s) in which the Course is Offered:	Bachelor of Medical Information Technology				
8.	Language of Teaching the Course:	Mixed (English + Arabic)				
9.	Location of Teaching the Course:	Faculty of Medical Technology				
10.	Prepared by:	Assoc. Prof. Farouk Al-Fahaidy				
11	Date and Number of Approval by Council:					

II. Course Description:

This course aims to provide students with basic principles, problem-solving techniques and learning strategies in Artificial Intelligence (AI). AI has become the dominant branch in variant information technology fields especially in medical information technology with its wide applications. Course topics include the foundation of AI, AI problem-solving with searching algorithms, AI Agents, knowledge representation, reasoning & planning, learning strategies with machine learning & Deep Learning, fuzzy logic and genetic algorithms. This course is supported with computer-based lab sessions and

course project, which expected to develop student's problem-solving skills related to AI and its wide applications in IT field.

III. Course Intended Learning Outcomes (CILOs) : Upon successful completion of the course, students will be able to:		Referenced PILOs		
	A. Knowledge and Understanding:	**I, P or M/A**		
a1	Explain the concepts, problem-solving techniques and learning approaches in AI, as well as their practices in health information technology.	I	A1	Demonstrate an understanding of appropriate models, theories, mathematical foundations, and techniques related to Health Information Technology discipline.
a2	Recognize the connection between AI's problem-solving besides searching algorithms & learning.	I	A2	Identify user and Healthcare needs to provide IT based solutions to real-world problem. A4. Demonstrate a sound understanding the computing concept related to analysis, design, implementation, and evaluation of Health information system.
			A3	Demonstrate a profound knowledge in utilizing and adapting IT tools, techniques, practices, and methods for solving computing problems in Health environment.
	B. Intellectual Skills:			
b1	Solve healthcare environmental problems using AI techniques.	P	B1	B1. Critically analyse complex computing problems and propose appropriate information technology based solutions and integrate them

				effectively into the uses and organization Health. **B4**. Evaluate IT based solution to meet a given set of Health requirements in the context of Health Information Technology discipline.
b2	Justify the problems solve according to the Health objectives and desired requirements.	**M**	**B2**	Analyze the impacts of computing on Health objectives and customer needs, and consider them during the analytical processing, selection, integration, configuration and administration of information systems
			B3	Explore variety of challenges and problems related to Health Information Technology to select the optimal solution.
	C. Professional and Practical Skills:			
c1	Familiar with variant AI working environments, techniques and AI programming languages	**P**	**C1**	Employ effectively the concepts, principles of computational tools, techniques used for the construction and documentation of Health Information of varying complexity.
c2	Write AI programs using AI programing languages for different applications in the field of AI.	**P**	**C2**	Design, implement, and test a computing-based solution to meet a given set of computing requirement in the context of Health Information Technology.
			C3	Use systematic approaches to select, develop, apply integrates, and administrate secure computing

				technologies to accomplish user and Health goals.
			C4	Use current techniques, skills, and tools necessary for computing practices.
	D. Transferable Skills:			
d1	Work in a group to achieve desired goals during course's project work or during laboratory activities.	P	D1	Function effectively as an individual, as a member, or leader of a team engaged in activities appropriate to the Health Information Technology discipline to accomplish a common goal.
d2	Follow the standards to achieve reports and presentations.	A	D2	Commit to professional ethics, responsibilities, and norms of professional IT practices.
			D4	Engage in continuing professional development and lifelong learning as an IT professional.
I= Introduced, P=Practiced or M/A= Mastered/Advanced				

