جامعة البحرين
University of Bahrain
مركز ضمان الجودة والاعتماد الأكاديمي
Quality Assurance and Accreditation Center

Academic Course Specification Form
استمارة توصيف المقرر الأكاديمي

Section Concerning the Student
القسم الخاص بالطالب

1. Course Code:	EENG 488	1. رمز المقرر:
2. Course Title	Biomedical Engineering	2. اسم المقرر:
3. College:	College of Engineering	3. الكلية:
4. Department:	Electrical and Electronics engineering	4. القسم:
5. Academic Program:	Electrical and Electronics engineering	5. البرنامج الأكاديمي:
6. Course Credits:	3 credits	6. عدد الساعات المعتمدة:
7. Course NQF Level	8	7. المستوى على الإطار الوطني للمؤهلات:
8. NQF Credits	12	8. عدد ساعات المقرر على الإطار الوطني للمؤهلات:
9. Prerequisite:	EENG262 & EENG251	9. المتطلب المسبق للمقرر:
10. Lectures Timing & Location:	MW: 01:00-01:15, S40-2083	10. وقت ومكان المحاضرة:
11. General Mode of Teaching and Learning	Tranditional تقليدي	11. نمط التدريس والتعلم العام:
12. Course Coordinator:	Professor Ebrahim Abdulla Mattar https://www.dr-e-mattar-uob.com/	12. منسق المقرر:
13. Course Instructor:	Professor Ebrahim Abdulla Mattar https://www.dr-e-mattar-uob.com/	13. مدرس المقرر:
14. Office Hours and Location:	U & H: 13:00-16:00, or by appointment. S40-1114	14. الساعات المكتبية وموقعها:
15. Instructor's Email	Professor Ebrahim Abdulla Mattar ebmattar@uob.edu.bh	15. البريد الإلكتروني لمدرس المقرر
16. Academic Year:	2025/2026	16. السنة الأكاديمية:
17. Semester:	Second Semester الفصل الثاني	17. الفصل الدراسي:

18. Textbook(s):	18. كتب المقرر:
[1] Introduction to Biomedical Engineering, A volume in Biomedical Engineering, Book • Third Edition • 2012, Edited by: John D. Enderle and Joseph D. Bronzino. [2] David Poole and Alan Mackworth "Artificial Intelligence: Foundations of Computational Agents". Cambridge University Press, (1st edition: 2010, 2nd edition: 2017). (Available online. The section references below are to the 2nd edition.)	
19. References:	**19. المراجع:**
Research Papers, AI Educational videos, Seminars, and keynotes Talks Analysis	
20. Other learning resources used (e.g. e-Learning, field visits, periodicals, software, etc.):	**20. مصادر أخرى (مثال : التعلم الالكتروني، زيارات ميدانية، دورات، برامج كمبيوتر، الخ....)**
Python, Matlab Computational Environments	
21. Course Description (as published in the College Catalogue):	**21. توصيف المقرر(حسبما ورد في دليل الكلية):**

Course Code: EENG 488 Course Title: Biomedical Engineering
Introduction to Biomedical Engineering; Transducer Principles; Cardiovascular system measurement: Electrocardiogram, Phonocardiogram, blood flow, blood pressure; measurements in the respiratory and nervous systems: Pneumatography, Plethysmography, and Electroencephalograms; Biomedical signal processing techniques; patient-care equipment: pacemaker, defibrillator, and breathing assistive systems; practical diagnostic and therapeutic applications.

AI ENGINEERING FOR HEALTHCARE:
AI has been tremendously introduced in the area of healthcare and the engineering aspects of tools and devices. Given this fact, this special topic within this course will rather focus on how engineers will use AI tools and how can be applied to verities of healthcare engineering aspects. Related topics are AI-powered predictive care, engineering tools for connected Network Hospitals, connected care, better patient and staff experiences, in addition to Bigdata Mining and Analysis while relying on engineering uses.

22. Course Intended Learning Outcomes (3 to 5 CILOs):	**22. المخرجات التعلّمية للمقرر (CILOs) إلى 5 مخرجات تعلّمية):**
1- Introducing the new trends on biomedical engineering.	
2- Comprehend the application of AI for bio-medical engineering.	
3- Having an ability to use AI for the healthcare educational sector.	
4- Use of AI for biomedical diagnosis applications.	
5- Use of the AI for the Robotics Healthcare Applications, (Intelligent Robotics Systems).	
6- Identifying applications of AI for the (nlp), the Natural Language Processing for healthcare.	

