جامعة البحرين
University of Bahrain
مركز ضمان الجودة والاعتماد الأكاديمي
Quality Assurance and Accreditation Center

Academic Course Specification Form

استمارة توصيف المقرر الأكاديمي

القسم الخاص بالطالب
Section Concerning the Student

1. Course Code:	BIOLS 466	**1. رمز المقرر:**
2. Course Title	Molecular mechanisms of bacterial pathogenesis	**2. اسم المقرر:**
3. College:	College of Science	**3. الكلية:**
4. Department:	Biology	**4. القسم:**
5. Academic Program:	Bachelor of Science in Biology	**5. البرنامج الأكاديمي:**
6. Course Credits:	2-2-3	**6. عدد الساعات المعتمدة:**
7. Course NQF Level:	8	**7. مستوى المقرر وفقا للإطار الوطني للمؤهلات:**
8. Notional Hours:	125	**8. عدد الساعات الافتراضية:**
9. NQF Credits:	13	**9. عدد الساعات المعتمدة للمقرر وفقا للإطار الوطني للمؤهلات:**
10. Prerequisite:	BIOLS 250 and BIOLS 360	**10. المتطلب السابق للمقرر:**
11. Lectures Timing & Location:		**11. وقت المحاضرة ومكانها:**
12. General Mode of Teaching and Learning	Traditional تقليدي	**12. النمط العام للتعليم والتعلّم:**

13. Course Coordinator:		**13. منسّق المقرر:**
14. Course Instructor:		**14. مدرّس المقرر:**
15. Office Hours and Location:		**15. الساعات المكتبية ومكانها:**
16. Instructor's Email:		**16. البريد الإلكتروني لمدرّس المقرر:**
17. Academic Year:		**17. السنة الأكاديمية:**
18. Semester:		**18. الفصل الدراسي:**

19. Textbook(s):	**19. الكتب الدراسية للمقرر:**
Molecular Mechanisms of Bacterial Infection via the Gut" by Bruno Dupuy, Nicola L. Jones, and Philippe Sansonetti Publisher: Springer: 2023 Wilson B., *et al*: Bacterial Pathogenesis, a molecular approach, 3ed Edition, ASM-Press, 2010. This textbook is intended for undergraduate students	
20. References:	**20.** المراجع:
Molecular identification, systematics, and population structure of prokaryotes by Erko Stackrbrandt (2006) and 2- Molecular genetics of bacteria by Jeremy Dale (2004)	
21. Other Learning Resources Used (e.g. e-learning, field visits, periodicals, software, etc.):	**21. مصادر التعلّم الأخرى (مثال: التعلّم الإلكتروني، زيارات ميدانية، دوريات، برمجيات، إلخ....)**
22. Course Description (as published in the College Catalogue):	**22. توصيف المقرر (حسب ما ورد في دليل الكلية):**
Introduction to genetics of bacterial pathogens in plants and animals with emphasis on gene regulation and molecular diagnostic techniques. This course introduces students to the basic key factors involved in bacterial pathogenesis. Selected examples of human, animal and plant pathogens are used to illustrate the molecular basis of bacterial pathogenesis. Development of laboratory techniques in diagnostic microbiology (such as identification of bacterial strains by molecular methods, the use of microbial bioinformatics tools in genome comparisons and analysis**).**	
23. Course Intended Learning Outcomes (3 to 5 CILOs):	**23. مخرجات التعلّم للمقرر (CILOs) (3 إلى 5 مخرجات تعلّمية):**
1. Discuss the association of bacteria with mammalian cells to outline diseases caused by pathogenic bacteria.	
2. Identify at the molecular level the role of virulence factors in the pathogenesis of bacterial diseases.	

3. Describe antibiotic resistance mechanisms applied by microbial pathogens.
4. Recognize horizontal gene transfer events and genome reduction processes during prokaryotic evolution.
5. Analyze results containing data for restriction fragment polymorphism (RFLP) and pulsed field gel electrophoresis (PFGE).

