Philadelphia University
Faculty of Science
Department of Biotechnology and Genetic Engineering
First semester, academic year (2011/2012)

Course Syllabus

Course Title: Protein Biotechnology	**Course code: 240448**
Course Level: 4th year	**:(Course prerequisite (s) and/or corequisite (s** Biochemistry I (240343) & (Molecular Biology (#240386
Lecture Time: 9:45-11:15 (M + W)	**Credit hours:** Three

Academic Staff Specifics

Name	Rank	Office number	Office hours	E-mail address
Dr. Sameer Masoud	Associate Professor	S817	**10-11 (S, Tu, Th)** **12-13 (M, W)**	smasoud@philadelphia.edu.jo

Course module description: This is an elective course in the old study plane but an obligate course for the new study plane (2008) for the major "Biotechnology and Genetic Engineering".

Course module objectives: The course aims to provide students with a comprehensive overview of protein biotechnology in three main themes: protein biochemistry, protein analysis and purification, and recombinant protein expression and harvesting. Examples of important proteins will be also discussed within the previous themes. The subject "Protein Biotechnology" has common principles learned in other courses such as Pharmaceutical Biotechnology. In this course we will try to minimize such repetition by emphasizing the general principles that are common for proteins.

Course/ module Text Book: (على رف الحجز في المكتبة الرئيسية)

Title: **Protein Biochemistry and Biotechnology;** Author/Editor: Gary Walsh
Publisher: John Wiley & Sons; 2002; ISBN: (0471899070; 978-0471899075)

Teaching methods: Each week three lectures (3 X 50-minutes). Student questions and student participation in discussions are encouraged.

Learning outcomes: *At the end of this module, student will be able to:*

.Explain the different aspects of protein biochemistry and structure *
.Modify a protein purification scheme to a specific application *
Understand the different systems of recombinant protein expression with advantages and disadvantages of each *
.Comprehend the difficulties in working with proteomics compare to genomics *
.Gain thinking and analysis skills in protein biochemistry *
.Communication skills well be developed by encouraging student participating in discussion and asking questions *

Assessment instruments

Allocation of Marks	
Assessment Instruments	**Mark**
First examination	20 %
Second examination	20 %
Final examination	40 %
Quizzes and Home works	20 %
Total	100 %

Expected workload: On average students need to spend 2 hours of study and preparation for each 50-minute lecture/tutorial.

Week	Basic and support material to be covered	Text book reading (pages and chapter number)
(1)	Introduction - amino acids, peptides, proteins - Protein biochemistry and structure. - Proteomics vs. protein biochemistry.	Pages 1-27
(2)	Protein post-translational modifications Protein stability and folding	Pages 28-50
(3)	Protein Sources: -Recombinant vs. non-recombinant.	Pages 51-88
(4)	Recombinant Proteins (The different systems of heterologous protein production)	Pages 51-88
(5)	Protein purification and characterization: - Protein quantification. - Cell disruption and removal of debris - Protein concentration	Pages 88-114
(6)	Continue previous subjects and *** First Examination**	
(7)	Protein purification and characterization: - Column chromatography (based on size, chemistry or affinity of proteins).	Pages 116-154
(8)	- Protein inactivation and stabilization. -Purity and functional studies.	Pages 155-177
(9)	Large-scale protein purification.	Pages 179-212
(10)	Continue Large-scale protein purification.	Pages 179-212
(11)	Therapeutic proteins: - Blood products and vaccines - Antibodies and therapeutic enzymes	Chapters 5 & 6
(12)	Continue previous subjects and *** Second Examination**	
(13)	Therapeutic proteins: - Hormones and growth factors. - Interferon and interleukins	Chapters 7 & 8
(14)	Proteins used for analytical purposes	Chapter 9
(15)	Industrial Proteins: - Industrial enzymes (proteases, carbohydrases, ..). - Non-catalytic industrial proteins.	Chapters 10-13
(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 the relevant college/faculty 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.

Course/module academic calendar

Module references

1. **Protein purification techniques: a practical approach;** Roe, Simon (ed.); Oxford University Press, 2000 (572.6 PRO).

2. **Protein purification applications: a practical approach;** Roe, Simon (ed.); Oxford University Press, 2001 (572.6 PRO)

3. **Gene expression systems: using nature for the art of expression;** Fernandez, Joseph M. and Hoeffler, James P.; Academic Press, 1999 (572.865 GEN).

4. **Expression of recombinant genes in eukaryotic systems;** Glorioso, Joseph J. and Schmidt, Martin C.; Series Title: Methods in enzymology; Vol. 306; Academic Press, 1999 (572.877 EXP).

5. **Proteins: analysis and design;** Angeletti, Ruth Hogue (ed.); Academic Press, 1998 (572.6 PRO).

6. **Polypeptide and protein drugs: production, characterization and formulation**; Hider, R. C. Barlow, D.; Ellis Horwood, 1990 (615.19 POL).

7. **Introduction to proteomics: tools for the new biology;** Liebler, Daniel C. (Author); Humana Press, 2002 (572.6072 LIE).

8. **Fundamentals of Protein Biotechnology**; Stanley Stein, Published by CRC Press, 1990, ISBN 0824783468, 9780824783464, 310 pages.

Journals: Scientific journal in this subject are numerous in number and sudents are encouraged searching for such journals in the internet.

Website: Gene banks contain amino acid sequences and structures of different proteins are easily accessible. Also, several animations of protein structure and interaction are available in the internet.