

COURSE COMPACT GUIDE

Course

Course code - BCH 224

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

Course status - (compulsory)

Course Duration

Three hours per week for 15 weeks (45hours)

Lecturer Data

Names of the lecturers: 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: A141, 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 achieve 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:

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 the 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
	Total	100

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: *Organisation of Gene structure in prokaryotes and Eukaryotes*

Objectives

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

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

III. The significance 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 Questions:

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

Reading List:

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. 4th 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

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

- I. Explain the concept of gene expression in organism
- II. Describe the relationship between the DNA molecule in an organism and the gene
- III. Describe the concepts of DNA replication, transcription, and translation
- IV. Explain the concept of genetic code
- V. Highlight the relationship between genetic code, translation and protein synthesis.

Study Question:

1. What is gene expression?
2. Distinguish between the gene expression in eukaryotic and prokaryotic organisms
3. Explain the genetic code.

Reading List –

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. 4th 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 describe:

1. The structure and life cycle of Virus
2. The various classification of viruses and other microorganism
3. The mechanism of viral infection

Description

First hour: Explanation of 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 Questions:

1. What is virus and viral infection?
2. Mention disease caused by virus in plant and animals
3. What is unique quality of virus different from other microorganism?
4. Mention the various types of virus

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. 4th 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 explain:

1. The concept of mutation and mutagenesis
2. The causes of mutation
3. The mechanisms of DNA repair after mutation
4. The concept of cancer
5. Genetic implication of cancer

Description:

First hour: Explain the concept of mutation and mutagenesis

Second hour: Discuss the causes of mutation and DNA repair

Third hour: Discuss the cause of cancer and biochemical implication

Study Questions:

1. What is mutation and mutagenesis?
2. Mention the causes of mutation
3. What is DNA repair?
4. What is carcinogenesis?

Reading List -

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. 4th edition. Worth Publishers, New York.

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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 discuss:

1. The way by which genes can be manipulated through recombinant DNA technology
2. What plasmid is, its source and use in the recombinant technology
3. The mechanism of gene modification through transposons
4. The procedure for 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 Questions:

1. What is DNA recombination?
2. Mention tools used in recombinant DNA technology
3. What is a plasmid?
4. What is a transposon?

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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. 4th 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:

1. Enumerate the different enzymes used in the DNA recombinant technique
2. Describe the mechanism of the action of the enzymes

Description :

First hour: Restriction enzymes

Second hour: Techniques in recombination technology

Third hour,: Relevant equipment and its uses

Study Questions:

1. What is restriction enzyme?

2. Mention the steps involved in genetic recombination

Reading List:

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. 4th 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

Reading List:

All text books used in the past weeks are recommended for examination

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. 4th edition. Worth Publishers, New York.

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