



LANDMARK UNIVERSITY, OMU-ARAN

COURSE COMPACT

COLLEGE: SCIENCE AND ENGINEERING
DEPARTMENT: BIOLOGICAL SCIENCES
PROGRAMME: BIOCHEMISTRY
COURSE COMPACT for: METABOLISM OF LIPIDS

Course

Course code: BCH 311
Course title: Metabolism of Lipids
Credit unit: 2
Course status: Compulsory

Lecturers' Data

Name of the lecturers: Prof. O. Ademuyiwa (Ph.D Biochemistry)
Prof. S.O. Owa (Ph.D Applied Zoology)
Department: Biological Sciences
College: Science and Engineering
E-mail: adelad2@yahoo.com
owa.stephen @lmu.edu.ng
Office Location: C011 2nd College building
C007 2nd College building

Consultation Hours: Tuesday 3pm- 4pm
Thursday 3pm- 4pm

INTRODUCTION TO THE COURSE

Course Description:

The course teaches classification of lipids, blood lipids and complex form of lipids such as lipoprotein. It also looks into lipid micelles, monolayers and bilayers. The metabolism and regulation of lipids is examined as well as the industrial and clinical application of glycolipids, leucotrienes, prostaglandins and thromboxanes.

Course Justification:

Lipid metabolism and regulation plays a crucial role in the diet, in health and in diseases; hence the need for an in depth teaching and understanding.

Course objectives

At the end of this course, students would be able to:

1. Classify lipids
2. Describe lipid micelles, monolayers and bilayers and their applications
3. Understand degradation and biosynthesis of lipids
4. Explain how fat metabolism can be regulated
5. Enumerate the industrial and clinical application of selected lipids

Course Content:

Classification of lipids, Blood lipids and the lipoprotein system. Lipid micelles, monolayers and bilayers: Oxidation of fats, general biosynthesis of lipids, phospholipids and sphingolipids, unsaturated and essential fatty acids, adipose tissue, regulation of the metabolism of fats, ketosis, cholesterol metabolism. Industrial and clinical application of glycolipids, leucotrienes, prostaglandins and thromboxanes

Course Expectations:

Attendance and full participation in Class is required from students

S/N	GRADING	SCORE (%)
1.	Continuous Assessments	
	• C.AI	7%
	• C.AII (Mid-Semester Test)	15%
	• C.AIII	8%
2.	Assignment	
3.	Practical (Laboratory work)/ Case Studies	10%
4.	Final Examination	60%
5.	Total	100

Course Delivery Strategies:

Course delivery will be by electronic method, giving explanation and establishing scientific facts while creating inquisitiveness in the minds of the students. Assignments will be given periodically. Students may be grouped for the laboratory work.

Course Duration:

Three hours per week for 15 weeks (45hours)

LECTURE CONTENT

Module 1

Week 1: Classification of Lipids

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

1. Identify the classes or/and sub-classes which different lipids belong
2. Know the significance of lipids

Description:

First hour: Hydrolyzable and non-hydrolyzable lipids

Second hour: Characteristics, components and applications of each

Study Questions:

1. Classify lipids
2. Describe the components of gangliosides and its biological application

Recommended reading

1. Nelson, D. L. and Cox, M. M. (2005): Lehninger's Principles of Biochemistry. 4th. Edition. W. H Freeman and Company, New York. ISBN: 1-4039-4876-3.
2. Voet D. and Voet J.G. (2011). Biochemistry, fourth edition. John Wiley and Sons Inc
3. Garrett Reginald H. and Grisham Charles M. (2007). Biochemistry. Updated Third Edition. Brooks/ Cole. ISBN 0-495-11912-1
4. Harper's Illustrated Biochemistry, (2003) twenty-sixth edition. McGraw-Hill companies limited. ISBN-0-07-121766-5

Week 2: Blood lipids and the lipoprotein system

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

1. Describe the significance and classify the lipoprotein system
2. Describe what makes High Density Lipoprotein (HDL) good cholesterol

Description:

First hour: Introduction to lipids and lipoproteins in the blood

Second hour: Types of lipids and lipoproteins, Physicochemical properties

Study Question:

1. What is the basis of the classification of Lipoproteins?
2. Give an highlight of the categories of lipoproteins and state the functions of each group.

Recommended reading

1. Nelson, D. L. and Cox, M. M. (2005): Lehninger's Principles of Biochemistry. 4th. Edition. W. H Freeman and Company, New York. ISBN: 1-4039-4876-3.
2. Voet D. and Voet J.G. (2011). Biochemistry, fourth edition. John Wiley and Sons Inc
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Week 3: Lipid micelles, monolayers and bilayer

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

1. Describe the lipid bilayer system

Description:

First hour: Lipid micelles, monolayers and their applications

Second hour: bilayers, liposomes and their applications

Study Question:

1. What structural lipid aggregate type achieves maximal stability in an aqueous environment?

Recommended reading

1. Nelson, D. L. and Cox, M. M. (2005): Lehninger's Principles of Biochemistry. 4th. Edition. W. H Freeman and Company, New York. ISBN: 1-4039-4876-3.
2. Voet D. and Voet J.G. (2011). Biochemistry, fourth edition. John Wiley and Sons Inc
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Week 4: Oxidation of fats

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

1. Describe the steps involved in the degradation of fats

Description

First hour: β -oxidation of fatty acids

Second hour: β -oxidation of fatty acids

Study Question:

