Unit Description Form

Course Description Form

/ Faculty of Engineering
Department of Biomedicine

Unit Information Course Information			
Unit Title	**Materials Science**	**Unit delivery**	
Unit Type	**fundamental**		☒ نظريه ☒ حاضر ☒ المختبر ☐ تعليمي ☐ عملي ☐ Seminar
Unit Code	BME-111		
ECTS Credits	8		
SWL (ساعة / SEM)	125		
Unit level	2	**Delivery Semester**	1
Department of Administration	Biomedical Engineering	**College**	Faculty of Engineering
Unit Commander	Hassan Allawi Cactus	**E-mail Address**	hassan.as@uowa.edu.ig
Title of Unit Commander	Assistant Lecturer	**Unit Commander Qualifications**	Master
Unit Teacher		**E-mail Address**	
Peer Reviewer Name	name	**E-mail Address**	E-mail Address
Date of accreditation of the Scientific Committee	26/9/2024	**Version number**	1.0

Relationship with other units Relationship with other subjects			
Prerequisites Unit	No	**Semester**	
Common Requirements Unit	No	**Semester**	

Unit objectives, learning outcomes and how-to contents Course objectives, learning outcomes and instructional contents	
Objectives of the Unit Course Objectives	The objectives of the Materials Science module focus on enabling students to understand the properties of different materials and their applications in everyday and industrial life. Students aim to learn about the classification of materials into categories such as metals, polymers, ceramics, and composites, and to understand the difference between the properties of each type of material such as electrical and thermal conductivity, durability, and corrosion resistance. The module also aims to teach students how to analyze the behavior of materials under different conditions such as pressure, heat, and stress, in addition to understanding manufacturing processes such as casting, forming, welding, and heat treatment. Students gain the skills to select the right materials for engineering and industrial applications based on their physical and chemical properties. The module also includes the study of the practical applications of these materials in fields as diverse as electronics, construction, automotive, and energy, helping students understand the role of materials science in technological development and innovation.

Unit Learning Outcomes Learning outcomes of the course	The learning outcomes of the Materials Science module include enabling students to understand the basic classification of materials such as metals, polymers, ceramics, and composites, with the ability to distinguish between properties of each type such as electrical and thermal conductivity, durability, and corrosion resistance. Students become able to analyze the behavior of materials under different conditions of stress, heat, and pressure, and apply this understanding to materials used in various industries. Students learn how to select the right materials for engineering and industrial applications based on their physical and chemical properties, and acquire the skills needed to understand manufacturing processes such as casting, forming, welding, and heat treatment. In addition, they are able to assess the impact of these processes on the properties of materials. Students also gain the ability to connect theoretical concepts with practical applications in fields as diverse as electronics, construction, automotive, and energy, enhancing their understanding of the role of materials science in technological innovation and the development of industries.
Indicative Contents Indicative Contents	The guidance contents of the Materials Science module address a range of core topics that aim to provide a comprehensive understanding of the properties of materials and their diverse uses. The module begins with an introduction to materials science, explaining its definition and importance in the development of technology and industry, with a presentation of the basic types of materials such as metals, polymers, ceramics, and composites. The unit then examines the physical and chemical properties of materials, such as electrical and thermal conductivity, durability, corrosion resistance, and mechanical properties such as strength and elasticity. Emphasis is placed on how these properties affect the choice of materials in different applications. The behavior of materials under the influence of various conditions such as stress, heat, and pressure is also studied, with an understanding of how the properties of materials change when exposed to these factors. Different manufacturing processes such as casting, forming, welding, and heat treatment are reviewed, and how these processes affect the properties of materials. The contents also include practical applications of materials science in various industries such as electronics, construction, automotive, and energy. Through which theoretical concepts are linked to practical applications to enable students to understand the role of materials in technological innovation and the development of various industries.

Learning and Teaching Strategies
Learning and Teaching Strategies

Strategies	The learning and teaching strategy in the Materials Science module is based on a combination of theoretical lectures and practical demonstrations to illustrate the characteristics of the materials and their applications. Students are encouraged to actively participate through hands-on activities and laboratory experiments that allow them to examine the behavior of materials under different conditions. Case studies and group discussions are also used to develop critical thinking skills. In addition, students are assigned applied projects to analyze and select materials suitable for real industrial applications.

Student Workload (SWL)
The student's academic load is calculated for 15 weeks

SWL منظم (h / sem) Regular academic load of the student during the semester	64	**SWL regulator (h / s)** Regular student load per week	4
SWL غير منظم (h / sem) Irregular academic load of the student during the semester	61	**Unregulated SWL (h/s)** Irregular student academic load per week	4
SWL إجمالي (h / sem) The student's total academic load during the semester	125		

Unit Evaluation
Course Evaluation

As		Time/Number	Weight (tags)	Week due	Related learning outcomes
Formative Assessment	**Contests**	2	10% (10)	5, 10	LO #1 , 2 , 10 and 11
	Assignments	2	10% (10)	2, 12	LO #3 , 4 , 6 and 7
	Projects /Laboratory.	1	10% (10)	continuous	every
	report	1	10% (10)	13	LO #5 , 8 and 10
	Midterm Exam	2 hr	10% (10)	7	LO #1-7

Final Assessment	**Final Exam**	2 hours	50% (50)	16	every
Overall Rating			100% (100 degree)		

Delivery Plan (Weekly Curriculum) Theoretical Weekly Curriculum	
week	**Covered Material**
Week 1	Introduction to Materials Science and Engineering
Week 2	Material classifications
Week 3	Materials presented and their classification
Week 4	Solids
Week 5	Crystalline solids
Week 6+7+8	Phase curve iron alloy and carbon phase shift
Week9+ 10	Properties of biomaterials, applications of metal alloys 4 Physical properties, the effect of physical properties of the surface of biomaterial on biological responses, mechanical properties of biomaterials
Week 11	Chemical properties of bioceramics, effect of chemical properties of the biomaterial surface on biological responses, solubility and corrosion, filtration of components, corrosion
Week 12+13+14	Polymer as a biomaterial, general techniques, materials used in maxillofacial prostheses, alex, polyurethane polymers, acrylic resins, resin teeth for prosthodontic applications
Week 15	Synthesis and testing of polymer as a biomaterial and polymer applications

Learning and Teaching Resources
Learning and Teaching Resources

	text	Available in the library?
Required texts	Sources	Yes
Recommended texts		Yes
Websites		

Grading chart
Grading chart

group	degree	Appreciation	Tags (%)	definition
An-Najah Group (50 - 100)	**A** - Excellent	privilege	90 - 100	Outstanding Performance
	B - Very Good	Very good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Proper work with noticeable errors
	D - Satisfactory	medium	60 - 69	Fair but with significant shortcomings
	E - sufficient	Acceptable	50 - 59	The work meets the minimum standards
Group failure (0 – 49)	**FX** - Failed	Deposit (in (processing	(45-49)	More work required but credit granted
	F - Failed	Failure	(0-44)	Large amount of work required

Note: Signs that are more than 0.5 decimal places greater than or below the full mark will be rounded higher or lower (for example, a score of 54.5 will be rounded to 55, while a mark of 54.4 will be rounded to 54. The university has a policy of not tolerating "imminent traffic failure", so the only modification to the marks granted by the original mark(s) will be the automatic rounding described above.