

# COURSE COMPACT GUIDE

## Course

Course code: BCH 224

Course title & credit unit. Introductory Molecular Biology (3 UNITS)

Course status if it's either - (compulsory)

## Course Duration

*Three hours per week for 15 weeks (45hours)*

## Lecturer Data

Name of the lecturer: Olaolu T.D., Awakan O.J., Nwonuma C.O.

Qualifications obtained: MSc.

Department: Biological Science

College: College of Science and Engineering

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Office Location: 49/A302

Consultation Hours: Monday-Wednesday 2:00pm

## Course Content – Illustration below:

*Organisation of Gene structure in prokaryotes and Eukaryotes; Gene expression; DNA replication, transcription, translation, and genetic code; Bacteriophages, and Eukaryotic viruses (structure, life cycles, biological assays etc.) mutation and mutagenesis; DNA repair mechanisms; Gene and cancer; Recombination; plasmids and transposons Restriction enzyme Techniques in molecular biology, PCR, microarray etc.*

## Course Description – Illustration below:

*This course will revolve round about gene or the genetic material. Gene is the hereditary material which convey parental inheritance to the protégée. The course will explain the component of gene and how gene can be manipulated to achieves or alter certain qualities in an organism. Gene recombination tool will be studied and other characteristics of gene which will make it easy for them to be manipulated.*

## Course Justification – Illustration below:

The main justification to this study is to explain the relationship between life and biological molecules. The interplay of the different biological molecule is responsible for the function of life. This biological molecule can be manipulated to influence the quality of the product from an organism.

## Course objectives

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

- (i) *Describe what is and importance of gene to life*
- (ii) *Explain how genes are preserved in an organism and transfer from organisms*
  
- (iii) *Explain the relationship between gene and DNA molecule*
  
- (iv) *Explain DNA transcription, duplication and translation*
  
- (v) *Explain the process of mutation and mutagenesis*
  
- (vi) *Give explanation to gene recombination technology*

**Course Requirement – Illustration below:**

*It is required that the students pass all the 100 level courses*

**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
	<b>Total</b>	<b>100</b>

**Course Delivery Strategies – Illustration below:**

*Lecture and Collaboration method complimented with laboratory work will be adopted. In the laboratory, material will be provided to the student to demonstrate the method of gene extraction*

## LECTURE CONTENT

- **Week 1-2: introduction, Organisation of Gene structure in prokaryotes and Eukaryotes**

- **Objectives (list the objectives)**

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

- I. the relationship between the gene and nucleic acid
- II. The similarity in the gene organisation in prokaryotes and eukaryotes

### III. The significant of gene to life

#### ➤ **Description**

First hour: Introduction and components of gene

Second hour: Refresh the mind of the student on the concept of eukaryotes and prokaryotes

Third hour: Differences/similarities in the eukaryotic and prokaryotic genetic contents

#### ➤ **Study Question: This section entails study question for the week lecture.**

- i. What is gene?
- ii. What the relationship between the gene and DNA?
- iii. Where in the cell the site of gene storage?
- iv. Is there any different between the genetic components of the plant and animal?

#### **Reading List - Books and materials students can read:**

Murray, R.K., Granner, D.K., Mayes, P. A. and Rodwell, V. W. (2003) twenty-sixth edition. McGraw-Hill companies limited.

Nelson, D. L. and Cox, M. M. (2004) Lehninger Principles of Biochemistry. 4<sup>th</sup> edition. Worth Publishers, New York.

Reginald H. Garrett and Charles M. Grisham (2007) Biochemistry third edition. Thomson Learning, Inc.



#### ➤ **Week 3-4**

**Topic:** *Gene expression; DNA replication, transcription, translation, and genetic code*

#### ➤ **Objectives (list the objectives)**

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

- I. The concept and mechanism of gene expression in organism
- II. Distinguish between the gene expression in eukaryotic and prokaryotic organism
- III. The relationship between the DNA molecule in an organism and the gene
- IV. The DNA replication, transcription, and translation
- V. The concept of genetic code
- VI. The relationship between genetic code, translation and protein synthesis.