1. Describe the β -oxidation of fatty acid

Recommended reading

1. Nelson, D. L. and Cox, M. M. (2005): Lehninger's Principles of Biochemistry. 4th. Edition. W. H Freeman and Company, New York. ISBN: 1-4039-4876-3.
2. Voet D. and Voet J.G. (2011). Biochemistry, fourth edition. John Wiley and Sons Inc
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Week 5: General biosynthesis of lipids

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

1. Describe the stages of cholesterol biosynthesis

Description:

First hour:

Second hour:

Study Question:

1. Describe the biosynthesis of cholesterol

Recommended reading

1. Nelson, D. L. and Cox, M. M. (2005): Lehninger's Principles of Biochemistry. 4th. Edition. W. H Freeman and Company, New York. ISBN: 1-4039-4876-3.
2. Voet D. and Voet J.G. (2011). Biochemistry, fourth edition. John Wiley and Sons Inc
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Week 6: Phospholipids and Sphingolipids

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

1. Describe the stages involved in the biosynthesis of phospholipids and sphingolipids

Description:

First hour: Glycerophospholipids and Sphingolipids

Second hour: Biosynthesis of sphingolipids

Study Question:

1. Describe the biosynthesis of phospholipids and sphingolipids

Recommended reading

1. Nelson, D. L. and Cox, M. M. (2005): Lehninger's Principles of Biochemistry. 4th. Edition. W. H Freeman and Company, New York. ISBN: 1-4039-4876-3.
2. Voet D. and Voet J.G. (2011). Biochemistry, fourth edition. John Wiley and

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Week 7: Unsaturated and essential fatty acids

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

1. Enumerate the unsaturated and essential fatty acids

Description:

First hour: Arachidonic acid and its metabolites

Second hour: Essential fatty acid

Study Question:

1. How are the essential fatty acids synthesized?

Recommended reading

1. Nelson, D. L. and Cox, M. M. (2005): Lehninger's Principles of Biochemistry. 4th. Edition. W. H Freeman and Company, New York. ISBN: 1-4039-4876-3.
2. Voet D. and Voet J.G. (2011). Biochemistry, fourth edition. John Wiley and Sons Inc
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Week 8: Adipose tissue

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

1. Understand how the adipose tissue manage fat stores

Description

Study Question:

1. How does the adipose tissue manage fat stores?

Recommended reading

1. Nelson, D. L. and Cox, M. M. (2005): Lehninger's Principles of Biochemistry. 4th. Edition. W. H Freeman and Company, New York. ISBN: 1-4039-4876-3.
2. Voet D. and Voet J.G. (2011). Biochemistry, fourth edition. John Wiley and Sons Inc
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Week 9: Regulation of the metabolism of fats

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

1. Explain the regulation of the metabolism of fats

Description

First hour: Nutritional status as a regulator of the metabolism of fats

Second hour: Role of insulin in the regulation of lipogenesis

Study Question:

1. How is fat metabolism regulated?
2. Describe the role of insulin in the regulation of lipogenesis

Recommended reading

1. Nelson, D. L. and Cox, M. M. (2005): Lehninger's Principles of Biochemistry. 4th. Edition. W. H Freeman and Company, New York. ISBN: 1-4039-4876-3.
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Week 10: Ketosis

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

1. Enumerate the fuel types that can be used to meet the metabolic demands of the body and what situations call for their use

Description:

First hour: Introduction to ketosis

Second hour: Acetone, acetoacetate and β -hydroxyl butyric acid

Study Question:

1. Describe the formation of ketone bodies from acetyl coA

Recommended reading

1. Nelson, D. L. and Cox, M. M. (2005): Lehninger's Principles of Biochemistry. 4th. Edition. W. H Freeman and Company, New York. ISBN: 1-4039-4876-3.
2. Voet D. and Voet J.G. (2011). Biochemistry, fourth edition. John Wiley and Sons Inc
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Week 11: Cholesterol metabolism

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

1. Describe the stages of cholesterol biosynthesis

Description:

First hour: Cholesterol

Second hour: Stages of cholesterol synthesis

Study Question:

1. Describe the biosynthesis of cholesterol

Recommended reading

1. Nelson, D. L. and Cox, M. M. (2005): Lehninger's Principles of Biochemistry. 4th. Edition. W. H Freeman and Company, New York. ISBN: 1-4039-4876-3.
2. Voet D. and Voet J.G. (2011). Biochemistry, fourth edition. John Wiley and Sons Inc
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Week 12: Industrial and clinical application of glycolipids, leukotrienes, prostaglandins and thromboxanes

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

1. Describe the synthesis of leukotrienes, prostaglandins and thromboxanes from arachidonic acid
2. Give an industrial and clinical application of each

Description:

First hour: Introduction to eicosanoids

Second hour: Biomedical importance of lipids

Study Question:

1. Enumerate the physiological effects of eicosanoids
2. Highlight the industrial use of glycolipids

Recommended reading

1. Nelson, D. L. and Cox, M. M. (2005): Lehninger's Principles of Biochemistry. 4th. Edition. W. H Freeman and Company, New York. ISBN: 1-4039-4876-3.
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Weeks 13 & 14: Revision

Objective: The students at the end of the revision should be able to:

1. Have a holistic view of the course
2. Further ascertain their knowledge of the course content

Week 15: Examination

Objective:

1. To examine the students on all that have been taught during the semester.