جامعة الكويت
KUWAIT UNIVERSITY

نموذج توصيف مقرر
Course Description Form

Name of College\Faculty : **Faculty of science** **اسم الكلية:**

Name of Department: **Biological Sciences** **اسم القسم العلمي:**

Course Name	**Ultrastructure of Microorganisms**	**اسم المقرر**
Course No.	**0495 - 315**	**رقم المقرر**
No. of Credits	**4**	**عدد الوحدات**
Theoretical Hours	**3**	**عدد الساعات النظرية**
Practical Hours	**3**	**عدد الساعات المحلية**

Course topics **مواضيع المقرر**

1. Introduction.
2. Basic principles of optics (light microscope *vs* electron microscope).
3. Usage of electron microscope
-Transmission electron microscopy.
- Scanning electron microscopy.
4. Fixation techniques and sample preparation.
5. Survey of microbial colonies by scanning electron microscope (SEM)
6. Prokaryotic cell structure (Archaea, Bacteria including and cyanobacteria): surface ultrastructure and the ultra-thin sections - Survey of microbial colonies by scanning electron microscopy.
7. Diversity of eukaryotic cell structures: The ultrastructure of fungi, including yeast (TEM +SEM), the ultrastructure of eukaryotic microalgae, the ultrastructure of Lichens, the ultrastructure of Protozoa.
8. Ultrastructure of viruses.
9. Interpretation of Micrographs.
10. Modern Light microscopy techniques
11. Special preparation techniques and modern electron microscopy
12. Correlative Ligh-Electron Microscope (CLEM)
13. Microbial interactions
14. Microbial abiotic interactions

Text book: (Name, Author , Year , Publisher)	**عنوان الكتاب : (الاسم ، المؤلف ، سنة الطبع ، دار النشر)**
1. Egerton, R. F. Physical principles of electron microscopy: An Introduction to TEM, SEM, and AEM. (2016). Springer.	

2. John Kuo. (2014). Electron Microscopy Methods and Protocols. Third Edition. Humana Press. **3. Review articles Provided by the Instructor**
References: (Name , Author , Year . Publisher) **عنوان المرجع : (الاسم ، المؤلف ، سنة الطبع ، دار النشر)**
Chandler, D. E. and Roberson, R. W. (2009). Bioimaging current concepts in Light and Electron Microscopy. Jones and Bartlett Publishers, LLC.

Prerequisites **1. 0495-205 Bacteriology.** **2. 0495-206 Mycology.** **3. 0495-207 Microalgae and protozoa.** **4. Department approval.**						**متطلبات المقرر**
Grading	**Exams**	**10**	**%**		**الاختبارات**	**آلية رصد المقرر**
	Project	**10**	**%**			
	Quizzes	**5**	**%**		**امتحانات قصيرة**	
	H.W.	**5**	**%**		**واجبات**	
	Practical	**30**	**%**		**عملي**	
	Final	**40**	**%**		**الاختبار النهائي**	
	%					

أهداف مخرجات المقرر :					
الرقم	**أهداف مخرجات المقرر :**	**أمثله من المقرر لتحقيق هذه الأهداف**	**المستوى المطلوب من عضو هيئة التدريس لتحقيق الهدف :**		
			عالي	**متوسط**	**منخفض**
1					
2					
3					
4					
5					
الحقول					
المهارات					
منسق المقرر (اسم عضو هيئة التدريس المشرف على توصيف المقرر ، توقيعه ، الختم و الرتبة الأكاديمية)					
تاريخ إعداد النموذج			/ /		

Course objectives					
No.	**Course Objectives (Learning Outcomes)**	**Example(s) of relevant (Topics and activities)**	**Recommended Level to satisfy the objectives**		
			High	**Medium**	**Low**
1	Exhibit knowledge of the basic physics and electron optics of the TEM and SEM.	Introduction and basic principles of optics	**X**		
2	Demonstrate knowledge of common and advanced laboratory practices in electron and light microscopy.	Scanning electron microscopy, transmission electron microscopy, modern light microscopy, special preparation techniques and modern electron microscopy		**X**	
3	Learn the procedure of producing high-quality images of microbial cells and samples by electron microscopy	Sample preparation for SEM (dehydration and drying-coating and SEM photography), sample preparation for TEM, fixation techniques	**X**		
4	Analyze various organisms' cellular structure meaningfully	Prokaryotic cell structure: Bacteria (including cyanobacteria) and Archaea); surface ultrastructure and ultra-thin section, diversity of eukaryotic cell structure, ultrastructure of viruses, interpretation of micrographs	**X**		
5	Deduce the function of the cell by looking at the number and size of organelles that it contains	Microbial interaction with the environment.	**X**		
6	Apply their knowledge of organelle function to explain cellular adaptations to biotic or abiotic factors	Homework, Project	**X**		
7	Engage in reviewing scientific literature pertaining to cell structure and exhibit clear and concise communication of scientific data	Homework, Project	**X**		

Fields	Practical Topics (Laboratory): 1. Introduction: safety rules in the electron microscopy laboratory 2. Biological sample preparation for the electron microscope: transmission electron microscope: dehydration, processing, and embedding 3. Trimming, knife making, and sectioning 4. Sectioning and staining TEM photographing 5. Embedding, sectioning, and staining artifacts 6. Scanning electron microscope: dehydration and drying 7. Coating and scanning electron photographing 8. Presentations 9. 3 trips for EM unit
Skills	
Coordinator (Name and Rank):	**Dr. Alanoud Rawdhan (Assistant professor)**
Signature and stamp:	د. العنود جابر رؤضان قسم العلوم البيولوجية كلية العلوم جامعة الكويت
Date:	**16\ 12 \2025**