23. Course Assessment Percentages (As per Regulations of Study and Examination at the University of Bahrain):	**المئوية (بحسب نظام الدراسة أساليب التقويم ونسبها والامتحانات في جامعة البحرين):**
HomeWorks	10%
Projects/Case Studies	10%
Labs sessions	10%

Examination Mid-Term	30%
Final Exam / Final Course Project (Oral exam + Report /paper)	40%

24. Description of Topics Covered	**المواضيع/المفردات التي يجب أن تدرس**
Topic Title ***)e.g. chapter/experiment title(*** **الموضوع**	***Description*** **التفصيل**
Historical background and foundations biomedical engineering.	- Introducing AI to students. - Historical backgrounds.
Special Topics and Development of AI for healthcare.	- Major development of AI, - Reading from several Reach papers.
Introducing to concepts of Intelligent agents, and to comprehend the application of AI for the healthcare sector.	- AI Computational models for healthcare. - Applications stories. - Applications stories with research papers.
Introducing to concepts of sensors, and to comprehend the application of instrumentation for the healthcare engineering.	- AI Computational models for Industry 4.0. - AI Computational models for Mechatronics - Applications stories with research papers.
Introducing to concepts of sensors, and to comprehend the application of instrumentation for the healthcare engineering.	- Introducing to concepts of sensors, and to comprehend the application of instrumentation for the healthcare engineering. AI Computational models for education. - Applications stories with research papers.
Introducing to concepts of Intelligent agents, and to comprehend the application of AI for biomedical Engineering.	- Introducing to concepts of Intelligent agents, and to comprehend the application of AI for biomedical Engineering.
Introducing to concepts of Intelligent agents, and to comprehend the application of AI for biomedical Engineering.	- AI Computational models for robotics sectors and Engineering. - AI Computational models for robotics. - Robotics, Bigdata, Computational Algorithms
Introduction to concepts of Intelligent agents, and to comprehend the application of AI for (nlp) for biomedical engineering.	- AI Computational models for nlp Engineering. - nlp, Computational Algorithms - Applications stories with research papers.

25. Weekly Schedule			**الجدول الأسبوعي**	
Week **الإسبوع**	**Date** **التاريخ**	**Topics Covered** **المواضيع المعروضة**	**CILOs** **المخرجات التعلُمية للمقرر** **)CILOs(**	**Teaching/Assessment Mode and Method** **منهجية ونمط التدريس/التقييم**
1	10_02_2026	Historical background and foundations of artificial intelligence.	1,2,3,4,5	Tranditional تقليدي
2	10_02_2026	Electrode transducers, resistive transducers, capacitive transducers and inductive transducers.	1	Tranditional تقليدي
3	15_02_2026	Electrode transducers, resistive transducers, capacitive transducers and inductive transducers.	1	Tranditional تقليدي
4	18_02_2026	transducers and inductive transducers. Cardiovascular system measurement	1	Tranditional تقليدي
5	25_02_2026	Computational models/healthcare. Applications stories. Applications stories with research papers.	2	Tranditional تقليدي
6	02_03_2026	Non invasive diagnostic instrumentation: Ultrasonic blood flow equipment, patient care equipment, pacemaker, defibrillator.	2	Tranditional تقليدي
7	10_03_2026	Noninvasive diagnostic instrumentation: Ultrasonic blood flow equipment, patient care equipment, pacemaker, defibrillator.	3	Tranditional تقليدي
8	15_03_2026	Introducing concepts of Intelligent agents, and to comprehend the application of AI for the biomedical engineering.		
9	18_03_2026	Introducing concepts of Intelligent agents, and to comprehend the application of AI for the biomedical engineering.	2	Tranditional تقليدي
10	22_03_2026	AI Computational models for education.	3	Tranditional تقليدي