	(A) Alignment of Course Intended Learning Outcomes (Knowledge and Understanding) to Teaching Strategies and Assessment Methods:		
	Course Intended Learning Outcomes	**Teaching Strategies**	**Assessment Strategies**
a1	Explain the concepts, problem-solving techniques and learning approaches in AI, as well as their practices in health information technology.	▪ Interactive lectures ▪ Interactive class discussions, ▪ case study, ▪ Exercises and Home Works, ▪ Problem-solving, ▪ Seminar/project/presentation.	▪ Written tests (mid and final terms and quizzes), ▪ Home works and assignments, ▪Reports, ▪Project presentation.
a2	Recognize the connection between AI's problem-solving besides searching	▪ Interactive lectures ▪ Interactive class discussions,	▪ Written tests (mid and final terms and

	algorithms & learning.	▪ case study, ▪ Exercises and Home Works, ▪ Problem-solving, ▪ Group work, ▪ Seminar/project/presentation.	quizzes), ▪ Home works and assignments, ▪ Reports, ▪ Project presentation.
a3		▪	▪
		▪	▪
		▪	▪
	(B) Alignment of Course Intended Learning Outcomes (Intellectual Skills) to Teaching Strategies and Assessment Methods:		
	Course Intended Learning Outcomes	**Teaching Strategies**	**Assessment Strategies**
b1	Solve healthcare environmental problems using AI techniques.	▪ Active Lectures, ▪ Interactive Class Discussions, ▪ Computer-based sessions, ▪ Problem-solving, ▪ Exercises and Home Works, ▪ Group work, ▪ Presentation, ▪ Project.	▪ Written exams, ▪ Quizzes, ▪ Practical assessment & exam, ▪ Project, ▪ Short Report, ▪ Assignment work.
b2	Justify the problems solve according to the Health objectives and desired requirements.	▪ Active Lectures, ▪ Interactive Class Discussions, ▪ Computer-based sessions, ▪ Problem-solving, ▪ Exercises and Home Works, ▪ Group work, ▪ Presentation, ▪ Project.	▪ Written exams, ▪ Quizzes, ▪ Practical assessment & exam, ▪ Project, ▪ Short Report, ▪ Assignment work.
	…	▪	▪
		▪	▪
		▪	▪
	(C) Alignment of Course Intended Learning Outcomes (Professional and Practical Skills) to Teaching Strategies and Assessment Methods:		

	Course Intended Learning Outcomes	Teaching Strategies	Assessment Strategies
c1	Familiar with variant AI working environments, techniques and AI programming languages	▪ Active Lectures, ▪ Interactive Class Discussions, ▪ Computer-based sessions ▪ Problem-solving, ▪ Exercises and Home Works, ▪ Project, ▪ Group work.	▪ Written exams, ▪ Quizzes, ▪ Practical exam, ▪ Assignment, ▪ Report submission, ▪ Project presentation.
c2	Write AI programs using AI programing languages for different applications in the field of AI.	▪ Computer-based sessions, ▪ Exercises and Home Works, ▪ Project, ▪ Group work.	▪ Quizzes, ▪ Practical exam, ▪ Assignment, ▪ Report submission, ▪ Project presentation.
	…	▪	▪
		▪	▪

(D) Alignment of Course Intended Learning Outcomes (Transferable Skills) to Teaching Strategies and Assessment Methods:

	Course Intended Learning Outcomes	Teaching Strategies	Assessment Strategies
d1	Work in a group to achieve desired goals during course's project work or during laboratory activities.	▪ Computer-based Sessions, ▪ Group work, ▪ Directed Self-study, ▪ Exercises and Home Works, ▪ Seminar/ project/presentation, ▪ Laboratory based session, ▪ Project.	▪ Project presentation, ▪ Laboratory assessment & exam, ▪ Assignment, ▪ Report/Project,
d2	Follow the standards to achieve reports and presentations.	▪ Computer-based Sessions, ▪ Group work, ▪ Exercises and Home Works, ▪ Seminar/ project/presentation, ▪ Project.	▪ Project presentation, ▪ Laboratory assessment & exam, ▪ Assignment, ▪ Report/Project
	…	▪	▪

