جامعة المستقبل
AL MUSTAQBAL UNIVERSITY

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Nanobiotechnology**			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	UOMU0307044				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		UGx1 2	**Semester of Delivery**		2
Administering Department		Biotechnology Medical	**College**	Sciences of college	
Module Leader	Sarah Kamil Abbood		**e-mail**	sarah.kamil@uomus.edu.iq	
Module Leader's Acad. Title		Assistance professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	MBT-2309	**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1- To understand the nature and properties of nanomaterials. 2- To provide scientific understanding of application of nanomaterials and nanotechnology in agriculture, health and environmental conservation.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After successful completion of the course, the student will be able to: 1. Familiarity with working principles, tools and techniques in the field of nanomaterials. 2. Understanding of the strengths, limitations and potential uses of nanomaterials.
Indicative Contents المحتويات الإرشادية	Student responsibilities: 1. Study of course materials as specified by the instructor 2. Timely submission of given class assignment

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Classroom lectures and discussions. 2. Case studies and examples from original research articles.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	10	4, 6, 10	#1 and#2, #3-#5, #9
	Assignments	2	10	13 and 14	#1 and #12
	Projects / Lab.	1	10	continuous	All
	Report	1	10	15	#14
Summative assessment	**Midterm Exam**	2h	10	7	#1-#6, #8-#14
	Final Exam	3h	50	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction to nanotechnology**
Week 2	**Various types of nanomaterials, Three-dimensional, two-dimensional, one-dimensional and zero-dimensional nanomaterials**
Week 3	**Bio-nanomaterials**
Week 4	**Synthesis methodologies**
Week 5	**Properties of nanomaterials**
Week 6	**Characterization of nanomaterials by various analytical methods**
Week 7	**Mid-term Exam**
Week 8	**Role of nanobiotechnology in the area of infectious & noninfectious diseases**
Week 9	**Nanopharmaceuticals**
Week 10	**Diagnosis, sensors and biosensors**
Week 11	**Delivery vehicles, biomedical applications of nanomaterials**
Week 12	**Nanotechnology based tools to enhance agricultural productivity**
Week 13	**Nanopesticides and Nanofertilizers**
Week 14	**Nanobiotechnology for Crop improvement**
Week 15	**Nanotechnology for environment: contamination detection and remediation**
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	**Introduction to nanomaterials**
Week 2	**Characterization of nanomaterials -1**
Week 3	**Characterization of nanomaterials -2**
Week 4	**Method for synthesis nanomaterials- 1**
Week 5	**Method for synthesis nanomaterials- 2**
Week 6	**Mid-term Exam**
Week 7	**Green method for synthesis of Nano product**
Week 8	**Synthesis nanomaterials via precipitation technique**
Week 9	**Effect of nanomaterials on plant growth – 1**
Week 10	**Effect of nanomaterials on plant growth – 2**
Week 11	**Effect of nanomaterials on bacteria growth -1**
Week 12	**Effect of nanomaterials on bacteria growth -2**
Week 13	**Review**
Week 14	**Final exam**

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Multilayer Thin Films, Editor(s): Gero Decher, Joseph B. Schlenoff Publisher: Wiley- VCH Verlag GmbH & Co. KGaA ISBN: 3527304401. 2. Bionanotechnology: Lessons from Nature Author: David S. Goodsell Publisher: Wiley- Liss ISBN: 047141719X. 3. Biomedical Nanotechnology Editor: Neelina H. Malsch Publisher: CRC Press ISBN: 0-8247-2579-4. 4. Springer Handbook of Nanotechnology- B Bhusan	
Recommended Texts	• **1. A. L. Rogach, Semiconductor nanocrystal quantum dots synthesis, assembly, spectroscopy** • **and applications (Springer, Wien; London, 2008).** • **2. E. Gazit, Plenty of room for biology at the bottom: an introduction to bionanotechnology** • **(Imperial College Press ; Distributed by World Scientific Pub. in the USA, London :** • **Hackensack, NJ, 2007).** • **3. G. E. J. Poinern, A laboratory course in nanoscience and nanotechnology (CRC Press,** • **Taylor & Francis Group, Boca Raton, 2015).** • **4. C. A. Mirkin, C. M. Niemeyer, Eds., More concepts and applications (Wiley-VCH,** • **Weinheim, 2007), Nanobiotechnology.** • **5. A. K. Mishra, Ed., Application of nanotechnology in water research (Wiley, Scrivener** • **Publishing, Hoboken, New Jersey, 2014).** • **6. K. R. Nill, Glossary of biotechnology and nanobiotechnology terms (Taylor & Francis,** • **Boca Raton, 4th ed., 2006).** • **7. J. Kim, Ed., Advances in nanotechnology and the environment (Pan Stanford, Singapore,** • **2012).** • **8. P. N. Prasad. Nanophotonics (Wiley, New York, 2003).**	

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.