		Applications stories with research papers.		
11	27_03_2026	Introducing to concepts of Intelligent agents, and to comprehend the application of AI for biomedical Engineering Sector.	3	Tranditional تقليدي
12	18_04_2026	AI Computational models for robotics sectors and Engineering. AI Computational models for robotics. Robotics, Bigdata, Computational Algorithms. Applications stories with research papers.	4	Tranditional تقليدي
13	25_04_2026	Introduction to concepts of Intelligent agents, and to comprehend the application of AI for (nlp).	4	Tranditional تقليدي
14	05_05_2026	AI Computational models for nlp Engineering. nlp, Computational Algorithms. Applications stories with research papers.	4	Tranditional تقليدي
15	25_05_2026	Review.	4	Tranditional تقليدي

26. Academic Integrity Statement	**(7 بيان النزاهة الأكاديمية**
Students are to observe the highest level of honesty and academic ethics in pursuit of their academic goals as per UOB Regulations of Student Conduct and Academic Integrity, Anti-plagiarism Policies, and Students' Rights and Responsibilities Handbook. The consequences for cheating, plagiarism, unauthorized collaboration, and other forms of academic dishonesty can be very serious and will be dealt with as per the aforementioned policies and regulations.	يعتبر الصدق والنزاهة عنصران أساسيان في العملية الأكاديمية. حيث يُتوقع من الطلاب خلال سعيهم لتحقيق أهدافهم الأكاديمية التحلي بالأمانة والأخلاق في جميع الأوقات، وذلك وفقًا للوائح والأنظمة الخاصة بطلبة جامعة البحرين، بالإضافة إلى دليل حقوق الطلبة وواجباتهم، وكما جاء في سياسة الانتحال الخاصة بجامعة البحرين. حيث سيتم التعامل مع أي انتهاك للنزاهة الأكاديمية بحسب ما تنص عليه السياسات والأنظمة السابق ذكرها.
27. Attendance and Absence Regulations	**(8 نظام الحضور والغياب**
Students are required to adhere to regular attendance for class lectures and practical sessions, as determined by the nature of the course, as per Article (33), of Regulations of Study and Examination at the University of Bahrain.	يُتوقع من الطلاب الالتزام بالحضور المنتظم للساعات الصفية والعملية بحسب طبيعة المقرر، وفقًا للمادة (33)، من نظام الدراسة والامتحانات في جامعة البحرين.

Section Concerning the Course Instructor and Academic Department قسم خاص بمدرس المقرر والقسم الأكاديمي	
28. Program Intended Learning Outcomes (7-10 PILOs):	(9 مخرجات التعلم المطلوبة للبرنامج (7-10 PILOs):
a) Demonstrate an advanced understanding of the basic principles of Artificial Intelligence Applications.	
b) Demonstrate engineering competency in Artificial Intelligence Applications areas.	
c) Demonstrate competency in undertaking in-depth research, design, analysis, or experimental investigation of some engineering problems involving Artificial Intelligence Applications.	
d) Demonstrate their ability to communicate AI related engineering ideas and techniques.	
e) Demonstrate a mathematical competency above that of an undergraduate engineering student.	

29. NQF Level Descriptors:		**(10 المحددات الوصفية للإطار الوطني للمؤهلات:**	
K1	Knowledge: Theoretical Understanding	**المعرفة:** الفهم النظري	**K1**
K2	Knowledge: Applied Knowledge	**المعرفة:** المعرفة التطبيقية	**K2**
S1	Skills: Generic Problem Solving & Analytical skills	**المهارات:** مهارات حل المشكلات العامة والمهارات التحليلية	**S1**
S2	Skills: Communication, ICT, and Numeracy	**المهارات:** مهارات التواصل، وتقنية المعلومات والاتصالات، والمهارات العددية	**S2**
C	Competence: Autonomy, Responsibility & Context	**الكفاية:** الاستقلالية والمسؤولية والتنسيق	**C**

30. Mapping of Course Intended Learning Outcomes (CILOs): **(11 ربط المخرجات التعلّمية للمقرر (CILOs):**

CILO number (From table 22)	Mapping to PILOs	Mapping to NQF Level Descriptors	NQF Level	Mapping to Criteria according to Accreditation body (Where different than PILOs)
رقم المخرج التعلّمي (الجدول 22)	الارتباط بالمخرجات التعلّمية للبرنامج (PILOs)	الارتباط بالمحددات الوصفية لمستويات الإطار الوطني للمؤهلات	مستوى الإطار	الارتباط بمعايير جهة الاعتماد الدولي (عند اختلاف المعايير عن المخرجات التعلّمية للبرنامج)
1	1,2	K1,K2,S1,C	9	
2	1-3	K1,K2	9	
3	2,5	K2,S1,S2	9	
4	2,4	S1,S2	9	
5	2,3	K2,S2,C	9	