IV. Course Contents:

A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	**AI Overview**	– Definition of AI – Foundations of AI – AI problems – Introduction to AI languages – AI techniques – Intelligent agents – Agent structure – Nature of environment	1	2	a1
2	**Problem-Solving & Search**	– Problem-solving (with example problems) – Searching for solution – uninformed search strategies – Heuristic search strategies – Heuristic functions – Local search algorithms and optimization problems – Searching with nondeterministic action – Searching with partial observation	2	4	a1, a2, b1, b2
3	**Intelligent systems (Expert Systems)**	– Definition and Environmental Architecture of intelligent systems – Inference engine – Design of Intelligent Systems – Applications of intelligent systems	1	2	a1, b1, b2
4	**Game Playing Overview**	– Optimal decisions in games (the minimax algorithm, optimal decision in multiplayer games) – Alpha-beta pruning	1	2	a2, b1, b2
5	**Knowledge, Reasoning, and Planning**	– Logical agents – First-order logic – Inference in first-order logic – Planning and acting in the real world – Classical planning – Knowledge structure	2	4	a1, a2, b1, b2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
		– Knowledge representation paradigms			
6	**Mid-term Theoretical Exam**	– All Previous Topics	1	2	a1, a2, b1, b2
7	**Learning and Machine Learning**	– Learning Strategies, – Self-learning computers – Concepts of Learning – Types of Learning. – Issues related to Learning algorithms – Classification – Prediction	1	2	a1, a2, b1, b2
8	**Neural networks & Deep learning**	– 1G & 2G NNs – Perceptron: illustration with example – Artificial Neural Networks, – Forward propagation & Backpropagation, – NNs Evaluation – Working environments like Anaconda and PyCharm – Deep learning Programming with KERAS Model – Convolution Neural Networks (CNNs)	3	6	a1, a2, b1, b2, c1
9	**Fuzzy logic**	– Classical sets – Fuzzy sets – Linguistic variables – Membership functions – Logical operations – Inference fuzzy	2	4	a2, b1, b2, c1
10	**Genetic Algorithms**	– Components of a GA – GA Framework – Fitness Functions – Generations, Selection, Crossover, Mutation – Genetic Algorithms for search and optimization.	1	2	a2, b1, b2, c1

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
11	Final Theoretical Exam	– ALL Topics	1	2	a1, a2, b1, b2, c1
Number of Weeks /and Units Per Semester			16	32	

B. Practical Aspect (Lab/Clinical):

No.	Tasks/ Experiments	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	- AI programming language: Basic concepts	1	2	b1, c1, c2, d1
2	- Basic Problem-Solving Strategies, DFS, BFS - Best-First Heuristic Search.	2	4	b1, b2, c1, c2, d1
3	– Using the AI prog. language in Logic Programming & Reasoning.	2	4	b1, b2, c1, c2, d1
4	– Using the AI prog. language in Gaming	1	2	b2, c1, c2, d1
5	– Basic Python Libraries for Data-science	2	4	b1, b2, c1, c2, d1
6	– Using the AI prog. language in Machine Learning	1	2	b1, b2, c1, c2, d1
7	– Programming with Keras or any other modern model, – Perceptron NN & ANNs, – Neural Networks,	4	8	b1, b2, c1, c2, d1

No.	Tasks/ Experiments	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
	– Deep learning with CNNs, – Fuzzy Logic, – Genetic Algorithm.			
8	– **Project Submission & Presentations**	1	2	a1, a2, b1, b2, c1, c2, d1, d2
9	– **Final Practical Exam.**	1	2	b1, b2, c1, c2, d1
Number of Weeks /and Units Per Semester		**15**	**30**	

C. Tutorial Aspect (if any):

No.	Tutorial	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	NONE			
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

No.	Tutorial	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
13				
14				
Number of Weeks /and Units Per Semester				

