AGU Graduate School of Engineering and Science Bioengineering PhD Program

COURSE RECORD

Code	BENG618
Name	RECOMBINANT DNA TECHNOLOGY
Hour per week	3 (3 + 0)
Credit	3
ECTS	7,5
Level/Year	Graduate
Semester	Fall and Springs
Type	Elective
Location	TBA
Prerequisites	None. However, students are expected to be familiar with cell/molecular biology
Special Conditions	-
Coordinator(s)	Dr. AYSUN ADAN
Webpage	-
Content	DNA modifying enzymes, cloning strategies, vector types, selection and screening of recombinants, nucleic acid labeling techniques, genomic and cDNA library preparation, whole genome sequencing, the methods for site-directed mutagenesis and sequencing of cloned genomic fragments will be covered. Software permitting *in-silico* manipulation and annotation of DNA sequences for efficient design, tracking, and management of cloning experiments and the application of recombinant DNA technology in biotechnological research will be discussed.
Objectives	- Theoretical knowledge of modern tools and techniques for manipulation and analysis of genomic sequences will be discussed - Differences and pros or cons of techniques will be discussed to allow students to choose the most suitable one for a particular experimental set up - Research methodologies employing genetic engineering techniques will be provided for students to strategize their own research - The application of recombinant DNA technology in biotechnological research will be emphasized
Learning Outcomes	**LO1:** to make the students familiar with versatile tools and techniques employed in genetic engineering and recombinant DNA technology **LO2:** to be able to design and conduct experiments involving genetic manipulation. **LO3:** methodological knowledge provided in this class allows students to understand how these are applied in basic and applied experimental biological research
Requirements	This class will require reading and active participation.
Reading List	-K. Wilson, J. Walker. Principles and Techniques of Biochemistry and Molecular Biology (Cambridge University Press, ed. 7, 2010, main book) -Molecular Biology of the Cell. 2014. Garland Science. Bruce Alberts and Alexander Johnson (Might be helpful for basic understanding) - M. R. Green, J. Sambrook. Molecular Cloning: A Laboratory Manual (Cold Spring Harbor
Ethical Rules and Course Policy	

LEARNING ACTIVITIES *Please, use this one as a reference for your course*

Activities	Number	Weight (%)
Lecture	14	30%
Scientific paper discussions by students	14	35%
Term paper drafts	7	35%
	Total	100

ASSESSMENT

Evaluation Criteria	Weight (%)
Term paper drafts (every two weeks)	10%
Term paper presentation and final draft (at the end of semester)	30%
Scientific paper discussions during the term	15%
Attendance/Participation	5%
Final Exam	40%
Total	100%

For a detailed description of grading policy and scale, please refer to the website https://goo.gl/HbPM2y section 28.

COURSE LOAD *Please, use this one as a reference for your course*

Activity	Duration (hour)	Quantity	Work Load (hour)
In class activities (lecture)	2	14	28
Required paper readings before the class	5	14	70
Paper presentations (in class)	1	7	7
Research (web, library)	5	14	70
Pre-work for Presentation	4	7	28
Term paper drafts	5	7	35
Term paper submission and presentation	2	1	2
Final	15	1	15
		General Sum	**255**

ECTS: 7,5 (255/25)

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
LO1	4	4	4					
LO2	5	5	5					
LO3	5	5	5					

* Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

WEEKLY SCHEDULE

W	Topic	Outcomes
1	The manipulation of nucleic acids – basic tools and techniques : Types and examples of typical enzymes used in the manipulation of nucleic acids Activity: No activity	LO1, LO2, LO3
2	Isolation and separation of nucleic acids Activity: No activity	LO1, LO2, LO3
3	Molecular analysis of nucleic acid sequences Activity: No activity	LO1, LO2, LO3
4	Polymerase Chain Reaction Activity: No activity	LO1, LO2, LO3
5	Nucleic acid sequencing methodologies Activity: No activity	LO1, LO2, LO3
6	Introduction to cloning: Cloning vectors	LO1, LO2, LO3

	Activity: No activity	
7	Constructing gene libraries	LO1, LO2, LO3
	Activity: No activity	
8	Hybridization and gene probes, screening gene libraries	LO1, LO2, LO3
	Activity: No activity	
9	Applications of gene cloning: sequencing cloned DNA, in vitro mutagenesis, oligonucleotide directed mutagenesis, PCR based mutagenesis	LO1, LO2, LO3
	Activity: No activity	
10	Expression of foreign genes: production of fusion proteins, phage display techniques, alternative display methods	LO1, LO2, LO3
	Activity: No activity	
11	*In-silico* analysis, manipulation and annotation of DNA sequences for experimental design and efficient management of cloning experiments	LO1, LO2, LO3
	Activity: No activity	
12	Molecular Biotechnology and applications I	LO1, LO2, LO3
	Activity: Current scientific papers will be discussed	
13	Molecular Biotechnology and applications II	
	Activity: Current scientific papers will be discussed	LO1, LO2, LO3
14	Student presentations	LO1, LO2, LO3
	Activity: Current scientific papers will be discussed	

Prepared by
Date