

COURSE CONTENT

Course

Course code: **BCH 414**

Course title followed by the credit unit: Biochemical Genetics (3 UNITS)

Course status: (compulsory)

Course Duration

2 hours teaching 10 – 12pm (Tuesday)

Total hours per week = 2 hours for 15 weeks (30 hours)

Lecturer Data

Name of the lecturer: Dr. O. Ibraheem

Qualifications obtained: PhD Biochemistry

Department: Biological Sciences

Faculty: Science

E-mail: your-username: Ibrahim.omodele@[lmu.edu.ng](mailto:Ibrahim.omodele@lmu.edu.ng)

Office Location: Old College Building, Room A302

Consultation Hours: Wednesdays 12 - 2pm.

Course Content – Illustration below:

Module 1: The genome

Module 2: Structure of prokaryotic genes

Module 3: Gene expression in prokaryotes and viruses

Module 4: Genetic transduction and conjugation

Module 5: Recombinant DNA Technology: Applications in food industries, agriculture diseases, e.t.c.

Module 6: Introduction to genomics, proteomics, nanotechnology and bioinformatics

Course Description – Illustration below:

Course will enable the student to be familiar with the latest molecular biology techniques used in developed countries. It will enable them to fit in adequately to the latest research approaches in recombinant DNA technologies towards the design or development of new methods that will be of benefit to agriculture, medicine, food/biochemical industries.

Course Justification – Illustration below:

Techniques in microbial biochemical genetics, most especially recombinant DNA technologies have been widely used in the production of enzymes, steroids etc. that are of high therapeutic and industrial use. Knowledge learnt will be of great use in industry

Course objectives

At the end of the course, students will be able to;

- i. Understand the structure and expression of prokaryotic genes
- ii. Understand methods of sub-cellular cloning and heterogenic gene expression used in recombinant DNA technology
- iii. Understand the applications of these genetically modified organisms in agriculture, medicine and food/biochemical companies

Course Requirement:

Pass grade in BCH 316 (Metabolism of Nucleic Acids)

Method of Grading- An example below

S/N	Grading	Score (%)
1.	Test	10
2.	Assignment	5
3.	Practical (laboratory work)	15
4.	Final Examination	70
	Total	100

Course Delivery Strategies – Illustration below:

Course delivery will be by Face-to-face method, Participatory method and Lecture method. Assignments will be given out to students periodically as individual and in groups.

LECTURE CONTENT

- **Week 1 & 2:** The genome
- **Objectives**
The students at the end of the lectures for the week should be able to have in-depth knowledge of gene structure and organization
- **Description**
First hour:
In-depth discussion of nature and function all genes that are present in living cells. These include DNA, mRNA, tRNA, rRNA, sRNA etc.
Second hour
Discussion on genetic code
- **Study Question:**
Enumerate the function of various genes in cell.
- **Reading List –**
Biochemistry, Third edition (2005) by Voet and Voet, Wiley, ISBN: 978-0-471-19350-0.
Lehninger Principles of Biochemistry, Fourth Edition (2005) by David L. Biochemistry by Nelson and Michael M. Cox

- **Week 3, 4 & 5:** Structure of prokaryotic genes
- **Objectives**
The students at the end of the lectures for the week should be able to know the prokaryotic gene architecture and the similarities and differences that exist between it and eukaryotic genes.
- **Description**
First hour:
Different components in prokaryotic gene architecture; gene promoter and regulatory site, coding region and terminator sequence.
Second hour
The structural differences between the prokaryotic and eukaryotic genes
- **Study Question:**
Describe gene architecture. What roles do the gene promoter plays in expression and regulation of a gene.
- **Reading List –**
Biochemistry, Third edition (2005) by Voet and Voet, Wiley, ISBN: 978-0-471-19350-0.
Lehninger Principles of Biochemistry, Fourth Edition (2005) by David L. Biochemistry by Nelson and Michael M. Cox
- **Week 6, 7 & 8:** Gene expression in prokaryotes and viruses.
- **Objectives**
The students at the end of the lectures for the week should be able to know and understand the various means whereby genes may be expressed and /or in prokaryotes and viruses.
- **Description**
First hour:
Bacteria plasmids; various types of plasmids. Methods of transfer of genetic material; recombination, conjugation
Second hour
Methods of transfer of genetic material; transformation, transduction
- **Study Question:**
Discuss the various methods in gene transfer.
- **Reading List –**
Biochemistry, Third edition (2005) by Voet and Voet, Wiley, ISBN: 978-0-471-19350-0.
Lehninger Principles of Biochemistry, Fourth Edition (2005) by David L. Biochemistry by Nelson and Michael M. Cox
- **Week 9, 10 &11:** Recombinant DNA Technology: Applications in food industries, agriculture diseases, e.t.c.

➤ **Objectives**

The students at the end of the lectures will have indepth understanding of how genes could be manipulated for agriculture, medicine and food/biochemical industrial applications

➤ **Description**

First & Second hour:

Gene cloning and manipulation. Gene mapping, sequencing and recombinant DNA technologies.

➤ **Study Question:**

Discuss the various applications of recombinant DNA technology in medicine or industry.

➤ **Reading List –**

Biochemistry, Third edition (2005) by Voet and Voet, Wiley, ISBN: 978-0-471-19350-0.

Lehninger Principles of Biochemistry, Fourth Edition (2005) by David L. Biochemistry by Nelson and Michael M. Cox

Week 12, 13 &14: Introduction to genomics, proteomics, nanotechnology and bioinformatics

➤ **Objectives**

The students at the end of the lectures should understand what the Omics Technologies (genomics, transcriptomics and proteomics). The uses of Bioinformatics approaches in deciphering the information as may be revealed during the Omics technologies approaches. Applications of nanotechnology in medicine and industry.

➤ **Description**

➤ First & Second hour:

Descriptions and applications of the Omics Technologies; genomics, transcriptomics and proteomics. Applications of bioinformatics and nanotechnology in agriculture, medicine and food/biochemical industries.

➤ **Study Question:**

Discuss the various Omics Technologies and their applications in medicine or industry. What is the relevance of nanotechnology to the modern day Science and Technology?

➤ **Reading List –**

Biochemistry, Third edition (2005) by Voet and Voet, Wiley, ISBN: 978-0-471-19350-0.

Lehninger Principles of Biochemistry, Fourth Edition (2005) by David L. Biochemistry by Nelson and Michael M. Cox