VII. Assignments & Reports:

No.	Assignments	Week Due	Mark	Aligned CILOs (symbols)
1	**Assignment 1:** – Problem Solving and AI Searching Techniques, – Searching web and prepare short report on AI's Problem-solving methods/techniques.	3rd – 5th	3	a1, a2, b1, b2, d1, d2
2	**Assignment 2:** – Homework and Report on Game Playing, Knowledge Reasoning & Planning and working environments.	6th & 7th	3	a2, b1, b2, c1, d1, d2
3	**Assignment 3:** Machine Learning	9th	3	a1, a2, b1, b2, c1, c2, d1
4	**Assignment 4:** Homework & Reports NNs, Perceptron NN, Deep Learning, Fuzzy Logic, Genetic Algorithm and.	10th – 13th	6	b1, b2, c1, c2, d1, d2
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	Assignments & Reports	3rd – 13th	15	10%	a1, a2, b1, b2, c1, c2, d1, d2
2	Quizzes 1 & 2	6th & 11th	10	6.67%	a1, a2, b1, b2, c1, c2
3	Mid-Term Theoretical Exam	8th	20	13.33%	a1, a2, b1, b2
4	Final Practical Exam including Project Presentation & Evaluation	14th & 15th	30	20%	a1, a2, b1, b2, c1, c2, d1, d2
5	Final Theoretical Exam	16th	75	50%	a1, a2, b1, b2, c1
Total			150	100%	

IX. Learning Resources:

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

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- Chris Pal , Ian Witten, Eibe Frank, and Mark Hall, (2016), Data Mining: Practical Machine Learning Tools and Techniques (4th Edition). Morgan Kaufmann.

2- Essential References:

1- George F. Luger, (2016), *Artificial Intelligence: structure and strategies for complex problem solving*, 6th Edition, Delhi, India, Pearson Education Ltd.

1- Rich, E. and Knight, K. (2010), *Artificial Intelligence*, 3rd Edition, New York, NY: McGraw Hill

2- Web Data Mining: Exploring Hyperlinks, Content, and Usage Data, by Bing Liu, 2nd Edition, , Springer, 2011.

3- Ivan Bratko , (2012), Prolog Programming for Artificial Intelligence 4th edition.

4- Patterson, D. W. (2005), *Introduction to Artificial Intelligence and Expert Systems*, 2nd Edition, Prentice-Hall, India.

3- Electronic Materials and Web Sites etc.:
Websites: 1- Book and Chapter's notes: http://www.aw-bc.com/catalog/academic/product/0,1144,0201403757,00.html 2- Visual Prolog download: http://www.visual-Prolog.com/vip6/download/ 3- CLIPS: http://clipsrules.sourceforge.net/ 4- Wikipedia: http://en.wikipedia.org/wiki/Expert_system 5- http://www.amzi.com/ExpertSystemsInProlog/xsipfrtop.htm 6- http://www.sciencedirect.com/ 7- http://dl.acm.org/dl.cfm 8- **Journals:** 1- http://ieeexplore.ieee.org/Xplore/guesthome.jsp 2- http://www.emeraldinsight.com 3- http://link.springer.com/ **Other Web Sources:** 1…… 2. MIT Courses: http://www.courses.mit.com

X. Course Policies: (Based on the Uniform Students' By law (2007)	
1	**Class Attendance:** Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.
2	**Tardiness:** A student will be considered late if he/she is not in class after 10 minutes of the start time of class.
3	**Exam Attendance/Punctuality:** No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed.
4	**Assignments & Projects:** Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	**Cheating:**

	Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
6	**Forgery and Impersonation:** Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
7	**Other policies:** The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration.

Republic of Yemen
Ministry of Higher Education & Scientific Research
University: 21 September University for Medical & Applied Sciences

الجمهورية اليمنية
وزارة التعليم العالي والبحث العلمي
جامعة: جامعة 21سبتمبر للعلوم الطبية والتطبيقية

Faculty of Medical Technology

Department of Medical Information Technology

Program of Medical Information Technology

Course Plan (Syllabus) of Elective 1 (Artificial Intelligence)

Course Code. 07.01.730

I. Information about Faculty Member Responsible for the Course:								
Name of Faculty Member:		Office Hours						
Location& Telephone No.:	777909815							
E-mail:	farouqakh@gmail.com	SAT	SUN	MON	TUE	WED	THU	

