نموذج توصيف مقرر
Course Description Form

Name of College/Faculty: Science
Name of Department: Biological Sciences

Course Name	**Introduction to Genetic Engineering**	**اسم المقرر**
Course No.	**0497-482**	**رقم المقرر**
No. of Credits	**3**	**عدد الوحدات**
Theoretical Hours	**3**	**عدد الساعات النظرية**
Practical Hours	**0**	**عدد الساعات المحلية**

Course topics — **مواضيع المقرر**

1. **Historical perspective**
2. **Preparation of DNA fragments**
3. **Vectors**
4. **Preparation of DNA molecules**
5. **Basic cloning protocol**
6. **Introducing recombinants into different cell types**
7. **Gene libraries**
8. **Selection of cloned recombinants**
9. **Characterization of cloned genes**
10. **PCR Technology**
11. **Cloning into animal and plant Cells**
12. **Applications of the Recombinant DNA Technology**
13. **Ethical Considerations**

Text book: (Name, Author , Year , Publisher) — **عنوان الكتاب : (الاسم ، المؤلف ، سنة الطبع ، دار النشر)**

Gene cloning and DNA analysis: an introduction, T.A. Brown, 2021, John Wiley & Sons Ltd.

عنوان المرجع : (الاسم ، المؤلف ، سنة الطبع ، دار النشر)	References: (Name , Author , Year . Publisher)

متطلبات المقرر	Prerequisites Introduction to Mol. Genetics (371)					
آلية رصد المقرر	الاختبارات		%	40	Exams	Grading
	امتحانات قصيرة		%	10	Quizzes	
	واجبات		%		H.W.	
	مشاريع (دراسة ميدانية)		%		Project (field study)	
	الاختبار النهائي		%	50	Final	
			%			

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	Students will learn the basic concept and the steps involved in gene cloning.	**Preparation of DNA fragments**	✓		
2	Students will learn how to generate and analyze DNA fragments for cloning purposes, the importance of restriction enzymes and how they can be used to manipulate DNA.	**Preparation and analysis of DNA fragments**	✓		
3	Students will understand the nature of, and need for cloning vectors, the different types of vectors available (plasmids, bacteriophage λ and M13, cosmids, phagemids, YACs, BACs, MACs and HACs) and their properties, the concept of selectable markers and the importance of multiple cloning sites.	**Vectors**	✓		
4	Students will learn the various methods for preparing chromosomal, plasmid and bacteriophage (λ and M13) DNA.	**Preparation of DNA molecules**	✓		
5	Students will learn the mode of action of DNA ligase and how it is used to join the different fragments of DNA.	**Basic cloning protocol**	✓		
6	Students will learn the various methods available for the introduction of recombinants into different cell types and	**Introducing recombinants into different cell types**	✓		

	the factors that determine the choice of host cell.				
7	Students will learn why gene libraries are an important tool in gene cloning, the differences between genomic and cDNA libraries, including the types of sequences they contain, their construction, and the circumstances where each is the most appropriate tool.	**Gene libraries**	✓		
8	Students will understand the problems associated with identifying a particular gene, the various approaches that can be applied to identify the clone of interest from a library, which approach would be most suitable in each set of circumstances and the limitations of the techniques available, functional complementation, DNA hybridization, a range of approaches to label DNA molecules, and immunological screening.	**Selection of cloned recombinants**	✓		
9	Students will learn how to characterize cloned genes by restriction mapping, Southern -, Zoo-, dot –, Northern -, Western – and South/Western blotting, characterization based on the translation products, the enzymatic sequencing procedure	**Characterization of cloned genes**	✓		

	developed by Fredrick Sanger, NGS techniques, and predictions derived from sequence analysis.				
10	Students will understand how PCR works compared to cell-based cloning, primers and primer design for PCR, detection and analysis of PCR products, and selective applications of PCR in medical and forensic sciences.	**PCR Technology**	✓		
11	Students will understand the meaning of "transgenic organism", why such organisms are such a powerful tool in biological research, some of the applications of transgenic organisms, and the different techniques used to produce transgenic organisms.	**Cloning into animal and plant Cells Applications of the Recombinant DNA Technology**	✓		
12	**Ethical Considerations**	**Ethical Considerations**		✓	
Fields	**Molecular Genetics Techniques and Forensic Sciences**				
Skills	**All the major techniques for the production and analysis of recombinant DNA molecules**				
Coordinator (Name and Rank):		**Dr. Abdulmajeed Bahman** **Assistant Professor**			
Signature and stamp:		Dr. A. M. Bahman Dept. Of Biological Science			
Date:		**30\ 11 \2025**			