



**A- COURSE TITLE, CODE, ACADEMIC YEAR:**

Molecular Biology (MLT 334) 1437-1438H

**B- COURSE INFORMATION:**

Course Code	Course Title	Credit Units			Study Level	Pre-requisites
		Total	Theory	Practical		
MLT-334	Molecular Biology	3	2	1	6 <sup>th</sup> level	MLT-331
Course Coordinator		Extension		Email Address		
Dr. Mahmoud M. Omar				mmomar@taibahu.edu.sa		

**C- COURSE DESCRIPTION:**

The course is describing the basic concepts and principles in molecular biology from nucleic acid and protein structure to the most recent and state of art techniques for detecting and analysis of biomolecules; DNA, RNA and protein. Gene structure, function and expression are stated. The molecular cellular mechanisms controlling DNA replication during cell division and gene expression is well explained. Most relevant molecular methods and techniques that are used to extract and analyze the biomolecules from clinical samples are listed and complemented by further illustration and hand on method practice. Applications of both PCR and DNA sequencing in medical clinical practice to detect and confirm gene mutations are well described. A most advanced and up to date molecular biology techniques that are being introduced to molecular diagnostic labs are summarized. Wealth of bio-information related to structures, functions and mutations of biomolecules are being stored in different but connected and accessible databases on the net facilitating emerging of anew field of science termed bioinformatics.

**D- COURSE OBJECTIVES:**

1. Define molecular biology and its relation to genetics and biochemistry.
2. Recognize structures of biomolecules including nucleic acid and protein.
3. Explain the gene molecular structure, function, mutation and expression.
4. Describe the central dogma of molecular biology and the major stages in DNA replication, transcription and translation.
5. Identify recombinant DNA technology and its applications.
6. Describe and list different PCR types and their applications.
7. Illustrate different molecular techniques for analysis of DNA, RNA and proteins biomolecules.
8. Define bioinformatics and state different biomolecule databases.
9. Outlining the major molecular diagnostic techniques in clinical labs.

**E- THEORY TOPICS:**

Week	Theory Topic	Contact Hours
1	Introduction to molecular biology	2
2	Gene and genome	2
3	Biomolecule structures	3



4	DNA replication	3
5	Transcription	2
6	Translation	2
7	Mutation	2
8	Recombinant DNA technology	2
9	Polymerase chain reaction	2
10	Molecular techniques for analysis of biomolecules	4
11	Bioinformatics	2
12	Clinical molecular diagnostic technique	2
13	Revision	2

#### F- PRACTICAL SESSIONS:

Week	Practical Session	Contact Hours
1	Molecular Biology lab safety	2
2	Genomic DNA extraction	2
3	Nucleic acid quantification	2
4	Gel electrophoresis	2
5-6	PCR	4
7-8	PCR-RFLP	4
9	qRT-PCR	2
10	RNA extraction and RT-PCR	2
11	DNA sequencing (Sanger & next generation)	2
12	Bioinformatics	2
13	Round trip to Genetic Center	2
14	Clinical molecular diagnostic technique	2
15	Revision	2

#### G- ASSESSMENT TASKS:

#	Type of assessment task	Week	Total Grades
1	Continuous assessment	Weeks 1-13	10%
2	Midterm examination (written)	Week 8	15%
3	Assignment submission	Week 10	5%



4	Final practical exam	Week 16	30%
5	Final written examination	Week 17-18	40%

#### H- LEARNING RESOURCES:

##### 1- Required textbook:

- Allison, Lizabeth A. Fundamental Molecular Biology, 2 ed. John Wiley & sons, 2012.

##### 2- Essential references:

- Journal of molecular biology: <http://www.sciencedirect.com/science/journal/00222836>
- Weaver , Robert F. Molecular Biology, 5<sup>th</sup> ed. MGravHill education. 2015.

#### **Notes:**

- Assignments topics and requirements shall be announced by the end of Week-1, the deadline for submission is 12pm Thursday of Week-10 (each semester).
- Assignments and written assessment tasks must be verified against plagiarism, the maximum acceptable percentage is determined by the department (according to each level).
- Continuous assessments may include quizzes, internet searches, home-works, exercises, class activity, scratch cards, presentations, group work, etc.
- Practical exams may contain hands-on experiments, laboratory work, simulations, or demonstrations.
- Written exams will include multiple-choice questions (MCQ), short essay questions, and long essay questions.