2025/2024

II. Course Identification and General Information:

	Course Title:	Elective 1 (Artificial Intelligence)				
	Course Code:	07.01. 730				
	Credit Hours:	**Credit Hours**	**Theory Contact Hours**		**Practical Contact Hours**	
			Lecture	**Tutorial/Seminar**	**Lab**	**Clinical**
		3	2	--	2 should be considered in the plan	--
	Level/ Semester at which this Course is offered:	4th Level / 1st Semester				
	Pre –Requisite (if any):	Object-Oriented Programming (07.01. 706)				
	Co –Requisite (if any):	------				
	Program (s) in which the Course is Offered:	Bachelor of Medical Information Technology				
	Language of Teaching the Course:	Mixed (English + Arabic)				
	Location of Teaching the Course:	Faculty of Medical Technology				
	Prepared by:	Assoc. Prof. Farouk Al-Fahaidy				
11	**Date and Number of Approval by Council:**					

III. Course Description:

This course aims to provide students with basic principles, problem-solving techniques and learning strategies in Artificial Intelligence (AI). AI has become the dominant branch in variant information technology fields especially in medical information technology with its wide applications. Course topics include the foundation of AI, AI problem-solving with searching algorithms, AI Agents, knowledge representation, reasoning & planning, learning strategies with machine learning & Deep Learning, fuzzy logic and genetic algorithms. This course is supported with computer-based lab sessions and course project, which expected to develop student's problem-solving skills related to AI and its wide applications in IT field.

IV. Course Intended Learning Outcomes (CILOs) :

Upon successful completion of the Course, student will be able to:

	A. **Knowledge and Understanding:**
a1	Explain the concepts, problem-solving techniques and learning approaches in AI, as well as their practices in health information technology.
a2	Recognize the connection between AI's problem-solving besides searching algorithms & learning.
	B. **Intellectual Skills:**
b1	Solve **healthcare environmental problems** using AI techniques.
b2	Justify the problems solve according to the Health objectives and desired requirements.
	C. **Professional and Practical Skills:**
c1	Familiar with variant AI working environments, techniques and AI programming languages
c2	**Write AI programs using AI programing** languages for different applications in the field of AI.
	D. **Transferable Skills:**
d1	**Work in a group** to achieve desired goals during course's project work or during laboratory

	activities.
d2	Follow the standards to achieve reports and presentations.

V. Course Contents:

A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
1	AI Overview	– Definition of AI – Foundations of AI – AI problems – Introduction to AI languages – AI techniques – Intelligent agents – Agent structure – Nature of environment	1	2
2	Problem-Solving & Search	– Problem-solving (with example problems) – Searching for solution – uninformed search strategies – Heuristic search strategies – Heuristic functions – Local search algorithms and optimization problems – Searching with nondeterministic action – Searching with partial observation	2	4
3	Intelligent systems (Expert Systems)	– Definition and Environmental Architecture of intelligent systems – Inference engine – Design of Intelligent Systems – Applications of intelligent systems	1	2
4	Game Playing Overview	– Optimal decisions in games (the minimax algorithm, optimal decision in multiplayer games) – Alpha-beta pruning	1	2
5	Knowledge, Reasoning, and	– Logical agents – First-order logic	2	4

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
	Planning	– Inference in first-order logic – Planning and acting in the real world – Classical planning – Knowledge structure – Knowledge representation paradigms		
6	**Mid-term Theoretical Exam**	All Previous Topics	1	2
7	**Learning and Machine Learning**	– Learning Strategies, – Self-learning computers – Concepts of Learning – Types of Learning. – Issues related to Learning algorithms – Classification – Prediction	1	2
8	**Neural networks & Deep learning**	– 1G & 2G NNs – Perceptron: illustration with example – Artificial Neural Networks, – Forward propagation & Backpropagation, – NNs Evaluation – Working environments like Anaconda and PyCharm – Deep learning Programming with KERAS Model – Convolution Neural Networks (CNNs)	3	6
9	**Fuzzy logic**	– Classical sets – Fuzzy sets – Linguistic variables – Membership functions – Logical operations – Inference fuzzy	2	4
10	**Genetic Algorithms**	– Components of a GA – GA Framework – Fitness Functions – Generations, Selection, Crossover,	1	2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
		Mutation – Genetic Algorithms for search and optimization.		
11	Final Theoretical Exam	– ALL Topics	1	2
Number of Weeks /and Units Per Semester			16	32

