MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Machine Design**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**PM 301**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	3		**Semester of Delivery**	6	
Administering Department	PM		**College**	TEMO	
Module Leader	Hussein Mohammed Ali		**e-mail**	E-mail	
Module Leader's Acad. Title	Assist.Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	PM 203	**Semester**	4
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The aim of the module is to enhance students' knowledge and understanding of the mathematics and scientific principles related to mechanics, materials, manufacturing and design processes, and to develop their ability to apply this knowledge in a number of topics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of the module students should be able to: 1. Demonstrate knowledge and understanding of the mathematics and scientific principles related to the analysis of machine elements, components, and systems. 2. Design and realize a physical system or component to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability. 3. Manage the engineering design process, identify, formulate, and solve engineering problems and evaluate outcomes. 4. Demonstrate an ability to communicate effectively and work well on team-based engineering projects. 5. Identify and manage cost drivers applied to the design and selection of components and systems constrained by a brief. 6. Work with technical uncertainty to develop technical solutions. 7. Understand the impact of design decisions on scale up production potential of products and manufacturing unit costs. 8. Conduct a critical analysis of existing product designs taking into account product life cycle considerations. 9. Understand the importance of engineering drawings, especially general assembly and detailed component drawings, as a formal means to communicate technical requirements for assembly and process designs. 10. Present a case for a chosen assembly and process designs for a given product formally and persuasively, including the use of British Standards.
Indicative Contents المحتويات الإرشادية	Indicative Contents: 1. Introduction to Machine Design 2. Definition and scope of machine design 3. Importance of machine design in engineering 4. Factors influencing machine design 5. Overview of the design process

	11. 6. Engineering Materials and their Selection 7. Properties of engineering materials (mechanical, thermal, electrical, etc.) 8. Material selection criteria for machine design 9. Commonly used materials in machine design (metals, polymers, composites) 10. Material testing and characterization 11. Design Considerations and Constraints 12. Functional requirements and specifications 13. Safety factors and design margins 14. Power Transmission Systems 15. Introduction to power transmission 16. Belt and chain drives 17. Gear drives and gear trains

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy for this module is to encourage students to actively participate in exercises and improve their critical thinking skills. We will achieve this through interactive classes, tutorials, and simple experiments that involve sampling activities students find interesting. The goal is to engage students, stimulate their curiosity, and help them develop their ability to think critically and analyze information effectively. By incorporating hands-on activities and encouraging collaboration, students will have the opportunity to apply what they've learned in practical ways. These strategies aim to create an enjoyable and inclusive learning environment that empowers students to become active learners and think critically about the subject matter.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	(78/15)= 5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	(72/15)= 4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	5	15% (15)	2, 4, 6, 9 and 12	LO #1, #2, #3, #6 and #10,
	Assignments	4	15% (15)	3, 5, 7 and 11	LO #4, #5, #7,#8 and #9
	Projects / Lab.	2	10% (10)	Continuous	All
	Report				
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Machine Design
Week 2	Selection of Materials in Machine Design
Week 3	Design of Piston

Week 4	Design of Cylinder
Week 5	Design of Connecting Rod
Week 6	Design of Crankshaft
Week 7	Design of Belts
Week 8	Design of springs
Week 9	Power Transmitted by a Shaft
Week 10	Design of Flywheel
Week 11	Design of clutch
Week 12	Design of Bearings
Week 13	Design Consideration for a Gear Drive
Week 14	Design of Gears
Week 15	Gear Trains
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to SolidWorks
Week 2	Lab 2: Design of Piston by SolidWorks
Week 3	Lab 3: Design of Connecting Rod by SolidWorks
Week 4	Lab 4: Design of Crank Shaft by SolidWorks
Week 5	Lab 5: Design of Belts by SolidWorks
Week 6	Lab 6: Design of Flywheel by SolidWorks
Week 7	Lab 7: Design of springs by SolidWorks

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Machine Design, R.S.Khurmi and J.K. Gupta.	Yes

Recommended Texts	Budynas, R., Nisbett, J.K., Shigley's Mechanical Engineering Design,McGraw-Hill	No
Websites	https://www.coursera.org/learn/machine-design1	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** – Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C – Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E – Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. 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.

Code	Course/Module Title	ECTS	Semester
PM 301	Machine Design	6	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	1	78	72

Description

Machine design is a complex and intricate process that involves carefully selecting the appropriate materials, shapes, sizes, and arrangements of mechanical components to ensure optimal performance of the intended machine. It encompasses both the creation of innovative new machines and the improvement of existing ones.

In this comprehensive module, students will delve into the world of machine design, acquiring a deep understanding of the mathematical and scientific principles underlying mechanics, materials science, manufacturing techniques, and design processes. They will explore various topics and gain the ability to apply their knowledge and skills in practical scenarios.

Through this course, students will develop a strong foundation in conceptualizing, modeling, and analyzing machines, enabling them to tackle real-world challenges in the field. They will gain proficiency in identifying suitable materials, designing robust and efficient mechanical elements, and ensuring the machine meets the required specifications. By honing their expertise in machine design, students will be equipped to contribute to technological advancements and innovation in diverse industries.