

Philadelphia University	 PHILADELPHIA UNIVERSITY THE WAY TO THE FUTURE	Approval date:
Faculty of Science		Issue:
Department of biotechnology and Genetic Engineering		Credit hours (2)
Academic year (2022/2023)		Bachelor

Course information

Course#	Course title	Prerequisite
٢٤٠٤٤٧	Protein Biotechnology	.٢٤٠١٠٧
Course type ☐ University Requirement ☐ Faculty Requirement ☒ Major Requirement ☐ Elective ☒ Compulsory		Class time S&Tu 8:15-9:30
		Room # 1001

Instructor Information

Name	Office No.	Phone No.	Office Hours	E-mail
Dr. Sameer Masoud	2-1013	2214	S & Tu 11:00-12:00) M & W (12:30-1:30)	smasoud@philadelphia.edu.jo

Course Delivery Method

Course Delivery Method			
☒ Physical	☐ Online	☐ Blended	
Learning Model			
Percentage	Synchronous	Asynchronous	Physical
			100%

Course Description

The course will discuss current and newly emerging technologies in expressing and preparing proteins using bacteria or tissue culture technology. Construction of 3-dimensional structures of proteins, determination of active and functional sites with emphasis on studying .enzymes and antibodies

Course Learning Outcomes

Number	Outcomes	Corresponding Program outcomes
Knowledge		
Kp1	Understand and recognize the biochemical, molecular and cellular structure of organisms and biological systems.	
Kp2	Understand concepts, applications and regulations of the existing and emerging methods of biotechnology and the role of bio-entrepreneurs in the successful commercial innovations.	
Skills		
Sp4	Use the appropriate computational tools and databases to make sense of the molecular data ((DNA, RNA and Protein	
Competencies		
Cp2	Demonstrate critical thinking skills utilize a wide range of information sources and communicate .through oral presentations and written reports	

Learning Resources

Course textbook	Title: Protein Biochemistry and Biotechnology (2nd Edition); Author/Editor: Gary Walsh Publisher: Wiley Blackwell, (2014); ISBN: (978-0-470-66986-0 & 978-0-470-66985-3
Supporting 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)
Supporting websites	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.
Teaching Environment	☒ Classroom ☐ laboratory ☐ Learning platform ☐ Other

Meetings and subjects timetable

Week	Topic	Learning Methods	Tasks	Learning Material
1&2	Chapter 1: Proteins and proteomics 1.1 Proteins, an introduction (1) 1.2 Genes, genomics and proteomics (2) 1.3 Bioinformatics (12) 1.4 Proteomics: goals and applications (14)	Pages 1-22		
3&5	Chapter 2: Protein structure and engineering 2.1 Primary structure (25) 2.2 Higher-level structure (36) 2.3 Protein classification on the basis of structure (41) 2.4 Protein structural stability (45) 2.5 Higher-order structure prediction (47) 2.6 Protein folding (48) 2.7 Intrinsically disordered proteins (50) 2.8 Protein engineering (51) 2.9 Protein post-translational modification (54)	Pages 25-62		
6&7	Chapter 3 Protein sources 3.1 Recombinant versus non-recombinant production (65) 3.2 Approaches to recombinant protein production (67) 3.3 Heterologous protein production in <i>E. coli</i> (72) 3.4 Heterologous production in bacteria other than <i>E. coli</i> (77) 3.5 Heterologous protein production in yeast (77) 3.6 Heterologous protein production in fungi (78) 3.7 Proteins from plants (80) 3.8 Animal tissue as a protein source (84) 3.9 Heterologous protein production in transgenic animals (85) 3.10 Heterologous protein production using animal cell culture (86) 3.11 Insect cell culture systems (87)	Pages 65-88		
8&9	Chapter 4 Protein purification and characterization 4.1 Protein detection and quantification (93) 4.2 Initial recovery of protein (95) 4.3 Removal of whole cells and cell debris (98) 4.4 Concentration (103)	Pages 91-139		

	4.5 Chromatographic purification (107) 4.6 Protein inactivation and stabilization (128) 4.7 Protein characterization (137)			
10	Chapter 5: Large-scale protein production 141 5.1 Upstream processing (141) 5.2 Downstream processing (154) 5.3 Therapeutic protein production: some special issues (163) 5.4 Range and medical significance of impurities potentially present in protein-based therapeutic products (166)	Pages 141-17		
12-15	Chapter 6: Therapeutic proteins: blood products, vaccines and enzymes Chapter 7: Therapeutic antibodies Chapter 8: Hormones and growth factors used therapeutically Chapter 9: Interferons, interleukins and tumour necrosis factors Chapter 10: Proteins used for analytical purposes Chapter 11: Industrial enzymes: an introduction Chapter 12: Industrial enzymes: proteases and carbohydrases Chapter 13: Additional industrial enzymes Chapter 14: Non-catalytic industrial proteins	Pages 177-202 Pages 205-230 Pages 233-253 Pages 257-274 Pages 277-309 Pages 311-325 Pages 327-367 Pages 371-390 Pages 393-414		
16	Final Exam			

* includes: Lecture, flipped Class, project- based learning, problem solving based learning, collaborative learning

Assessment Methods and Grade Distribution

Assessment Methods	Grade Weight	Assessment Time (Week No.)	Link to Course Outcomes
Mid Term Exam	% 30	Week 7	
Various Assessments *	% 20	Four Quizzes	
	% 10	Term Paper	
Final Exam	% 40	Week 16	
Total	%100		

* includes: quiz, in class and out of class assignment, presentations , reports, videotaped assignment, group or individual projects.

Course Policies

Policy	Policy Requirements
Passing Grade	The minimum passing grade for the course is (50%) and the minimum final mark recorded on transcript is (35%).
Missing Exams	• Missing an exam without a valid excuse will result in a zero grade to be assigned to the exam or assessment. • A Student who misses an exam or scheduled assessment, for a legitimate reason, must submit an official written excuse within a week from the an exam or assessment due date. • A student who has an excuse for missing a final exam should submit the excuse to the dean within three days of the missed exam date.
Attendance	The student is not allowed to be absent more than (15%) of the total hours prescribed for the course, which equates to six lectures days (M, W) and seven lectures (S,T,R). If the student misses more than (15%) of the total hours prescribed for the course without a satisfactory excuse accepted by the dean of the faculty, s/he will be prohibited from taking the final exam and the grade in that course is considered (zero), but if the absence is due to illness or a compulsive excuse accepted by the dean of the college, then withdrawal grade will be recorded.
Academic Honesty	Philadelphia University pays special attention to the issue of academic integrity, and the penalties stipulated in the university's instructions are applied to those who are proven to have committed an act that violates academic integrity, such as: cheating, plagiarism (academic theft), collusion, and violating intellectual property rights.