Ministry of Higher Education and
Scientific Research - Iraq
Al-Furat Al-Awsat Technical University
Technical College /Al-Mussaib
Department of Electrical Engineering Techniques

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	SENSORS			**Module Delivery**	
Module Type	CORE			☒ **Theory** **Lecture** ☒ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	ATU23034				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	٢		**Semester of Delivery**	١	
Administering Department	Department Of Electrical Engineering Techniques		**College**	Technical College /Al-Mussaib	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	None		**e-mail**	None	
Scientific Committee Approval Date	١٤/٠٦/٢٠٢٣		**Version Number**	١,٠	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	١. To realize the operation principle of several sensors and recognize the key issues in selecting the right instrument. ٢. To be acquainted with several types of actuators. ٣. To understand modern signal transmission techniques and relevant standards. ٤. To become aware of the sampling theorem, ADC and DAC.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	١. Knowledge of sensors, including types and operation principle. ٢. Get to know the principle of Position sensors, their types and uses. ٣. Get to know the principle of Temperature Sensors, their types and uses. ٤. Apply acquired knowledge to the Acceleration & vibration sensors. ٥. Get to know the principle of pressure Sensors. their types and uses. ٦. Apply acquired knowledge to the speed sensors. ٧. Specify and select appropriate sensors for a wide range of systems and applications. ٨. Knowledge of actuators, including types and operation principle. ٩. Apply acquired knowledge to the Transmitters. ١٠. Knowledge of ADC & DAC.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Sensors [١٦ hrs.] • Position measurement o Limit switch o Proximity sensors o Potentiometer o LVDT o Encoders • Stress & strain measurement o Strain gauge • Temperature measurement o Metal strip o RTD o Thermistor o Thermocouple • Acceleration & vibration measurements • Pressure measurement • Speed measurement Actuators [٤ hrs.] • Dc motor • Servo motor • Stepper motor • Solenoid

	Transmitters [٤ hrs.] • Current transmitter ٠-٢٠ / ٤-٢٠ • Voltage transmitter ٠-١٠ Analog & Digital interfaces [٤ hrs.] • Sampling theorem • ADC • DAC

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is interactive learning through the visualization via flow charts, graphic and pictures that helps students to receive the information in a simpler, clear and systematic way. Also, depending on group work by dividing student into small groups of mixed abilities. By doing so, those who have more knowledge of the subject can share their knowledge and help their peers understand the topic better. Adapt Inquiry-Based learning to Encouraging learners to ask a lot of questions that does not only motivate students to think more practically but also helps them to become independent learners.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	٦٣	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	٤,٢
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	٣٧	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	٢,٤٦
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	١٠٠		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	٤	١٠٪ (١٠)	٢,٥,٩,١٢	LO # ١,٣, ٤, ٦ and ٧
	Assignments	٩	١٠٪ (١٠)	١-١٢	LO # ١,٣, ٤, ٦ and ١٠

	Projects / Lab.	١٠	١٠٪ (١٠)	Continuous	All
	Report	٨	١٠٪ (١٠)	٢-١٠	LO #٥, #٨ and #١٠
Summative assessment	**Midterm Exam**	٢hr	١٠٪ (١٠)	٨	LO #١ - #٨
	Final Exam	٣hr	٥٠٪ (٥٠)	١٥	All
Total assessment			١٠٠٪ (١٠٠ Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week ١	Introduction to the sensors (general principles of sensors).
Week ٢	Sensors: Limit switch, Proximity sensors.
Week ٣	Sensors: Potentiometer, LVDT.
Week ٤	Sensors: Encoders, Strain gauge.
Week ٥	Sensors: Metal strip, RTD.
Week ٦	Sensors: Thermistor, Thermocouple.
Week ٧	Sensors: Acceleration sensors.
Week ٨	Sensors: vibration sensors.
Week ٩	Sensors: Pressure sensors, Speed sensors.
Week ١٠	Actuators: Dc motor, Servo motor.
Week ١١	Actuators: Stepper motor, Solenoid.
Week ١٢	Transmitters: Current transmitter ٤-٢٠ mA & Voltage transmitter ٠-١٠ v
Week ١٣	Analog & Digital interfaces (Sampling theorem).
Week ١٤	ADC (Analogue to Digital Converter).
Week ١٥	DAC (Digital to Analogue Converter).
Week ١٦	Preparatory week before the final Exam**.**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week ١	Lab ١: Limit switch, Proximity sensors.

Week ٢	Lab ٢: Potentiometer.
Week ٣	Lab ٣: Encoders
Week ٤	Lab ٤: RTD (Resistance Temperature Detector)
Week ٥	Lab ٥: Thermocouple.
Week ٦	Lab ٦: Pressure sensor
Week ٧	Lab ٧: Tachometer
Week ٨	Lab ٨: Servo motor
Week ٩	Lab ٩: Stepper motor
Week ١٠	Lab ١٠: Solenoid
Week ١١	Lab ١١: Current transmitter & Voltage transmitter.
Week ١٢	Lab ١٢: ADC (Analogue to Digital Converter).
Week ١٣	Lab ١٣: DAC (Digital to Analogue Converter).
Week ١٤	Lab ١٤: Review

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Introduction to Instrumentation and Measurements, Third Edition, Robert B. Northrop.	No
Recommended Texts	Measurement, Instrumentation and Sensors Handbook.	No
Websites	https://www.udemy.com/course/sensors-sensor-fundamentals/	

Grading Scheme
مخطط الدرجات

Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (٥٠ - ١٠٠)	**A** - Excellent	امتياز	٩٠ - ١٠٠	Outstanding Performance
	B - Very Good	جيد جدا	٨٠ - ٨٩	Above average with some errors
	C - Good	جيد	٧٠ - ٧٩	Sound work with notable errors
	D - Satisfactory	متوسط	٦٠ - ٦٩	Fair but with major shortcomings
	E - Sufficient	مقبول	٥٠ - ٥٩	Work meets minimum criteria
Fail Group (٠ – ٤٩)	**FX** – Fail	راسب (قيد المعالجة)	(٤٥-٤٩)	More work required but credit awarded

	F – Fail	راسب	(٠-٤٤)	Considerable amount of work required

Note: Marks Decimal places above or below ٠,٥ will be rounded to the higher or lower full mark (for example a mark of ٥٤,٥ will be rounded to ٥٥, whereas a mark of ٥٤,٤ will be rounded to ٥٤. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.