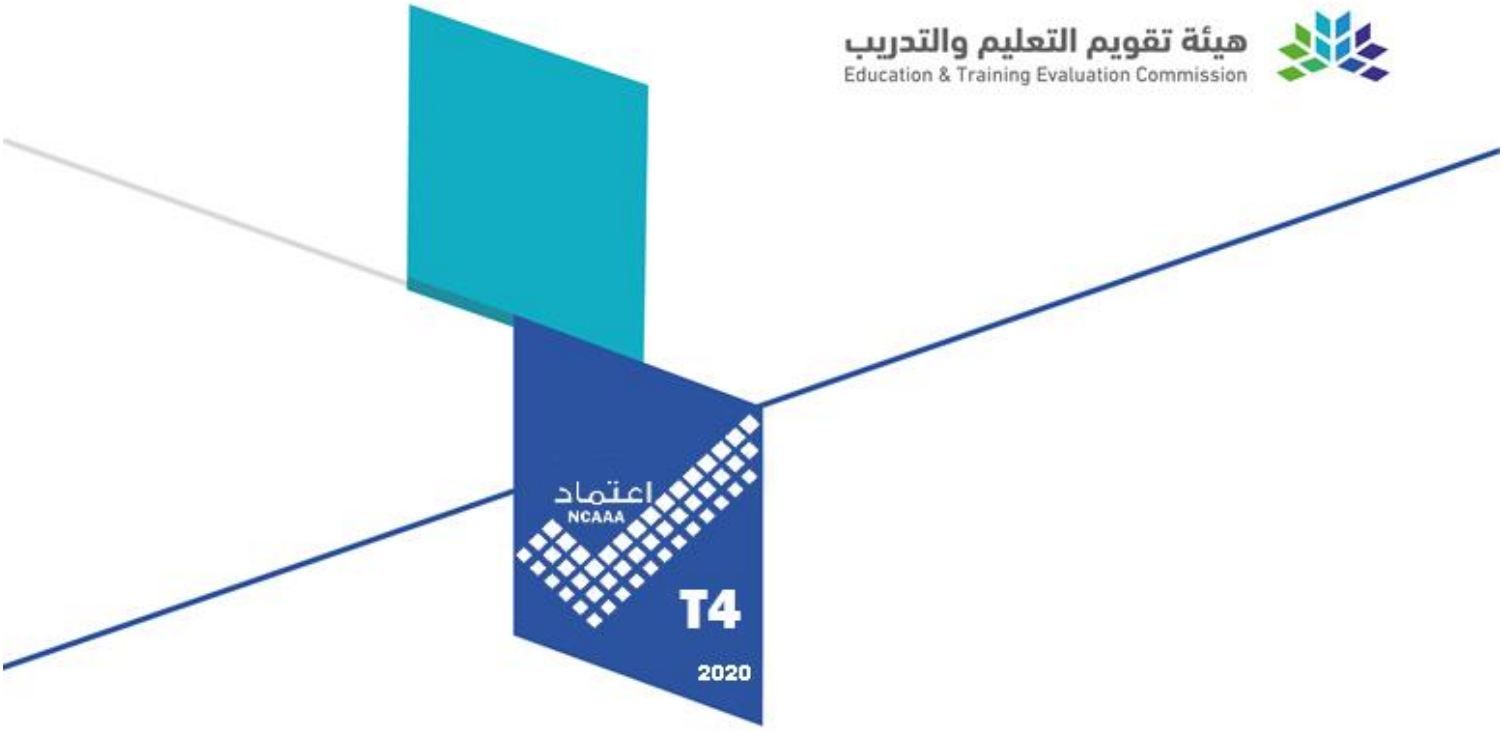
هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	**Molecular Biology**
Course Code:	**2062240-3**
Program:	**Bachelor in Food Science and Nutrition**
Department:	**Food Sciences and Nutrition Department**
College:	**College of Science**
Institution:	**Taif University**

Table of Contents

A. Course Identification:

1. Credit hours: 3 Hours
2. Course type **a.** University ☐ College ☐ Department √ Others ☐ **b.** Required √ Elective ☐
3. Level/year at which this course is offered: 4th Level / 2th year
4. Pre-requisites for this course (if any)**: Introduction to Biotechnology (2051204-3)**
5. Co-requisites for this course (if any)**: None**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	√	100%
2	**Blended**	---	---
3	**E-learning**	---	---
4	**Distance learning**	---	---
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	30
2	**Laboratory/Studio**	30
3	**Tutorial**	---
4	**Others** (specify)	---
	Total	**60**

B. Course Objectives and Learning Outcomes:

1. Course Description

The course will provide students with the knowledge and understanding of molecular biology principles. In addition, the course will emphasis on the structure and function of the genetic materials represented by DNA and its replication, analysis, damage and repair. Furthermore, RNA transcription and protein synthesis processes and their regulation will be described. The course will also offer understanding and hand-on experience on some essential and modern techniques in molecular biology.

2. Course Main Objective:

After successful completion of the course, students will be able to:

- Describe structure, formation and function of DNA, RNA and proteins.
- Explain DNA replication, transcription and translation processes.
- Define the significances of DNA damage and repair systems and gene regulation.
- Understand advances on modern molecular biology techniques such as PCR and their applications to answer food and nutrition questions.

3. Course Learning Outcomes:

	CLOs	Aligned PLOs
1.0	**Knowledge and Understanding**	
1.1	Understand the importance of molecular biology and describe the structure of DNA, RNA and proteins.	**K1**
1.2	Define DNA replication, RNA transcription and protein synthesis and their regulatory mechanisms.	**K1**

CLOs		Aligned PLOs
1.3	Know the basics of molecular biology techniques and their applications.	**K4**
2.0	**Skills :**	
2.1	Apply molecular biology techniques such as PCR on food safety.	**S3**
3	**Values:**	
3.1	Accept the internet and electronic databases as a source of information in molecular biology and bioinformatics.	**V 2**

C. Course Content:

No	List of Topics	Contact Hours
1	Introduction and overview to molecular biology.	3
2	Nucleic acids structure and function.	3
3	Gene and chromosome: DNA structure and organization.	3
4	DNA replication, mutations, and repair.	3
5	RNA transcription and splicing.	3
6	Genetic code and protein synthesis.	3
7	Regulation and control of Gene Expression	3
8	Molecular biology techniques.	3
9	Food genetic engineering human nutrition.	3
10	Bioinformatics and DNA analysis	3
Total		**30**
Experimental Topics		
1	Safety measures in molecular biology lab.	3
2	Buffers preparation, micro-pipetting exercise and calculation.	3
3	DNA extraction.	3
4	DNA molecular size determination.	3
5	DNA characterization by Spectrophotometry and Melting Temperature (Tm).	3
6	Agarose Gel Electrophoresis (AGE).	3
7	Gel documentation & photography.	3
8	Polymerase chain reaction (PCR) and primer design.	3
9	Digestion of DNA with Restriction Enzymes.	3
10	DNA barcoding and food fraud identification.	3
Total		**30**

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Understand the importance of molecular biology and describe the structure of DNA, RNA and proteins.	Lecture. Discussion.	Written exam Quizzes.

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.2	Define DNA replication, RNA transcription and protein synthesis and their regulatory mechanisms.	Lecture. Discussion.	Written exam Quizzes.
1.3	Demonstrate a basic understanding of molecular biology techniques and their applications.	Lecture. Practical	Exams Practical exam
2.0	**Skills**		
2.1	Apply molecular biology techniques such as PCR on food safety.	Lecture	Exams
3.0	**Values**		
3.1	Employ the internet and electronic databases as a source of information in molecular biology and bioinformatics.	Groups discussion	Group presentation

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignment and Interaction during lectures	Continues	10%
2	Midterm exam	5-6	20%
3	Weekly Lab. Reports	Continues	20%
4	Practical exam	11	10%
5	Final exam	12	40%

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support:

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

- Academic staff have six office hours per week for student discussions and academic assistance.
- Instructors are available during laboratory session for assistance and advice.
- Students can communicate with faculty staff 24 hours per day 7 days per week via e-mail, Blackboard, social media such as WhatsApp.
- Each student has been assigned a faculty staff member for academic guidance.
- Student satisfaction surveys are conducted for academic guidance.
- Improvement plans will be agreed following analysis of student survey results.

F. Learning Resources and Facilities

1.Learning Resources:

Required Textbooks	• Molecular biology: principles and practice. 2nd edition. Cox MM, Doudna J, O'Donnell M. W. H. Freeman, 2015. ISBN-13:978-1464126147 • Essential Molecular Biology: A Practical Approach 2nd edition. Brown, TA. Oxford University Press, 2001. ISBN 0199636443
Essential References Materials	• Essentials of genetics. 9th edition. William S. Klug, Michael R. Cummings, Charlotte A. Spencer, Michael A. Palladino and Darrell Killian Boston: Pearson, 2016 ISBN 9780134047201 • Molecular Biology of the Gene 7th edition; James D. Watson; Tania A. Baker; Stephen P. Bell; Alexander Gann; Michael Levine; Richard Losick Publisher Pearson, 2013 ISBN13 9780321762436 • Introduction to Genetics: A Molecular Approach 1st edition. T. A. Brown Garland Science; 2011; ISBN-10: 9780815365099.

Electronic Materials	• www.journals.elsevier.com/journal-of-molecular-biology • https://tu.blackboard.com • https://www.rcsb.org/
Other Learning Materials	• www.yk.rim.or.jp/~aisoai/index.html • www.hpc.unm.edu/~aroberts/main/molbio.htm • www.scirp.org/Journallajmb/ • www.ebi.ac.uk/ • blast.ncbi.nlm.nih.gov/Blast.cgi

2. Facilities Required:

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Lecture theater (capacity not more than 50 students) for 3 hours per week. • Well-equipped molecular biology laboratory that accommodates up to 20 students for 3 hours per week
Technology Resources (AV, data show, Smart Board, software, etc.)	• Data show projectors, smart board. • Portable computer for lectures power point presentations • Computer lab equipped with internet and multimedia resources • Mega6 software. • SPSS software.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Molecular biology lab equipped with: • Polymerase Chain Reaction (PCR). • Gel electrophoresis. • Spectrophotometry. • UV transilluminator with camera. • DNA sequencing equipment's. • Micropipettes. • MilliQ Water apparatus.

G. Course Quality Evaluation:

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment	Students, faculty, program leaders and Peer Reviewer.	• Constant monitoring by program leaders and faculty quality assurance unit (Direct). • Perform student evaluation surveys administered by the deanship of academic development (Indirect). • Appraisal of course reports (Indirect).
Extent of achievement of course learning outcomes	Students, faculty, program leaders, peer reviewer and stakeholder.	• Implement questionnaires for student assessments (Indirect). • Evaluation of course report (Indirect).

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Quality of learning resources	Faculty, program leaders, administrative staff, independent reviewers.	• Nonstop monitoring by program directors and faculty quality assurance unit (Direct). • Execute questionnaires for student evaluation (Indirect). • Evaluation of course report (Indirect).

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	**Department council - Academic Development Committee**
Reference No.	**Department council NO: 2 Subject NO: 1**
Date	**30 /02 /1444 H**