



Philadelphia University

Faculty of Science

Department of Biotechnology and Genetic Engineering

Second Semester, 2007/2008

Course Syllabus

Course Title: Special Topics A (MOLECULAR DIAGNOSTICS)	Course code: 240497
Course Level: 4 th year	Course prerequisite (s) and/or corequisite (s): Department approval-Finish at least 90 credit hours.
Lecture Time: 10:100-11:00 (S)	Credit hours: One

Academic Staff Specifics

Name	Rank	Office Number and Location	Office Hours	E-mail Address
Dr. Sameer Masoud	Associate Professor	S817	11-12 (S, Tu, Th) 12-1 (S)	smasoud@philadelphia.edu.jo

Course module description:

This course will cover the principles of Molecular Diagnosis which is the process of identifying a disease by studying molecules, such as proteins, DNA, and RNA, in a tissue or fluid. Molecular diagnostics is a new discipline that captures genomic and proteomic expression patterns and uses the information to distinguish between two or more conditions at the molecular level. The conditions under investigation can be human genetic disease or infectious diseases. Molecular diagnostics is not confined to human diseases but can be used in animals or plants. It can be also used in environmental monitoring, food processing ...etc.

Course module objectives:

The objective of this course is learning and understanding how molecular techniques that were studied in other classes can be developed and utilized in diagnosis and sold in diagnostic kits.

Course/ module components

Many of the diagnostic techniques are developed and marketed in kit format by biotechnology companies. The main source of information is web sites of companies that develop and market the molecular diagnostic kits. New methods are continuously developed.

Teaching methods:

One lecture (50-minutes) each week. Student questions and student participation in discussions are encouraged.

Learning outcomes:

- Knowledge and understanding of the basic principles used in molecular diagnosis.
- Gain thinking and analysis skills to understand new diagnostic methods
- Ability to collect information to develop a new diagnostic kit.
- Knowledge and skills gained in the course should be useful in practical life in developing or using diagnostic kits

Assessment instruments

- Each student should submit a short **term-paper** on a newly developed molecular diagnostic technique. It should include the principle and applications of this technique. Alternative to term paper: a research project in developing a diagnostic method of a specific disease using DNA sequence information from gene bank. No laboratory work is needed but sequence analysis and design of probes or primers.
- **Home works**: Probe design and melting temperature (1), PCR primer design (2), Specifications of Real Time PCR machines (3) and ELISA Diagnostics (4).

Allocation of Marks	
Assessment Instruments	Mark
Midterm examination	30 %
Final examination: 50 marks	50 %
Term paper or research projects (10%) Home works and Quizzes (10%)	20 %
Total	100 %

Documentation and academic honesty

- All home works or term papers should be done using your own wording and not just copy/paste from the internet. Also you should understand what you write and should expect to be asked about what you write.

Course/module academic calendar

week	Basic and support material to be covered	Homework/reports and their due dates
(1)	Introduction	
(2)	What is molecular diagnostics?	
(3)	Why use molecular diagnosis?	
(4)	Hybridization based methods	
(5)	Reverse hybridization methods	Homework 1
(6)	Diagnostics based on DNA chips and Micro-arrays	
(7)	Nucleic acid amplification-End-point PCR- Qualitative	
(8)	Nucleic acid amplification- End-point PCR- Qualitative (Part two)	Homework 2
(9)	Midterm examination	
(10)	Nucleic acid amplification- Real time PCR- Qualitative and Quantitative	
(11)	Nucleic acid amplification- Real time PCR- Qualitative and Quantitative (part two)	Term paper due in this lecture
(12)	Ligation assay: SNP detection by probe ligation and amplification (e. g. MLPA)	Homework 3
(13)	Other DNA based diagnosis (e. g. DNA sequencing)	
(14)	Principle of Immunological diagnosis	Homework 4
(15)	Immunological Diagnostics: agglutination, Rapid, ELISA's, immunofluorescence, Western blots --Bioluminescence to monitor hygiene and contamination	
(16)	Final Examination	

Attendance policy:

Absence from lectures and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse acceptable to and approved by the Dean of Science shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.

Expected workload:

On average students need to spend 2-3 hours of study and preparation/week.