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
1	AI Overview	– Definition of AI – Foundations of AI – AI problems – Introduction to AI languages – AI techniques – Intelligent agents – Agent structure – Nature of environment	1	2
2	Problem-Solving & Search	– Problem-solving (with example problems) – Searching for solution – uninformed search strategies – Heuristic search strategies – Heuristic functions – Local search algorithms and optimization problems – Searching with nondeterministic action – Searching with partial observation	2	4
3	Intelligent systems (Expert Systems)	– Definition and Environmental Architecture of intelligent systems – Inference engine – Design of Intelligent Systems – Applications of intelligent systems	1	2
4	Game Playing Overview	– Optimal decisions in games (the minimax algorithm, optimal decision in multiplayer games) – Alpha-beta pruning	1	2
5	Knowledge, Reasoning, and	– Logical agents – First-order logic	2	4

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
	Planning	– Inference in first-order logic – Planning and acting in the real world – Classical planning – Knowledge structure – Knowledge representation paradigms		
6	**Mid-term Theoretical Exam**	– All Previous Topics	1	2
7	**Learning and Machine Learning**	– Learning Strategies, – Self-learning computers – Concepts of Learning – Types of Learning. – Issues related to Learning algorithms – Classification – Prediction	1	2
8	**Neural networks & Deep learning**	– 1G & 2G NNs – Perceptron: illustration with example – Artificial Neural Networks, – Forward propagation & Backpropagation, – NNs Evaluation – Working environments like Anaconda and PyCharm – Deep learning Programming with KERAS Model – Convolution Neural Networks (CNNs)	3	6
9	**Fuzzy logic**	– Classical sets – Fuzzy sets – Linguistic variables – Membership functions – Logical operations – Inference fuzzy	2	4
10	**Genetic Algorithms**	– Components of a GA – GA Framework – Fitness Functions – Generations, Selection, Crossover, Mutation – Genetic Algorithms for search and	1	2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
		optimization.		
11	**Final Theoretical Exam**	– ALL Topics	1	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	AI programming language: Basic concepts	1	2
2	- Basic Problem-Solving Strategies, DFS, BFS Best-First Heuristic Search.	2	4
3	Using the AI prog. language in Logic Programming & Reasoning.	2	4
4	Using the AI prog. language in Gaming	1	2
5	Basic Python Libraries for Data-science	2	4
6	Using the AI prog. language in Machine Learning	1	2
7	– Programming with Keras or any other modern model, – Perceptron NN & ANNs, – Neural Networks, – Deep learning with CNNs, – Fuzzy Logic, – Genetic Algorithm.	4	8
8	**Project Submission & Presentations**	**1**	**2**
9	**Final Practical Exam.**	1	2
Number of Weeks /and Units Per Semester		**15**	**30**

No.	Tasks/ Experiments	Number of Weeks	Contact Hours

No.	Tasks/ Experiments	Number of Weeks	Contact Hours
1	- AI programming language: Basic concepts	1	2
2	- Basic Problem-Solving Strategies, DFS, BFS - Best-First Heuristic Search.	2	4
3	– Using the AI prog. language in Logic Programming & Reasoning.	2	4
4	– Using the AI prog. language in Gaming	1	2
5	– Basic Python Libraries for Data-science	2	4
6	– Using the AI prog. language in Machine Learning	1	2
7	– Programming with Keras or any other modern model, – Perceptron NN & ANNs, – Neural Networks, – Deep learning with CNNs, – Fuzzy Logic, – Genetic Algorithm.	4	8
8	– **Project Submission & Presentations**	**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	NONE		
2			

No.	Tutorial	Number of Weeks	Contact Hours
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
Number of Weeks /and Units Per Semester			

VI. Teaching Strategies of the Course:

- Active Lectures,
- Interactive Class Discussions,
- Computer-based sessions,
- Problem-solving,
- Exercises and Home Works,
- Directed Self-study,
- Group work,
- Seminar/project/presentation.

