



هيئة تقويم التعليم

Education Evaluation Commission

المركز الوطني للتقويم والاعتماد الأكاديمي

National Center for Academic Accreditation and Evaluation

ATTACHMENT 5.

T6. COURSE SPECIFICATIONS (CS)

**Protein Biochemistry
(BCH 303)**

**King Saud University
College of Science
Biochemistry Department**

Course Specifications

Institution	King Saud university	Date
College/Department	College of Science / Biochemistry department	

A. Course Identification and General Information

1. Course title and code: Protein Biochemistry (BCH 303)			
2. Credit hours 3(2+0+2)			
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs)			
4. Name of faculty member responsible for the course		Male Section	Female Section
5. Level/year at which this course is offered Fourth level / Second year			
6. Pre-requisites for this course (if any)		BCH 202	
7. Co-requisites for this course (if any)			
8. Location if not on main campus The main campus (Male campus and Female campus)			
9. Mode of Instruction (mark all that apply)			
a. traditional classroom	<input checked="" type="checkbox"/>	What percentage?	<input type="text" value="100%"/>
b. blended (traditional and online)	<input type="checkbox"/>	What percentage?	<input type="text"/>
c. e-learning	<input type="checkbox"/>	What percentage?	<input type="text"/>
d. correspondence	<input type="checkbox"/>	What percentage?	<input type="text"/>
f. other	<input type="checkbox"/>	What percentage?	<input type="text"/>
Comments:			

B Objectives

1. What is the main purpose for this course?

Proteins are undoubtedly one of the most important molecules in living organism. This course introduces biochemistry by describing the physical and chemical activities of proteins and their functions in cells. To familiarize students with basic knowledge of protein biochemistry needed for higher level courses. This course covers the details of amino acid as the building blocks of protein.

Protein synthesis and folding, protein structure, structural and functional classification of proteins, the introduction to enzymes and metabolism. Techniques in protein chemistry and analysis, including Protein purification, Protein quantification, Amino Acid Analysis, Protein Sequencing Mass Spectrometry and Proteomics are introduced together with key experiments which reveal the physical and chemical basis of the functioning of proteins. The practical course will nurture technical skills in biochemistry and will include protein preparation, the analysis of protein structure and enzymatic assays.

2. Briefly describe any plans for developing and improving the course that are being implemented. (e.g. increased use of IT or web based reference material, changes in content as a result of new research in the field)

Continuous development and improvement in the course is warranted.

- 1- This is achieved by changes made in the course, keeping in view the increase in the application of biochemistry in medicine, agriculture, food industry, pharmaceutical industry etc.
- 2- Allocating a longer time span to problem solving especially from the websites of highly categorized universities and from the three recommended text books. Practicing the problem solving put the KSU student in parallel to the international students studying the subject.
- 3- Developing computer based PowerPoint Presentations to support the lecture course material
- 4- Assigning students to gain knowledge from the scientific websites that present animations, videos etc on the subject.
- 5- The practical part is being reviewed and modified.

C. Course Description (Note: General description in the form used in Bulletin or handbook)

Course Description:

The course is 3(2+0+1) credit hours, as 1 credit hour is 50 minutes theoretical and 100 minutes tutorial per session. Topics to be taught are distributed into 17 weeks. So, the theoretical part consists of 17 weeks x 1 lecture = 17 lectures, and the 1 credit tutorial hour is 14 weeks x 2 actual hours = 28 hours.

1. Topics to be Covered		
List of Topics	No. of Weeks	Contact hours
Introduction Macromolecules; Definitions and introduction	1	2
Amino acids Definitions and types of amino acids Functions of amino acids Properties of amino acids: (Polarity, Stereoisomers, Light absorption, Ionization)	4	8
Structure & Classification of standard amino acids Functional groups in amino acids	2	4
Protein synthesis Post Translation Modification (hydroxylation, phosphorylation, methylation, disulfide bridge, etc) Protein folding	2	4
Protein Structure Peptide Bond (formation, structure, & properties), and terminology: amino acids versus residue versus polypeptide & proteins Protein structure (primary, secondary, tertiary, and quaternary) Misfolding problem Protein denaturation	3	6
Structural classification of proteins: (Fibrous proteins and Globular proteins: representatives of all-alpha, all-beta, and alpha/beta proteins)	3	6

Protein function Functional classifications: enzymes, immunoglobulins, transport (O ₂ , fatty acids), regulatory (hormones etc), structural, & movement, with examples. complex proteins (metal ions, cofactors, lipids, carbohydrates, etc) Introduction to enzymes and metabolism	1	2
Introduction to metabolism Overall Metabolic pathways for protein Urea cycle	1	2
Proteins general methods Protein purification Protein quantification Amino Acid Analysis Protein Sequencing Mass Spectrometry and Proteomics	3	6

Experiments of practical part	No of Weeks	(hour)
General Laboratory Guidelines	1	2
Identification of the common laboratory glassware, pipettes and Equipment	2	2
Scanning spectrophotometry and spectrophotometric determination of concentration	3	2
Qualitative tests of amino acids	4	2
Ninhydrin Test for α a.a Determination of Proline by Ninhydrin	5+6	4
Titration curves of amino acids	7	2
Paper and Thin Layer Chromatography (TLC)	8	2
Quantitative Proteins Spectrophotometric methods for determination of proteins	9+10+11	4
Some factors affecting B- fructofuranosidase (sucrose) activity	12	2
Filtration using cheese cloth, filter paper, ultramembrane, nitrocellulose membrane	13	2
Salting in and Salting out of proteins and Dialysis	14	2

2. Course components (total contact hours and credits per semester):						
	Lecture	Tutorial	Laboratory or Studio	Practical	Other:	Total
Contact Hours	28	Not Applicable	Not Applicable	14		42
Credit	2	Not Applicable	Not Applicable	1		2+1

3. Additional private study/learning hours expected for students per week. <input type="text"/>

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy			
On the table below are the five NQF Learning Domains, numbered in the left column.			
<p>First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). Second, insert supporting teaching strategies that fit and align with the assessment methods and intended learning outcomes. Third, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)</p>			
Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	Knowledge		
1.1	<ul style="list-style-type: none"> Different biomolecules in living organisms. Properties, Structure-Function relationship (@ILO-3). 	<ul style="list-style-type: none"> In-class lecturing where the previous knowledge is linked to the current and future topics Homework assignments 	<ul style="list-style-type: none"> In class short MCQs quizzes Major and final exams Evaluation of lab reports
1.2	<ul style="list-style-type: none"> Introduction to metabolism of different biomolecules (@ILO-1, @ ILO-2) 		
2.0	Cognitive Skills		
2.1	<ul style="list-style-type: none"> Identify the main functional groups in biomolecules (@ILO-3) 	<ul style="list-style-type: none"> Homework assignment Case studies related to the course topics Problem solving 	<ul style="list-style-type: none"> In class short MCQs quizzes Major and final exam Checking the problems solved in the homework assignments
2.2	<ul style="list-style-type: none"> Solve problems on buffer 		

	solution (@ILO-6)		• Performing experiment and writing result report
2.3	• Calculation of molecular weight of macromolecule polymer using the summary of residues		
2.4	• Employ critical thinking in the performance, design and interpretation of laboratory experiments (@ILO-10, @ILO-11)		
2.5	• Evaluate, measure, estimate, interpret, and write report of qualitative and quantitative experiments in the practical part (@ILO-9)		
3.0	Interpersonal Skills & Responsibility		
3.1	• Work independently and as part of a team • Manage resources, time and other members of the group • Communicate results of work to others (@ILO-9, ILO-10)	• Conducting group experiments and writing group reports • Solving problems in groups during tutorials	• Laboratory exams • Assessment of the laboratory reports • Grading homework assignments
3.2			
4.0	Communication, Information Technology, Numerical		
4.1	• Use the computer for searching information, analyzing and processing the experimental data • Report writing	• Writing laboratory reports • Incorporating the use and utilization of computer in the course requirements	Evaluating the laboratory written reports Group preparing essay
4.2			
5.0	Psychomotor		
5.1	Not applicable	Not applicable	Not applicable
5.2			

5. Map course LOs with the program LOs. (Place course LO #s in the left column and program LO #s across the top.)

Course LOs #	Program Learning Outcomes (Use Program LO Code #s provided in the Program Specifications)							
	1.1	1.2		2.1		3.2		4.1
1.1								
2.1								

6. Schedule of Assessment Tasks for Students During the Semester

	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Major exam I	6	20
2	Major exam II	11	20
3	Lab quizzes and reports	Weekly	20
4	Final exam	16	40
5			

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)

- Office hours 8 hr / week
 - Academic advisor

E Learning Resources

1. List Required Textbooks

- Lehninger, A.L., Nelson, D.L., Cox, M.M, Principles of Biochemistry, Worth publishers, Inc., New York

2. List Essential References Materials (Journals, Reports, etc.)

- Stryer, L; Biochemistry, W.H. Freeman and company. New York
- Protein Biochemistry and Proteomics, ISBN 012088545X 9780120885459
- Proteins: Biochemistry and Biotechnology, 2nd Edition, Gary Walsh, ISBN : 978-0-470-66985-3
Wiley Blackwell

3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)

4. List Electronic Materials, Web Sites, Facebook, Twitter, etc.

5. Other learning material such as computer-based programs/CD, professional standards or regulations and software.

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access etc.)
<p>1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)</p> <ul style="list-style-type: none"> Lecture room with at least 30 seats equipped with overhead projector and data show projector with smart Board. Practical part: well-equipped lab housing 30 students. The lab contains all the necessary equipment, glass and plastic wares and chemicals with all the lab safety and First-Aid materials.
<p>2. Computing resources (AV, data show, Smart Board, software, etc.)</p> <ul style="list-style-type: none"> Computer room containing 20 apparatus, connected to internet. Wireless internet available to all students in the campus.
<p>3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)</p> <ul style="list-style-type: none"> Spectrophotometer, pH meter, vortex etc available in each bench. Qualified technician and lecturer help student during the practical sessions.

G Course Evaluation and Improvement Processes

<p>1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching</p> <p>Course evaluation by student</p> <ol style="list-style-type: none"> Survey on “evaluating the course” Survey on instructor teaching Survey on method of teaching <p>Survey on the learning outcome</p>
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2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department Discussions within the group of faculty teaching the course
3 Processes for Improvement of Teaching Conducting workshops given by experts on the teaching and learning methodologies organized by Deanship of Skill Development at KSU (DSD-KSU)
4. Processes for Verifying Standards of Student Achievement (e.g. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution)
5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

Name of Instructor: _____

Signature: _____ Date Report Completed: _____

Name of Field Experience Teaching Staff _____

Program Coordinator: _____

Signature: _____ Date Received: _____