COURSE CONTENT

Course

Course code: BCH 222
Course title: General Aspects of metabolism (3 Units)
Course status: Compulsory

Course Duration

5 hours per week

Lecturer Data

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Consultation Hours: Wednesdays 10-12 noon

Course Content:

Carbon-oxygen cycle in living organisms. The Nitrogen cycle, Anabolic, catabolic and amphibolic pathways. Experimental studies of the intermediary metabolism.

Course Description:

The course introduces intermediary metabolism. It shows the flow of matter between different forms of living organisms, and also examine the consistent circulation of nitrogen between the atmospheric free gaseous nitrogen and the combined nitrogen in the proteins of living tissues. It reviews the anabolic, catabolic and amphibolic pathways.

Course Justification:

Metabolism is the sum of the chemical changes that convert the raw materials necessary to nourish living organisms into energy and the finished products of cells. Its importance to the existence of life needs to be well understood.

Course objectives: At the end of the course, students would be able to;

i. Describe how the flow of energy in the biosphere is coupled primarily to the oxygen and carbon cycles
ii. Discuss the maintenance of the nitrogen cycle

iii. Explain how anabolic and catabolic processes form the core of metabolic pathways
iv. Describe the amphibolic pathways
v. Describe the experimental methods in intermediary metabolism

Course Requirement – Illustration below:

To derive maximum benefits from the course and for fast grasping, students are encouraged to check a list of the recommended books and familiarize their selves with topics designated for the week.

Method of Grading:

S/N	**Grading**	**Score** (%)
1.	Test/Assignment	15
2.	Practical (laboratory work)	15
3.	Final Examination	70
	Total	**100**

Course Delivery Strategies:

Lectures and guided instructions for practical activities will be given. Interactive classroom sessions will hold for adequate participation of the students. Assignments will be given periodically either individually or in groups

LECTURE CONTENT

Weeks 1-4: Carbon-Oxygen cycle in living organisms

Objective: The students at the end of the lectures for the week should be able to:

(i) Give an outline of the carbon-oxygen cycle
(ii) Describe photosynthesis (Inorganic to organic carbon)
(iii) Differentiate between autotrophs and heterotrophs
(iv) Describe the biodegradation of organic matter in bacteria and fungi

Description: First hour: Description of the carbon-oxygen cycle
Second hour: Introduction to photosynthesis
Third hour: Autotrophs and heterotrophs

Study Questions:

- Outline the Carbon-Oxygen Cycle and emphasize the role of decomposers of dead plant and animal matter
- Define the differences in carbon and energy metabolism between photoautotrophs and photoheterotrophs and between chemoautotrophs and chemoheterotrophs

Recommended reading

- Garrett Reginald H. and Grisham Charles M. (2007). Biochemistry. Updated Third Edition. Brooks/ Cole. ISBN 0-495-11912-1
- Biochemistry, Third edition (2005) by Voet and Voet, Wiley, ISBN: 978-0-471-19350-0.

- Harper's Illustrated Biochemistry, (2003) twenty-sixth edition. McGraw-Hill companies limited. ISBN-0-07-121766-5
- Nelson, D. L. and Cox, M. M. (2004) Integration and Hormonal Regulation of Mammalian Metabolism. Lehninger Principles of Biochemistry. 4th edition. Worth Publishers, New York

Weeks 5-7: The nitrogen cycle

Objective: The students at the end of the lectures for the week should be able to:

(i) Give an overview of the nitrogen cycle
(ii) Describe the enzymatic mechanism of nitrogen cycle
(iii) Describe the metabolism of nitrogen-containing compounds (proteins and nucleic acids)

Study Questions:

1. Give an outline of the role of Nitrogen-fixing bacteria in the Nitrogen Cycle.
2. Describe the enzymatic mechanism of Nitrogen fixation.
3. Give an outline of the processes involved in the conversion of inorganic Nitrogen into such organic compounds as amino acids and nucleic acids.

Recommended reading

- Garrett Reginald H. and Grisham Charles M. (2007). Biochemistry. Updated Third Edition. Brooks/ Cole. ISBN 0-495-11912-1
- Biochemistry, Third edition (2005) by Voet and Voet, Wiley, ISBN: 978-0-471-19350-0.
- Harper's Illustrated Biochemistry, (2003) twenty-sixth edition. McGraw-Hill companies limited. ISBN-0-07-121766-5
- Nelson, D. L. and Cox, M. M. (2004) Integration and Hormonal Regulation of Mammalian Metabolism. Lehninger Principles of Biochemistry. 4th edition. Worth Publishers, New York

Weeks 8-10: Anabolic, catabolic and amphibolic pathways

Objective: The students at the end of the lectures for the weeks should be able to:

(i) Describe anabolic, catabolic and amphibolic pathways and their integration
(ii) Describe the term intermediary metabolism

Study Questions:

1. How do anabolic and catabolic processes form the core of metabolic pathways?
2. What are amphibolic pathways?
3. Anabolism and catabolism are not mutually exclusive; explain
4. What are the features that generally distinguish pathways of catabolism from pathways of anabolism?

Recommended reading

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0-471-19350-0.

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Weeks 11-12: Experimental studies of intermediary metabolism

Objective: The students at the end of the lectures for the weeks should be able to:

(i) Describe how metabolic inhibitors are used to elucidate the steps in a metabolic pathway

Study Questions:

1. How can mutations create specific metabolic blocks?

Recommended reading:

- Garrett Reginald H. and Grisham Charles M. (2007). Biochemistry. Updated Third Edition. Brooks/ Cole. ISBN 0-495-11912-1
- Biochemistry, Third edition (2005) by Voet and Voet, Wiley, ISBN: 978-0-471-19350-0.
- Harper's Illustrated Biochemistry, (2003) twenty-sixth edition. McGraw-Hill companies limited. ISBN-0-07-121766-5
- Nelson, D. L. and Cox, M. M. (2004) Integration and Hormonal Regulation of Mammalian Metabolism. Lehninger Principles of Biochemistry. 4th edition. Worth Publishers, New York.

Week 13: Tutorial
Objective: To enhance comprehension of all that has been taught

Week 14: Revision
Objective: To remind students of all that has been taught

Week 15: Examination
Objective: To examine students of all that has been taught