



AYDIN ADNAN MENDERES UNIVERSITY COURSE INFORMATION FORM

Course Title		Nucleic Acid Chemistry							
Course Code		BYK607		Couse Level		Third Cycle (Doctorate Degree)			
ECTS Credit	5	Workload	125 (<i>Hours</i>)	Theory	3	Practice	0	Laboratory	0
Objectives of the Course		The aim of this course is to gain advanced knowledge about basic and important subjects about nucleic acids which is one of the four main molecules that make up the viability.							
Course Content		Biological functions of nucleic acids, Chemical Structures of Nucleic Acids, Isolation and Characterization of Nucleic Acids, RNA Structure and Virus Nucleic Acids, Nucleases and their Relations with Other Enzymes, Biosynthesis of Mononucleotides, Replication and Biosynthesis of DNA, Biosynthesis of RNA, Transcription , Translation, Biological Functions of RNA: Protein Synthesis, Catabolism of Nucleic Acids, DNA and RNA purification, quantification, DNA sequencing, southern blotting, DNA hybridization, DNA fingerprinting protocol, Northern blotting.							
Work Placement		N/A							
Planned Learning Activities and Teaching Methods				Explanation (Presentation), Discussion					
Name of Lecturer(s)									

Assessment Methods and Criteria

Method	Quantity	Percentage (%)
Midterm Examination	1	40
Final Examination	1	60

Recommended or Required Reading

1	Biochemistry by Lehninger
2	Nucleic Acids: Structures, Properties, and Functions. Victor A.

Week	Weekly Detailed Course Contents	
1	Theoretical	Introduction to nucleic acid and protein biochemistry, basic terms and definitions
2	Theoretical	Structure, function and physical properties of nucleic acids
3	Theoretical	Central dogma, nucleotide structure, primary structure, chemical stability, nomenclature
4	Theoretical	Structures of double helices; A, B, and Z form helices, base pairing and hydrogen bonding, zinc-finger motif
5	Theoretical	DNA and RNA hybridization and thermodynamics; Base-pair stability rules, melting, hybridization, hypochromism, gene chips
6	Theoretical	RNA structure and triple helices; Tertiary structure and tRNA, prediction of RNA folding, antisense
7	Theoretical	Sequencing and synthesis of DNA and RNA; Maxam-Gilbert and Sanger sequencing, chemical and enzymatic synthesis, genomics and bioinformatics
8	Intermediate Exam	Nucleic Acid Chemistry Midterm Exam
9	Theoretical	Interaction and Reaction with Drugs, Protein-Nucleic Acid Interactions Drug and cation binding, chemical probing methods, Intercalation, groove-binding, ion atmosphere, reactivity of nucleotides, altered backbone chemistries
10	Theoretical	DNA bending, flexibility, and cyclization; Bending and twisting flexibility, sequence-directed bending, methods for detection and quantitation
11	Theoretical	Topology, supercoiling, topoisomerases; Linking number, superhelix structure, topoisomerase reaction mechanisms, knots and catenanes
12	Theoretical	Enzymatic manipulation of nucleic acids; Restriction enzymes, nucleases, radiolabeling, basic genetic engineering, polymerases, PCR
13	Theoretical	The power of the XRD-NMR combination of techniques for structure determination
14	Theoretical	Methods used to elucidate the structure and mechanism of nucleic acids
15	Theoretical	Current issues and applications in nucleic acid and protein biochemistry
16	Final Exam	Nucleic Acid Chemistry Final Exam

Workload Calculation

Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	4	2	84
Midterm Examination	1	18	2	20



Final Examination	1	19	2	21
Total Workload (Hours)				125
[Total Workload (Hours) / 25*] = ECTS				5
*25 hour workload is accepted as 1 ECTS				

Learning Outcomes

1	To know the basic terms and definitions used in nucleic acid biochemistry
2	To have information about structure, physical properties and functions of nucleic acids
3	To know synthesis and degradation mechanisms of nucleic acids
4	To have knowledge about the methods used in structure and mechanism elucidation of nucleic acids
5	To have knowledge about current developments and applications of nucleic acid biochemistry

Programme Outcomes (Biochemistry (Medical) Doctorate)

1	To have basic theoretical knowledge about biochemistry and to help understanding biochemistry
2	To have the basic laboratory knowledge, apparatus and methods used in biochemistry
3	Analysis: To be able to analyze information critically
4	Synthesis: To be able to synthesize and adapt the knowledge in the field from different directions
5	Evaluation: To critically evaluate research in the field

Contribution of Learning Outcomes to Programme Outcomes 1:Very Low, 2:Low, 3:Medium, 4:High, 5:Very High

	L1	L2	L3	L4	L5
P1	5	5	5	5	5
P2	4	4	5	5	4
P3	5	5	5	4	5
P4	4	5	4	5	5
P5	5	4	5	4	4

