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الجمهورية اليمنية
وزارة التعليم العالي والبحث العلمي
جامعة ـ صنعاء
كلية الحاسوب وتكنولوجيا المعلومات
وحدة ضمان الجودة

Course Specification of Artificial Intelligence

Course No (...................)

2020/2021

Head of Department	Vise Dean for Quality Assurance	Dean of the Faculty	Dean of Academic Development center and Quality
Dr. Ahmed Al-shalabi	Dr. Anwar Al-Shamiri	Dr. Nagi Al-Shibani	Assoc. Prof. Dr.Huda Al.Emad
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I. Course Identification and General Information:						
1	**Course Title:**	Artificial Intelligence				
2	**Course Code & Number:**	---------				
3	**Credit hours:**	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2	-	2	-	3
4	**Study level/ semester at which this course is offered:**	3rd Level– 2nd Semester				
5	**Pre –requisite (if any):**	Programming Fundamentals				
6	**Co –requisite (if any):**	None				
7	**Program (s) in which the course is offered:**	CS				
8	**Language of teaching the course:**	English/Arabic				
9	**Study System**	Term based system				
10	**Mode of delivery:**	Full Time				
11	**Location of teaching the course:**	Faculty of Computer and Information Technology				
12	**Prepared By:**	Dr.Ghaleb AL.Gaphari				
13	**Date of Approval**					

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II. Course Description:

The goal of Artificial Intelligence is to build software systems that behave "intelligently". By this, we mean that the computer systems "do the right thing" in complex environments--that they act optimally given the limited information and computational resources available. This course provides an introduction to artificial intelligence by covering the following topics: An overview of Artificial Intelligence (AI), Artificial intelligence as representation and search, Knowledge representation and reasoning, Machine learning techniques, Hybrid intelligent techniques and maintenance of intelligent systems.

III. Course Intended learning outcomes (CILOs) of the course (maximum 8CILOs)		Referenced PILOs (Only write code number of referenced Program Intended learning outcomes)
a1	Understand the history, development and various applications of artificial intelligence	A1, A6
a2	Familiarize with propositional and predicate logic and their roles in logic programming	
b1	Deepen thoughts and understanding of human abilities such as learning, reasoning and planning	B4, B6
b2	Explore the nature of human intelligence and its role in problem solving	
c1	Ability to implement Machine Learning algorithms such as decision tree induction, artificial neural networks, and genetic algorithm	C1,C2
c2	Apply and integrate various artificial intelligence techniques in intelligent system development as well as understand the importance of maintaining intelligent systems	C2

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d1	Manage tasks and resources	D1, D6
D2	Collaborate effectively within team	

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- Understand the history, development and various applications of artificial intelligence	Lecture, Discussion, Video	Oral, Writing Exam
a2-Familiarize with propositional and predicate logic and their roles in logic programming	Lecture , Discussion	Oral, Writing Exam

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1- Deepen thoughts and understanding of human abilities such as learning, reasoning and planning	Lecture with Examples	Oral
b2-Explore the nature of human intelligence and its role in problem solving	Discussion	Oral, Exercise

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(C) Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
C1-Ability to implement Machine Learning algorithms such as decision tree induction, artificial neural networks, and genetic algorithm	Building Algorithms	Implementation , Exercise
C2-Apply and integrate various artificial intelligence techniques in intelligent system development as well as understand the importance of maintaining intelligent systems	Considering Case study	Exercise, Presentation

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

Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1-Manage tasks and resources	Considering Case study	Exercise, Presentation
d2-Collaborate effectively within team	Considering Case study	Exercise, Presentation

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IV. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	contact hours
1	Introduction to Artificial Intelligence (AI)	a1-a6	- Roots of AI - Scope of AI. - Early history and applications. - Overview of: ✓ The development of formal logic; ✓ The Turing test; ✓ AI application areas: ✓ Game playing, ✓ Automated theorem proving, ✓ Expert systems, ✓ Natural language understanding and semantics, ✓ Planning and robotics, ✓ Machine learning.	1	3
2	Artificial intelligence as representation and search.	a1-a4, a6, b2	- The Propositional Calculus and Predicate Calculus; - Using inference rules to produce predicate calculus expressions; - Strategies and structures for state space search; - Heuristic search; - Recursion-based search;	3	9

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			- Admissibility, monotonicity and informed-ness of search algorithms		
3	Knowledge representation and reasoning	a1, a4, a6, b1,b2,c2,d1,d2	- Rule-based production systems; - Case-based reasoning systems and model based reasoning systems; - Reasoning under uncertain situations: - Stochastic methods, - Fuzzy logic and fuzzy set theory; - Fuzzy expert systems	3	9
4	Machine learning	a1, c1,c2, d1,d2	- Decision tree induction algorithms; - Artificial neural networks; - Genetic algorithms - Other ML algorithms	4	12
5	Hybrid intelligent techniques and maintenance of intelligent systems	a1, c1,c2, d1,d2	- Hybridization of neural networks, fuzzy logic, genetic algorithms and other intelligent techniques for problem solving; maintenance of the completeness, correctness and consistency of intelligent systems	3	9
Number of Weeks /and Units Per Semester				**14**	**28**