24. Course Assessment Percentages (as per Regulations of Study and Examination at the University of Bahrain):		**24. أساليب التقييم ونسبها المئوية (بحسب نظام الدراسة والامتحانات في جامعة البحرين):**	
Assessment **التقييم**	**Type** **النوع**	**Percentage** **النسبة**	**Assessment Date** **تاريخ التقييم**
Tests 1	Individual فردي	15%	
Test 2	Individual فردي	15%	
Laboratory: Assignments, reports	Individual فردي	15%	
Final laboratory assignment	Individual فردي	15%	
Final Exam	Individual فردي	40%	
Total	**100%**		

25. Description of Topics Covered	**25. وصف الموضوعات التي ينبغي تناولها:**
Topic Title ***(e.g. chapter/experiment title)*** **الموضوع**	***Description*** **التفصيل**
Approaching and studying bacterial diseases	Approaching and studying bacterial diseases involves a multifaceted approach. It starts with identifying causative bacteria through techniques like culturing, staining, and genetic analysis.
Molecular approaches to the diagnosis and characterization of bacterial infections	Understanding the disease mechanism involves studying how the bacteria infect, damages tissues, and evades the immune system. Epidemiological studies track disease spread and risk factors, while clinical research focuses on developing effective treatments like antibiotics and vaccines.
Mechanisms of bacterial pathogenesis (plant and animal models)	Bacterial pathogenesis, the process by which bacteria cause disease, involves a variety of mechanisms that can be studied using both plant and animal models.
Regulation of virulence gene expression in bacterial pathogens	Bacterial pathogens possess a sophisticated arsenal of genes, known as

	virulence genes, that enable them to cause disease.
Antimicrobial agents and bacterial resistance	Antimicrobial agents are drugs designed to kill or inhibit the growth of microorganisms. Bacterial resistance occurs when bacteria evolve to survive exposure to antimicrobial agents. This happens when bacteria change in a way that allows them to defeat the drugs designed to kill them.
Molecular mechanisms of Staphylococcus pneumonia pathogenesis	Streptococcus pneumoniae, a leading cause of pneumonia, meningitis, and other invasive diseases, employs a variety of molecular mechanisms to cause illness.
Molecular mechanisms of Pseudomonas aeruginosa pathogenesis	These mechanisms include secreting toxins that damage host tissues, forming biofilms that resist antibiotics and immune attack, and utilizing a complex regulatory system to adapt to diverse environments within the host.
Tuberculosis pathogenesis (molecular approach) ***H. pylori* pathogenesis**	Tuberculosis (TB) is a contagious disease caused by the bacterium Mycobacterium tuberculosis. It primarily affects the lungs but can also involve other parts of the body.
Molecular basis of *Vibrio cholerae* Pathogenesis	Vibrio cholerae, the bacterium responsible for cholera, causes severe diarrheal disease through a complex interplay of molecular mechanisms.
Molecular pathogenesis of Salmonellae	Salmonella is a genus of bacteria that causes a variety of illnesses, ranging from mild gastroenteritis to life-threatening typhoid fever.
Shigellosis and Pathogenic *Escherichia coli*	Shigellosis and pathogenic Escherichia coli (E. coli) are both bacterial infections that cause gastrointestinal illness.
Pathogenic *Escherichia coli* EPEC	Enteropathogenic Escherichia coli (EPEC) is a type of E. coli bacteria that causes diarrhea, particularly in infants. Unlike some other E. coli strains, EPEC doesn't produce toxins like Shiga toxin. Instead, it uses a different strategy to cause illness.

26. Weekly Schedule			**26. الجدول الأسبوعي**	
Week **الأسبوع**	**Date** **التاريخ**	**Topics Covered** **الموضوعات المتناولة**	**CILOs** **مخرجات التعلُم للمقرر (CILOs)**	**Teaching/Assessment Mode and Method**