#### ➤ **Study Question: This section entails study question for the week lecture.**

#### **Reading List - Books and materials students can read:**

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Nelson, D. L. and Cox, M. M. (2004) Lehninger Principles of Biochemistry. 4<sup>th</sup> edition. Worth Publishers, New York.  
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### **Week 5-6**

**Topic:** *Bacteriophages, and Eukaryotic viruses (structure, life cycles, biological assays etc)*

- **Objective:** The students at the end of the lectures for the week should be able to understand:
  - i. The structure and life cycle of Virus
  - ii. The various classification of viruses and other microorganism
  - iii. The mechanism of viral infection

- **Description**

First hour: Explain the features of microorganisms and unique characteristics of virus

Second hour: the life cycle of virus and its advantage in infection

Third hour: the mechanism of viral infection

- **Study Question: This section entails study question for the week lecture.**
  - i. What is virus and viral infection?
  - ii. Mention disease caused by virus in plant and animals
  - iii. What is unique quality of virus different from other microorganism?
  - iv. Mention the various types of virus
  - v. **Study Question: This section entails study question for the week lecture.**

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Nelson, D. L. and Cox, M. M. (2004) Lehninger Principles of Biochemistry. 4<sup>th</sup> edition. Worth Publishers, New York.

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### **Week 7-8**

**Topic:** *mutation and mutagenesis; DNA repair mechanisms; Gene and cancer*

- **Objective:** The students at the end of the lectures for the week should be able to understand:
  - i. The concept of mutation and mutagenesis
  - ii. The causes of mutation

- iii. The mechanisms of DNA repair after mutation
- iv. The concept of cancer
- v. Genetic implication of cancer

➤ **Description**

First hour: Explain the concept of mutation and mutagenesis a

Second hour: the causes of mutation and DNA repair

Third hour,: the cause of cancer and biochemical implication

➤ **Study Question: This section entails study question for the week lecture.**

- vi. What is mutation and mutagenesis?
- vii. Mention causes of mutation
- viii. What is DNA repair?
- ix. What is carcinogenesis?

**Reading List - Books and materials students can read:**

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**Week 9-10**

**Topic:** *Recombination; plasmids and transposons*

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

- i. The way by which genes can be manipulated through recombination technology
- ii. What is plasmid, source and the use in the recombinant technology
- iii. The mechanism of gene modification through the natural way of transposon
- iv. The procedure of the gene recombination

➤ **Description**

First hour: Explain the concept of DNA recombination technology

Second hour: Explain the function of plasmid in its natural environment and as a vital tool in DNA recombination

Third hour,: The concept of transposon

➤ **Study Question: This section entails study question for the week lecture.**

- x. What is DNA recombination?
- xi. Mention tools used in recombination technology
- xii. What is plasmid?
- xiii. What is transposon?

**Reading List - Books and materials students can read:**

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twenty-sixth edition. McGraw-Hill companies limited.  
Nelson, D. L. and Cox, M. M. (2004) Lehninger Principles of Biochemistry. 4<sup>th</sup> edition. Worth Publishers, New York.  
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### **Week 10-12**

- **Topic :** *Restriction enzyme Techniques in molecular biology, PCR, microarray etc*
- **Objective:** The students at the end of the lectures for the week should be able to understand:
  - i. The different enzymes used in the DNA recombinant technique
  - ii. The mechanism of the action of the enzymes
  - iii. The use of some instrument relevant in recombinant technology

- **Description :**

First hour: Restriction enzymes

Second hour: Techniques in recombination technology

Third hour.: Relevant equipment and its uses

- **Study Question: This section entails study question for the week lecture.**

xiv. What is restriction enzyme?

xv. Mention the steps in the gene recombination

**Reading List - Books and materials students can read:**

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Nelson, D. L. and Cox, M. M. (2004) Lehninger Principles of Biochemistry. 4<sup>th</sup> edition. Worth Publishers, New York.

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### **Week 15**

**Topic:** 2015/2016 Omega Semester Examination

**Objectives:**

The exam question will include all that was taught in the class and the assignment given to in the class

**Reading List:**

- i. The text book that will be recommended for the class
- ii. Lecture note book
- iii. Assignments