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B - Practical Aspect: (if any)

Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes
Number of Weeks /and Units Per Semester				

V. Teaching strategies of the course:

- direct delivery Lectures
- interactive student problem solving
- Tutorial Exercises
- Practical Exercises
- Presentation

VI. Assignments:

No	Assignments:	Aligned CILOs(symbols)	Week Due	Mark
1	Implement some Machine Learning algorithms (suitable with that problem).	a3, a4, a6, b2 c1, c2, d1, d2	3rd	6
2	Explore the nature of human intelligence and its role in problem solving	a3, a4, a6, b2 c1, c2, d1, d2	5th	6

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3	Convert the existing system to Fuzzy System	a3, a4, a6, b2 c1, c2, d1, d2	8th	6
4	Integrate various artificial intelligence techniques in intelligent system.	a3, a4, a6, b2 c1, c2, d1, d2	12th	6
5	Presentation and discussion	a3, a4, a6, b2 c1, c2, d1, d2	15th	6
Total				30%

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

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Exercise	3rd, 5th, 8th, 12th, 15th	30	30%	a3, a4, a6, b2 c1, c2, d1, d2
2	Mid-Exam	8th	10	10%	a1-a3
3	End-Exam	16th	60	60%	a1-a6, c1-c2

VIII. Learning Resources:

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

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

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	1. Mariusz Flasiński, 2016 , *Introduction to Artificial Intelligence*, Springer 2. George F. Luger, 2009, *Artificial Intelligence: Structures and Strategies for Complex Problem Solving*, 6th Edition, Addison Wesley.
2- Essential References.	
	1. Michael Negnevitsky, 2005, *Artificial Intelligence: A Guide to Intelligent Systems*. 2nd edition, Addison Wesley **2.** LISP craft by Robert Wilensky, W.W. Norton.
3- Electronic Materials and Web Sites *etc*.	
	1- https://www.tutorialspoint.com/artificial_intelligence/AI Programming Resources

IX.	Course Policies:
	Unless otherwise stated, the normal course administration policies and rules of the Faculty of Computer and Information Technology apply. For the policy, see: --------------------------------- The University Regulations on academic misconduct will be strictly enforced. Please refer to **-----------**
1	**Class Attendance:** A student should attend not less than 75 % of total hours of the subject; otherwise he 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
2	**Tardy:** For late in attending the class, the student will be initially notified. If he repeated lateness in attending class, he will be considered as absent.
3	**Exam Attendance/Punctuality:** A student should attend the exam on time. He 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 & Project**

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	The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time.
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 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.
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 my given directly to students using soft or hard copy

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Faculty of Computer & Information Technology

Department of Computer Science

Program of Computer Science

Course syllabus of Artificial Intelligence

Course No (...................)

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I. - Information about Faculty Member Responsible for the Course:

Name of Faculty Member		Office Hours					
Location& Telephone No.		SAT	SUN	MON	TUE	WED	THU
E-mail							

X. Course Identification and General Information:

1	Course Title:	Artificial Intelligence				
2	Course Code & Number:	………..				
3	Credit hours:	C.H				TOTAL
		Th.	Seminar	Pr	Tr.	
		2	-	2	-	3
4	Study level/ semester at which this course is offered:	3rd Level– 2nd Semester				
5	Pre –requisite (if any):	Programming Fundamentals				
6	Co –requisite (if any):	None				
7	Program (s) in which the course is offered:	CS				
8	Language of teaching the course:	English/Arabic				
9	Study System	Term based system				
10	Mode of delivery:	Full Time				
11	Location of teaching the course:	Faculty of Computer and Information Technology				

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I.   Course Description:

The goal of Artificial Intelligence is to build software systems that behave "intelligently". By this, we mean that the computer systems "do the right thing" in complex environments--that they act optimally given the limited information and computational resources available. This course provides an introduction to artificial intelligence by covering the following topics: An overview of Artificial Intelligence (AI), Artificial intelligence as representation and search, Knowledge representation and reasoning, Machine learning techniques, Hybrid intelligent techniques and maintenance of intelligent systems.

II. Intended learning outcomes (ILOs) of the course:

a1. Understand the history, development and various applications of artificial intelligence	
a2. Familiarize with propositional and predicate logic and their roles in logic programming	
b1.Deepen thoughts and understanding of human abilities such as learning, reasoning and planning	
b2. Explore the nature of human intelligence and its role in problem solving	
c1. Ability to implement Machine Learning algorithms such as decision tree induction, artificial neural networks, and genetic algorithm	
c2. Apply and integrate various artificial intelligence techniques in intelligent system development as well as understand the importance of maintaining intelligent systems	
d1. Manage tasks and resources	
d2. Collaborate effectively within team	

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III. Course Content:

- Distribution of Semester Weekly Plan of Course Topics/Items and Activities.