				منهجية ونمط التدريس/التقييم
1		Approaching and studying bacterial diseases **Lab1**: "Tools for gene finding and whole genome comparison"	***1, 2***	Traditional تقليدي
2		Molecular approaches to the diagnosis and characterization of bacterial infections **Lab2**: Bacterial genome annotation "annotating the genome of CFT073 at TIGR"	**1, 2**	Traditional تقليدي
3		Mechanisms of bacterial pathogenesis (plant and animal models) **Lab3**: Bioinforamtics and microbial pathogenesis (part one): Mobile genetic elements and their prediction in CFT073	**2, 3**	Traditional تقليدي
4		Regulation of virulence gene expression in bacterial pathogens **Lab4**: Bioinforamtics and microbial pathogenesis (part two): b) Horizontal gene transfer: its detection and role Genome reduction during prokaryotic evolution	**1, 3**	Traditional تقليدي
5		Antimicrobial agents and bacterial resistance	**3**	Traditional تقليدي

		Lab5: Bacteriophage bioinformatics "identifying pro-phage integration sites in CFT073 and their role in bacterial genome evolution"		
6		*Molecular mechanisms of Staphylococcus pneumonia pathogenesis* ***Lab6****:* The development of plasmid vectors "Modifying the cloning site of pBluescript II KS^{+}"	**3**	Traditional تقليدي
7		*Molecular mechanisms of Pseudomonas aeruginosa pathogenesis* ***Lab7****:* Identification of essential genes in bacteria (amplification of housekeeping "16S rRNA" genes in MG1655)	**4, 5**	Traditional تقليدي
8		Tuberculosis pathogenesis (molecular approach) **Lab8**: "Isolation and development of transposons"	**4, 5**	Traditional تقليدي
9		*H. pylori* pathogenesis **Lab9**: Genetic characterization of the CFT073 uro-pathogenic *E. coli* strain (determining antibiotic resistance factors)	**3**	Traditional تقليدي
10		Molecular basis of *Vibrio cholerae* Pathogenesis **Lab10**: Genome comparisons between CFT073 and MG1655 by restriction	**3**	Traditional تقليدي

		fragment length polymorphism (RFLP) analysis		
11		Molecular pathogenesis of Salmonellae **Lab11**: Physical mapping of bacterial chromosomes by Pulsed-field Gel Electrophoresis (PFGE)	**2, 3**	Traditional تقليدي
12		Shigellosis and Pathogenic *Escherichia coli* ***Lab12****:* Physical mapping of large bacterial plasmids by Pulsed-field Gel Electrophoresis (PFGE)	**1, 3**	Traditional تقليدي
13		Pathogenic *Escherichia coli* ETEC	**1, 3**	Traditional تقليدي
14		Pathogenic *Escherichia coli* EPEC	**1, 3**	Traditional تقليدي
15		Pathogenic *Escherichia coli* UPEC	**1, 3**	Traditional تقليدي
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27. Academic Integrity Statement	**27. بيان النزاهة الأكاديمية**
Students are to observe the highest level of honesty and academic ethics in pursuit of their academic goals as per UOB Regulations of Student Conduct and Academic Integrity, Anti-plagiarism Policies, and Students' Rights and Responsibilities Handbook. The consequences for cheating, plagiarism, unauthorized collaboration, and other forms of academic dishonesty can be very serious and will be dealt with as per the aforementioned policies and regulations.	يتعيّن على الطلبة الالتزام بأعلى مستويات الصدق والأمانة والأخلاق الأكاديمية في سعيهم لتحقيق أهدافهم الأكاديمية وفقًا للوائح سلوك الطلاب والنزاهة الأكاديمية، سياسات مكافحة الانتحال، ودليل حقوق الطلبة وواجباتهم، المعمول بها في جامعة البحرين. يمكن لعواقب الغش والسرقة الأدبية والتعاون غير المصرح به وغيرها من أشكال عدم الأمانة الأكاديمية أن تكون خطيرة للغاية وسيتم التعامل معها وفقًا للسياسات واللوائح المذكورة آنفا.
28. Attendance and Absence Regulations	**28. نظام الحضور والغياب**
Students are required to adhere to regular attendance for class lectures and practical sessions, as determined by the nature of the course, as per Article (33) of Regulations of Study and Examination at the University of Bahrain.	يجب على الطلبة الالتزام بالحضور المنتظم للمحاضرات الصفية والعملية، حسبما تحدده طبيعة المقرر الدراسي، ووفقا للمادة (33) من نظام الدراسة والامتحانات في جامعة البحرين.