6	2,3	K2,S2,C	9	

31. Mapping of course assessment:			**(12**	**ربط أساليب التقويم:**
Assessment التقييم	Formative summative تكويني / ختامي	Mapped CILO الربط بمخرجات التعلّم للمقرر	Assessment NQF Level Descriptor (Refer to table 23) وصف التقييم بالنسبة للمحددات الوصفية للإطار (جدول 23)	NQF level مستوى الإطار
Course Project	ختامي Summative تكويني Formative	1-6	K1,K2,S1,	9
Midterm (Survey paper / Seminar / Presentation)	تكويني Formative	1-6	K1,K2,S1,C	9
Assignments	تكويني Formative ختامي Summative	1-6	K2, S1, S2,C	9
Final Exam / Final Course Project (Oral exam + Report /paper)	تكويني Formative	1-6	K1,K2,S1,C	9

32. Allocation of NQF Credit		**(13**	**تحديد الساعات المعتمدة في الإطار الوطني للمؤهلات**
Learning Activity **النشاط التعليمي**	**Activity Duration** **مدة النشاط**	**Frequency** **التكرار**	**Notional Hours** **الساعات الافتراضية**
Lessons / Lectures / Seminars الدروس/ المحاضرات/ الندوات	Lecture:4 hours per week المحاضرات: 3 ساعات في الأسبوع	4/week * number of weeks (15) = 60 60 – midterm hours (1.5) - Quizzes hours (1)-Final exam hours (2.5)= 43 3 ساعات في الأسبوع xعدد الأسابيع = المجموع – ساعات التقييم = مجموع الساعات الافتراضية الفعلي	55 (Actual notional hours) (مجموع الساعات الافتراضية الفعلي)
Tutorial حصص التقوية			

Practical / Laboratory عملي/ مختبر			
Supervised Assessment التقييم	Course project (2) Midterm 1.5hr Final 2,5hr	2x30=1 notional hours 1x1.5=1.5 hr 1x2.5=2.5 hr	5
Student Centered Learning / Independent Learning تعلم مستقل	Independent learning 4h/w Studying for Midterm 10hr Studying for final 14 hr Preparation for assignment 2h (3) Studying for course project 5h (2)	4x15=60hr 10x1=10 14x1=14 2x3=6 5x2=10	100
Work based Learning **التعلم القائم على عمل**			
Other *(specify)* ***أخرى (يرجى ذكرها)***			
Total Notional Hours: **مجموع الساعات الافتراضية**			120
NQF Credit *(divide notional hours by 10)* **الساعات المعتمدة في الإطار الوطني للمؤهلات (اقسم مجموع الساعات الافتراضية على 10)**			12
Notes if any:			**ملاحظات إن وجدت:**

For more information about the allocation process, kindly refer to:

NQF Handbook

NQF General Policies

NQF capacity building course

للمزيد من المعلومات حول تحديد الساعات يرجى الرجوع إلى:

دليل الإطار الوطني للمؤهلات

دورة بناء القدرات للإطار الوطني للمؤهلات

Prepared by:	Professor Ebrahim Abdulla Mattar https://www.dr-e-mattar-uob.com/	تم الاعداد من قبل:
Date:	Saturday, February 7, 2026	تاريخ الإعداد:
Updated by:	Professor Ebrahim Abdulla Mattar https://www.dr-e-mattar-uob.com/	تم التحديث من قبل:
Reviewed by:		تمت المراجعة من قبل:
Approved by Department Council on: [Click or tap to enter a date.], Meeting no. [Click or tap here to enter text.] for the academic year [Click or tap here to enter text.]		تم اعتماد الاستمارة من قبل مجلس القسم بتاريخ: [Click or tap to enter a date.]، رقم الاجتماع [Click or tap here to enter text.] للسنة الأكاديمية [Click or tap here to enter text.]