A – Theoretical Aspect:

Order	Topics List	Week Due	Contact Hours

1	- **An Introduction to Artificial Intelligence (AI):**
	✓ Roots of AI
	✓ Scope of AI.
	✓ Early history and applications.
	✓ Overview of:
	  ➢ The development of formal logic;
	  ➢ The Turing test;
	  ➢ AI application areas:
	  ➢ Game playing,
	  ➢ Automated theorem proving,
	  ➢ Expert systems,
	  ➢ Natural language understanding and semantics,
	  ➢ Planning and robotics,
	  ➢ Machine learning.
		1st	3

2	- **Artificial intelligence as representation and search** ✓ The Propositional Calculus and Predicate Calculus; ✓ Using inference rules to produce predicate calculus expressions; ✓ Strategies and structures for state space search; ✓ Heuristic search; ✓ Recursion-based search; ✓ Admissibility, monotonicity and informed-ness of search algorithms	2nd-4th	9
3	- **Knowledge representation and reasoning** ✓ Rule-based production systems; ✓ Case-based reasoning systems and model based reasoning systems; ✓ Reasoning under uncertain situations: ✓ Stochastic methods, ✓ Fuzzy logic and fuzzy set theory; ✓ Fuzzy expert systems	5th-7th	9

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Order	Topics List	Week	Units
4	- **Mid-Exam**	8th	3

5	- **Machine learning**
	  ✓ Decision tree induction algorithms;
	  ✓ Artificial neural networks;
	  ✓ Genetic algorithms
	  ✓ Other ML algorithms
		9th - 12th	12

6	- **Hybrid intelligent techniques and maintenance of intelligent systems** ✓ Hybridization of neural networks, fuzzy logic, genetic algorithms and other intelligent techniques for problem solving; maintenance of the completeness, correctness and consistency of intelligent systems	13th - 15th	9
11	- **End-Exam**	16th	3
Number of Weeks /and Units Per Semester		16	48

B – Practical Aspect: *(if any)*			
Order	**Topics List**	**Week Due**	**Contact Hours**
1			
Number of Weeks /and Units Per Semester			

VI. Teaching strategies of the course:

- direct delivery Lectures
- interactive student problem solving

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- Tutorial Exercises
- Practical Exercises
- Presentation

VII. Assignments:

No	Assignments:	Aligned CILOs(symbols)	Week Due	Mark
1	Implement some Machine Learning algorithms (suitable with that problem).	a3, a4, a6, b2 c1, c2, d1, d2	3rd	6
2	Explore the nature of human intelligence and its role in problem solving	a3, a4, a6, b2 c1, c2, d1, d2	5th	6
3	Convert the existing system to Fuzzy System	a3, a4, a6, b2 c1, c2, d1, d2	8th	6
4	Integrate various artificial intelligence techniques in intelligent system.	a3, a4, a6, b2 c1, c2, d1, d2	12th	6
5	Presentation and discussion	a3, a4, a6, b2 c1, c2, d1, d2	15th	6

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وحدة ضمان الجودة

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

Assessment	Type of Assessment Tasks	Week Due	Mark	Proportion of Final Assessment
1	Exercise	3rd, 5th, 8th, 12th, 15th	30	30%
2	Mid-Exam	8th	10	10%
3	End-Exam	16th	60	60%

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. Mariusz Flasiński, 2016 , *Introduction to Artificial Intelligence*, Springe
2. George F. Luger, 2009, *Artificial Intelligence: Structures and Strategie Complex*
Problem Solving, 6th Edition, Addison Wesley.

2- Essential References.

1. Michael Negnevitsky, 2005, *Artificial Intelligence: A Guide to Intelligent Systems*. 2nd edition, Addison Wesley
2. LISP craft by Robert Wilensky, W.W. Norton.

3- Electronic Materials and Web Sites *etc*.

1. https://www.tutorialspoint.com/artificial_intelligence/AI Programming Resources

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Rector of Sana'a University

Prof. Dr. Qassim Mohammed Abbas

Republic of Yemen
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XIV.	Course Policies:
	Unless otherwise stated, the normal course administration policies and rules of the Faculty of Computer and Information Technology apply. For the policy, see: --------------------------------- The University Regulations on academic misconduct will be strictly enforced. Please refer to -----------
1	**Class Attendance:** A student should attend not less than 75 % of total hours of the subject; otherwise he 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
2	**Tardy:** For late in attending the class, the student will be initially notified. If he repeated lateness in attending class he will be considered as absent.
3	**Exam Attendance/Punctuality:** A student should attend the exam on time. He 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 & Project** The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time.
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 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.
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 my given directly to students using soft or hard copy

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اللجنة الإشرافية

التوقيع	الصــــــفة	الاســـم	م.
	نائب عميد الكلية للشؤون الأكاديمية	أ.م.د. عبد الماجد الخليدي	١
	نائب عميد مركز التطوير الأكاديمي وضمان الجودة	أ.م.د. احمد مجاهد	٢
	ممثل المركز في الكلية	د. حسين الأشول	٣
	نائب رئيس الجامعة للشؤون الأكاديمية	أ.د. إبراهيم المطاع	٤

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