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A. General information about the course:

1. Course Identification:

1. Credit hours: 3(Lecture 2+ Lab 2)

2. Course type

A. ☐ University ☐ College ☐ Department ☒ Track

B. ☒ Required ☐ Elective

3. Level/year at which this course is offered: (Level 1 / first year)

4. Course General Description:

This postgraduate course provides the students with advanced biochemistry topics including regulation of protein functions, protein folding, enzyme functions, and proteomics. The course also focuses on the various advanced metabolic pathways including the biosynthesis of amino acids, and nucleotides synthesis and degradation. In addition, the integration of mammalian metabolism via hormonal regulation is also emphasized to enable the students to be acquainted with a comprehensive view of metabolic interactions.

5. Pre-requirements for this course (if any):

None

6. Co-requisites for this course: (if any):

None

7. Course Main Objective(s):

This course aims to develop a comprehensive understanding of significant issues in biochemistry that cover the integrated regulation of the various biochemical pathways. This is best exemplified by the pathways involved in amino acids, and nucleotides biosynthesis and degradation. The course aims to encompass the metabolic implications of some outstanding topics such as obesity and diabetes mellitus. Among the major course objectives is the development of professional lab skills to apply modern biochemical techniques.



2. Teaching Mode: (mark all that apply)

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

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

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	30
3.	Field	-
4.	Tutorial	-
5.	Others (specify).....	
	Total	60

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

Code	Course Learning Outcomes	Code of CLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Outline the process by which a protein structure acquires its functional three-dimensional shape.	K1	Three credits weekly involving lectures and tutorials	-Quizzes -Written exams -Assignments -Lecture discussions

Code	Course Learning Outcomes	Code of CLOs aligned with the program	Teaching Strategies	Assessment Methods
1.2	Describe the various biosynthesis and degradation pathways such as that of nucleotides	K2	Three credits weekly involving lectures and tutorials	-Quizzes -Written exams -Assignments -Lecture discussions
1.3	Illustrate the biochemical basis of obesity and diabetes mellitus and their impact on glucose metabolism and homeostasis	K3	Three credits weekly involving lectures and tutorials	-Quizzes -Written exams -Assignments -Classroom participation
1.4	Explain how different organs contribute to the overall metabolic homeostasis.	K4	Three credits weekly involving lectures and tutorials	-Quizzes -Written exams -Assignments -Classroom participation
2.0	Skills			
2.1	Apply the proteomic techniques to study the expression, structure, and function of proteins by employing the acquired practical skills	S1	Independent lab work.	-Direct observation -Lab Reports
2.2	Interpret and analyze the cell- and tissue-specific biochemical data using the appropriate analytical methods.	S2	Independent lab work.	-Lab Reports

Code	Course Learning Outcomes	Code of CLOs aligned with the program	Teaching Strategies	Assessment Methods
3.3	Design and conduct biochemical research work by applying critical thinking and the appropriate lab methods.	S3	Independent lab work.	-Lab reports - Presentations
3.0	Values, autonomy, and responsibility			
3.1	Demonstrate autonomy in critically evaluating the scientific literature related to biochemistry topics.	V1	Independent assigned data search	-Classroom discussions - Presentations
3.2	Sow responsibility in making informed decisions regarding the biochemistry issues.	V2	Independent assigned data search	-Classroom discussions - Presentations
3.3	Share the scientific issues professionally and present the research results via oral presentations and written formats	V3	Participation in teamwork	-Group discussions - Presentations

C. Course Content:

No	List of Topics	Contact Hours
1.	Course Introduction: General introduction on protein structure and function, and the major metabolic pathways.	4
2.	Protein folding: Stepwise process of protein folding, Chaperones and their role in protein folding, and diseases associated with abnormalities of protein folding.	4
3.	Regulation of protein function:	4



	Synthesis and degradation of proteins, Phosphorylation and dephosphorylation in regulation of protein activity.	
4.	Proteomics: Introduction to proteomics, and mass spectrometry in proteomics.	4
5	Overview of Nitrogen Metabolism: Nitrogen cycling network, nitrogen fixation, and role of glutamine synthetase in nitrogen metabolism.	3
6.	Amino acids metabolism: Synthesis of amino acids, amino acids catabolism; deamination and transamination reactions, and urea cycle	2
7.	Molecules Derived from Amino Acids: Physiologically active amines: Epinephrine, norepinephrine, and dopamine, Arginine derivatives: Nitric Oxide and glutathione.	2
8.	Biosynthesis and Degradation of Nucleotides: De Novo and Salvage Pathways, ribonucleotides as a precursor of Deoxyribonucleotides, and degradation of Purines and Pyrimidines.	2
9.	Integration of Metabolism: Integration of Metabolism-I: Tissue-specific metabolism; role of the liver in processing and distributing nutrients. Adipose tissues and their role in Storing and Supplying Fatty Acids. Integration of Metabolism-II: Hormonal regulation of fuel metabolism; Metabolic effects of insulin and glucagon Integration of Metabolism-III: Obesity and regulation of the body mass, and diabetes mellitus	6
10.	Selected Topics for Discussion	2
Total		30

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm exam-1	5 th week	20 %
2.	Midterm exam -2	10 th week	20 %
3.	Presentations, data survey, discussion of published articles, Assignments	Throughout the semester duration	20%
4	Final exam	16 th week	40%

*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	-Nelson D L., Cox MM, Hoskin AA. (2021). Lehninger Principles of Biochemistry. 8th Ed. Macmillan Learning. ISBN-13: 978-1-319-32234-2 -Lodish, H., Berk, A., Kaiser, C. A., Krieger, M., Scott, M. P., Bretscher, A. Matsudaira, P. 2021. Molecular Cell Biology (9th ed.). W. H. Freeman. -Berg, J.M., Tymoczko, J.L. and Stryer, L. 2019. Biochemistry. 9th Edition. W. H. Freeman Publishing, New York.
Supportive References	https://www.farmingdale.edu/courses/outlines/chm381.shtml
Electronic Materials	
Other Learning Materials	Tutorial videos

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom
Technology equipment (Projector, smart board, software)	Projector and smart board
Other equipment (Depending on the nature of the speciality)	



F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of students' assessment	Faculty	Direct
Quality of learning resources	faculty	Direct
The extent to which CLOs have been achieved	Faculty	Direct
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

-	BIOLOGY DEPARTMENT COUNCIL
REFERENCE NO.	23
DATE	23/8/1445