Liverpool John Moores University

Title:	Biochemistry
Status:	Definitive
Code:	**4502YAUGEN** (127941)
Version Start Date:	01-08-2021
Owning School/Faculty:	Pharmacy & Biomolecular Sciences
Teaching School/Faculty:	Pharmacy & Biomolecular Sciences

Team	Leader
Iain Hargreaves	Y

Academic Level:	FHEQ4	**Credit Value:**	20	**Total Delivered Hours:**	43
Total Learning Hours:	200	**Private Study:**	157		

Delivery Options
Course typically offered: Semester 2

Component	Contact Hours
Lecture	30
Practical	10

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	exam	3 hour exam - all components	60	3
Essay	Essay	Essay	20	
Practice	observe	Practical assessment	20	

Aims

The first aim of this course will be to introduce the concept of nutrition and how it impacts upon eukaryotic cells. The course will include information of how the different food groups, carbohydrate, lipid and proteins are digested in and absorbed from the gastrointestinal tract. The essential role of vitamins in metabolism will also be studied, concentrating of vitamin C, B6 and B1. Diseases associated with deficits in these vitamins will also be discussed. The synthesis of fatty acids, cholesterol and

glycogen will be studied in this course together with gluconeogenesis. Diabetes and glycogen storage disorders will also be discussed to emphasize the importance of glucose homeostasis.

The second aim of this course is to introduce the concept of eukaryotic cellular energy generation. Glycolysis and mitochondrial energy generation (pyruvate dehydrogenase, Krebs cycle and the mitochondrial respiratory chain) will be studied in this course. In addition, fatty acid beta oxidation and ketogenesis will be also be discussed to illustrate how the body adapts to starvation conditions. Disorders of the mitochondrial respiratory chain and fatty acid beta oxidation will be used to highlight the importance of cellular energy metabolism in maintaining health

The third aim of this course will be to discuss the concept of autotrophs and how they utilise photosynthesis to synthesize carbohydrate. Although this course will primarily discuss eukaryotic photosynthesis, the ability of certain prokaryotes to undertake this process will be highlighted. The structure of the chloroplast, the light and dark stages of photosynthesis will be studied together with the regulation of photosynthesis in plants. The thylakoid respiratory chain will be described and compared and contrasted with the mitochondrial respiratory chain. The Calvin cycle will be outlined together with biosynthetic steps involved in carbohydrate synthesis and storage in the plant.

Learning Outcomes

After completing the module the student should be able to:

1	Demonstrate an understanding of the how the gastrointestinal system is able to liberate the different food groups from our diet using digestive enzymes enabling them to be absorbed by the blood stream.
2	Understand how vitamins play an essential role metabolism and their involvement in health and disease.
3	Describe the metabolic biosynthetic pathways utilized for fatty acid, cholesterol, glycogen synthesis and gluconeogenesis and how a defect in these pathways may affect health.
4	Describe a number of metabolic pathways operating in eukaryotic cells.
5	Understand the consequences of impaired cellular energy generation on health.
6	Demonstrate a knowledge of photosynthesis and how the light and dark stages operate.
7	Understand the principles of the thylakoid electron transport chain, its structure and how the products of the light reactions influence the activity of the dark reactions.
8	Attain an understanding of how carbon dioxide is utilized by the Calvin cycle to provide the plant cell with the capability of synthesizing carbohydrate.
9	Execute a number of biochemically related laboratory techniques and report on their findings by making reference to the literature.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Written Exam	1	4	3	2

Essay	5	6	
In class observations	7	8	9

Outline Syllabus

An understanding of the gastrointestinal system and how it is utilized to digest the different food groups from our diet.

A comprehensive of the different biosynthetic pathways utilized by the cell to store energy in the form of polymers such as fats and glycogen and how blood glucose status is maintained by the process of gluconeogenesis.

An appreciation of the importance of vitamins in maintaining cellular metabolic function and how an impairment in food utilization or glucose homeostasis can affect health.

Metabolic pathways operating in eukaryotic cells.

Energy balance in eukaryotic cells: glycolytic and mitochondrial energy generating pathways.

Disorders of energy metabolism and clinical consequences.

An understanding of the morphology of the chloroplast and its role in Photosynthesis together with an appreciation of biosynthetic pathways involved in this process.

An appreciation of how photophosphorylation of chloroplasts is able to synthesis ATP and how this process shares similarities and important differences with the process of oxidative phosphorylation in mitochondria.

Learning Activities

The module content will be delivered through lectures, workshops and practical activities.
Theoretical lectures will provide appropriate subject knowledge to support practical application.

Notes

This module will provide individuals with an thorough understanding of biochemical basis of nutrition and how the gastrointestinal system functions to liberate the different food groups from our diet.

This module will provide individuals with an understanding of eukaryotic energy metabolism and how metabolic disorders impact upon health. Practical experience

of role of the biochemical laboratory in the diagnosis of mitochondrial respiratory chain disorders will also be gained.

This module will provide individuals with an understanding of photosynthesis and how plants are able to utilize the energy from sunlight and carbon dioxide from the air to synthesize carbohydrate.