VII. Assessment Methods of the Course:

- Written exams,
- Quizzes,
- Practical assessment & exam,
- Project presentation,

- Short Report,
- Report/Project,
- Assignment Work.

VIII. Assignments & Reports:

No.	Assignments	Week Due	Mark
1	**Assignment 1:** – Problem Solving and AI Searching Techniques, **Searching web and prepare short report on AI's Problem-solving methods/techniques.**	3rd – 5th	3
2	**Assignment 2:** Homework and Report on Game Playing, Knowledge Reasoning & Planning and working environments.	6th & 7th	3
3	**Assignment 3:** Machine Learning	9th	3
4	**Assignment 4:** Homework & Reports NNs, Perceptron NN, Deep Learning, Fuzzy Logic, Genetic Algorithm and.	10th – 13th	6
Total			**15**

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

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1	Assignments & Reports	3rd – 13th	15	10%
2	Quizzes 1 & 2	6th & 11th	10	6.67%
3	Mid-Term Theoretical Exam	8th	20	13.33%
4	Final Practical Exam including Project Presentation & Evaluation	14th & 15th	30	20%
5	Final Theoretical Exam	16th	75	50%

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
Total			150	100%

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1	Assignments & Reports	3rd – 13th	15	10%
2	Quizzes 1 & 2	6th & 11th	10	6.67%
3	Mid-Term Theoretical Exam	8th	20	13.33%
4	Final Practical Exam including Project Presentation & Evaluation	14th & 15th	30	20%
5	Final Theoretical Exam	16th	75	50%
Total			150	100%

X. Learning Resources:

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

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..

Chris Pal , Ian Witten, Eibe Frank, and Mark Hall, (2016), Data Mining: Practical Machine Learning Tools and Techniques (4th Edition). Morgan Kaufmann.

2- Essential References:

2- George F. Luger, (2016), *Artificial Intelligence: structure and strategies for complex problem solving*, 6th Edition, Delhi, India, Pearson Education Ltd.

3- Rich, E. and Knight, K. (2010), *Artificial Intelligence*, 3rd Edition, New York, NY: McGraw Hill

4- Web Data Mining: Exploring Hyperlinks, Content, and Usage Data, by Bing Liu, 2nd Edition, , Springer, 2011.

5- Ivan Bratko , (2012), Prolog Programming for Artificial Intelligence 4th edition.

6- Patterson, D. W. (2005), *Introduction to Artificial Intelligence and Expert Systems*, 2nd Edition, Prentice-Hall, India.

3- Electronic Materials and Web Sites etc.:
Websites: 7- Book and Chapter's notes: http://www.aw-bc.com/catalog/academic/product/0,1144,0201403757,00.html 8- Visual Prolog download: http://www.visual-Prolog.com/vip6/download/ 9- CLIPS: http://clipsrules.sourceforge.net/ 10- Wikipedia: http://en.wikipedia.org/wiki/Expert_system 11- http://www.amzi.com/ExpertSystemsInProlog/xsipfrtop.htm 12- http://www.sciencedirect.com/ 13- http://dl.acm.org/dl.cfm 14- 15- Journals: 16- http://ieeexplore.ieee.org/Xplore/guesthome.jsp 17- http://www.emeraldinsight.com 18- http://link.springer.com/ 19- Other Web Sources: 20- 1…… 21- 2. MIT Courses: http://www.courses.mit.com

XI. Course Policies: (Based on the Uniform Students' Bylaw (2007)

1	**Class Attendance:** Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.
2	**Tardiness:** A student will be considered late if he/she is not in class after 10 minutes of the start time of class.
3	**Exam Attendance/Punctuality:** No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed.
4	**Assignments & Projects:** Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	**Cheating:**

	Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
6	**Forgery and Impersonation:** Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
7	**Other policies:** The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration.