The Hong Kong Polytechnic University

Subject Description Form

Subject Code	ABCT3626
Subject Title	Biomolecules
Credit Value	3
Level	3
Pre-requisite/ Co-requisite/ Exclusion	NIL
Objectives	The aims of this subject are for students to acquire a basic understanding of common biomolecules such as carbohydrates, lipids, amino acids and enzymes; and to appreciate the importance of their unique structure and biochemical reactions involved.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. recognize the sources, structure and properties of water, simple carbohydrates, proteins, vitamins, lipids, amino acids; and relate the structure and function of various important biomolecules. b. understand the basic principles of carbohydrate and lipid metabolism to appreciate how energy is being preserved, and extracted and utilized in biological systems. c. explain the change of chemical and physical characteristics of those molecules during process and heat d. explain the essential principles of chemistry and enzyme kinetics and mechanisms e. utilise laboratory techniques to study the chemical and biochemical properties of constituents and their reactions. f. develop analytical, critical thinking, and written communication skills.
Subject Synopsis/ Indicative Syllabus	● Introduction of biomolecules and their function to sustain beauty and healthy life; ● Water: Structure and properties of water and ice; Influence of water activity on chemical and biochemical reactions; ● Carbohydrates: structures, sources and properties. Simple carbohydrates including monosaccharides, oligosaccarides, polysaccharides and its related compounds; ● Lipids: structure, sources, properties and classification of lipids; Deteriorative reactions of lipids: Autoxidation and lipolysis; Modification of fats; ● Protein: structure, sources, properties and classification of protein; denaturation, non-enzymatic browning and cross-linking; ● Vitamins: structure, sources, properties and group: water-soluble and fat-soluble vitamins; technical roles of vitamins. ● Enzymatic reactions: glycolysis and tricarboxylic acid cycle; lipid metabolism; beta-oxidation
Teaching/Learning Methodology	**Lectures:** Science fundamentals and principles of different biomolecules will be introduced and discussed. The technological principles and mechanism of reactions as well as impact to human will

be examined. Examples will be used to demonstrate the scientific principles.

Tutorials: Students are required to search for information and discussion is encouraged for selected topics and their project work. In-class tutorial questions will be used to draw students' interest, understanding and discussion. Group poster/oral presentation or project preparation may be arranged. Finally, logical thinking will be developed using the tutorial questions.

Group activities: (1) students are required to work in groups for learning activities in-class or out-of-class; (2) students will be required to prepare a mini project and deliver an oral/poster presentation on selected topics. Through presentation, their higher order thinking, such as problem analysis and solving skills, critical and creative thinking, can be evaluated. Their group effort such as preparation of group presentation and discussion, their critical and creative thinking mind can be solicited and consolidated. During the project preparation, students will have chance to apply their lifelong learning skills, analytical skills as well as critical thinking for problem identification, data collection, analysis and interpretation as well as drawing conclusion and recommendation for further action. In this subject, students are required to do extensive reading (on literatures, reference books and government reports/websites and internet) and analyze information for possible action formulation via self-study and group discussion. Students will also be required to write an individual report on their findings for learning consolidation, idea elaboration as well as developing scientific thinking for their future study.

Laboratory classes: students will learn some basic techniques in chemistry and biochemistry and to develop their skills in data interpretation and report writing.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					
		a	b	c	d	e	f
1.Test	30%	✓	✓	✓	✓		✓
2. Laboratory	20%	✓	✓	✓	✓	✓	✓
3.Group activities	30%	✓	✓	✓	✓		✓
4.In-class assignments	20%	✓	✓	✓	✓		✓
Total	100 %						

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Test:

Assess the students' understanding of the basic scientific aspects related to biomolecules and their chemical and biochemical reactions. The

	students' higher order thinking, such as analytical and problem-solving skills, critical thinking and creative thinking, will be evaluated. [Outcomes a,b,c,d and f] Laboratory work: Student performance during the laboratory classes will be assessed, and their report will be graded. The students' higher order thinking, such as the analytical mind, data collection as well as report writing skill will be assessed and evaluated. Students will develop their teamwork skill during practical classes. [Outcomes a-f] Group learning activities, project work and presentation: Students will be assessed based on their individual performance in group learning activities, presentation skills and prepared content, as well as response to questions raised by subject lecturer(s), peers. The team spirit and individual contribution to the presentation will also be evaluated. [Outcomes a,b,c,d and f] In-class assignments: To enhance the students' active learning. Assess the students' understanding of the basic scientific aspects related to cosmetic science and formulation. The students' higher order thinking, such as analytical and problem-solving skills, critical thinking and creative thinking, will be evaluated. [Outcomes a,b,c,d and f]	
Student Study Effort Expected	Class contact:	
	▪ Lecture	19Hrs.
	▪ Tutorial	4Hrs.
	▪ Group activities	4Hrs
	▪ Laboratory	12Hrs
	Other student study effort:	
	▪ Preparation of project presentation, assignments, laboratory reports, flipped classroom/active learning activity	40Hrs.
	▪ Self study (reading on literatures, reference books, textbooks and reports)	50Hrs.
	Total student study effort	129Hrs.
Reading List and References	Lehninger Principles of Biochemistry 8th Edition (2021) by David Nelson and Michael Cox. Foods: Experimental Perspectives 8th Edition (2016) by Margaret McWilliams.	