



# Course Specification

— (Postgraduate)

<b>Course Title:</b>	Molecular diagnostic practicum
<b>Course Code:</b>	373507-4
<b>Program:</b>	Master of Clinical Laboratory Sciences in Molecular Diagnostics
<b>Department:</b>	Clinical Laboratory Sciences
<b>College:</b>	Applied medical Sciences
<b>Institution:</b>	Taif University
<b>Version:</b>	No 3
<b>Last Revision Date:</b>	18/01/2024



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## A. General information about the course:

### 1. Course Identification:

<b>1. Credit hours: (4 hrs.)</b>			
<b>2. Course type</b>			
A.	<input type="checkbox"/> University	<input type="checkbox"/> College	<input checked="" type="checkbox"/> Department <input checked="" type="checkbox"/> Track
B.	<input checked="" type="checkbox"/> Required		<input type="checkbox"/> Elective
<b>3. Level/year at which this course is offered: (2<sup>nd</sup> level/1<sup>st</sup> year)</b>			
<b>4. Course general Description:</b>			
This course aims at providing students with basic and advanced laboratory techniques in the field of molecular diagnostics. The course was designed to be delivered as intensive laboratory sessions, therefore providing the necessary practical skills in molecular techniques. Students will also gain in-depth experience in data interpretation, analysis, and writing up a scientific report.			
<b>5. Pre-requirements for this course (if any):</b>			
None			
<b>6. Pre-requirements for this course (if any):</b>			
None			
<b>7. Course Main Objective(s):</b>			
The main objective of the course is to enhance students' practical skills and making them understand basic and advanced molecular techniques such as cell culture, PCR, gel electrophoresis, sequencing, blotting techniques, flowcytometry...etc. By the end of the course students should be able to understand technique principles, major instrument operations, data interpretation and their critical analyses.			

### 2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	N/A	0
2	E-learning	N/A	0
3	Hybrid <ul style="list-style-type: none"> <li>• Traditional classroom</li> <li>• E-learning</li> </ul>	N/A	0
4	Distance learning	N/A	0
5	Others	4 hours/week Practical sessions	100%



### 3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	N/A
2.	Laboratory/Studio	60
3.	Field	N/A
4.	Tutorial	N/A
5.	Others (specify).....	N/A
Total		60

### B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
<b>1.0</b>	<b>Knowledge and understanding</b>			
1.1	Describe the principles of molecular laboratory techniques and their applications in clinical settings.	K2	Laboratory sessions	<ul style="list-style-type: none"> <li>Lab reports</li> </ul>
1.2	Understand the principle of operation of molecular laboratory instruments and their applications.	K1	Laboratory sessions	<ul style="list-style-type: none"> <li>Lab reports</li> <li>Assessment of learning activities</li> </ul>
<b>2.0</b>	<b>Skills</b>			
2.1	Cary out experiment protocols effectively	S1	Laboratory sessions	<ul style="list-style-type: none"> <li>Lab reports</li> <li>Assessment of learning activities</li> </ul>
2.2	Analyze and interpret laboratory results in a critical manner to deliver clear and fluent scientific reports.	S2	Laboratory sessions	<ul style="list-style-type: none"> <li>Lab reports</li> </ul>
2.3	Maintain accurate and organized records of experimental protocols and procedures	S2	Laboratory sessions	Assessment of learning activities
<b>3.0</b>	<b>Values, autonomy, and responsibility</b>			
3.1	Display professional and responsible attitude	V1	Laboratory sessions	Assessment of learning activities



Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
	while performing tasks related to the course.			
3.2	Leadership characteristics in operating the techniques in accurate manner	V4	Laboratory sessions	<ul style="list-style-type: none"> <li>Lab reports</li> </ul> Assessment of learning activities

### C. Course Content:

No	List of Topics	Contact Hours
1.	<b>Nucleic acid extraction</b> <ul style="list-style-type: none"> <li>Extraction</li> <li>Precipitation and purification</li> <li>Quantitation (Nanodrop)</li> </ul>	8
2.	<b>Cell culture technique</b> <ul style="list-style-type: none"> <li>Introduction to cell and tissue culture</li> <li>CO2 incubator</li> <li>Biological safety cabinets use and cleaning\</li> <li>Contamination prevention</li> <li>Media and cell inoculation</li> <li>Trypsinization, cell counting, and harvesting Growth analysis</li> </ul>	12
3.	<b>Polymerase chain reaction (PCR)</b> <ul style="list-style-type: none"> <li>PCR set up</li> <li>PCR amplification</li> <li>PCR products purification</li> <li>Agarose gel electrophoresis</li> </ul>	8
4.	<b>Sequencing (NGS)</b>	8
5.	<b>RT-PCR</b>	8
6.	<b>Western blotting</b> <ul style="list-style-type: none"> <li>Protein extraction</li> <li>Polyacrylamide gel electrophoresis and western blotting</li> <li>Protein immunoassay of western blotting</li> </ul>	8
7.	<b>Flowcytometry unit</b> ; visit, analysis, and demonstration	8
<b>Total</b>		<b>60</b>





## D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Practical reports	Throughout	75%
2.	Assessment of learning activities	Throughout	25%
	Total		100%

\*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

## E. Learning Resources and Facilities:

### 1. References and Learning Resources:

Essential References	Keith Wilson & John Walker (2012), Principles and techniques of biochemistry and molecular biology, 3 <sup>ed</sup> ed. Cambridge University Press.
Supportive References	N/A
Electronic Materials	SDL: <a href="https://sdl.edu.sa/SDLPortal/en/Publishers.aspx">https://sdl.edu.sa/SDLPortal/en/Publishers.aspx</a> PubMed: <a href="https://www.ncbi.nlm.nih.gov/pubmed/">https://www.ncbi.nlm.nih.gov/pubmed/</a>
Other Learning Materials	N/A

### 2. Educational and Research Facilities and Equipment Required:

Items	Resources
<b>facilities</b> (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Laboratories
<b>Technology equipment</b> (Projector, smart board, software)	Data show, Blackboard and A/V, interactive presentations softwares e.g. <u>Mendeley</u>
<b>Other equipment</b> (Depending on the nature of the specialty)	<ul style="list-style-type: none"> <li>- Laboratory should be stocked with all necessary consumable materials (chemicals, reagents, kits...etc.).</li> <li>- All safety materials, tools, and regulation implementation must be available and applied appropriately.</li> <li>- Necessary laboratory equipment and instruments should be available in the laboratory with effective operation and maintenance.</li> </ul>



## F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Peer evaluators	Direct: Peer evaluation
Effectiveness of student's assessment	Students	Indirect: Questionnaire Survey at the end of each semester.
Quality of learning resources	Program Leaders /Teaching staff/ Development and accreditation committee	Indirect: Review by Department Committee
The extent to which CLOs have been achieved	Program Leaders /Teaching staff/ Development and accreditation committee	Indirect: Review course reports and program annual reports by Department Committee
Other	-	-

**Assessor** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)

## G. Specification Approval Data:

<b>COUNCIL /COMMITTEE</b>	Department council
<b>REFERENCE NO.</b>	06
<b>DATE</b>	21/01/2024

