**UNIVERSITY OF GONDAR**

**INSTITUTE OF BIOTECHNOLOGY**

**DEPARTMENT OF MEDICAL BIOTECHNOLOGY**

**COURSE OUTLINE**

**2018/19 Academic year**

**Course title:** Molecular Diagnostics

**Course number**: Biot 642

**Credit:** 3 hours per week

**Instructor**: Dr. Nega Berhane

**Course objectives:-**

**Learning out comes:**

Up on successful completion of the course students will be able to:

* Explain the basic laboratory diagnostic techniques
* Analyze group specify and strain specific nucleic acid based diagnosis
* Describe the basics of selecting gene/nucleotide sequence of pathogenic organisms as target of detection
* Elucidate the application of restriction endonuclease analysis for identification of pathogens.
* Clarify principles of development of pathogen specific DNA probe
* Describe the basic techniques and applications of Southern and Northern hybridization
* Explain the applications of PCR and real time PCR in disease diagnosis
* Reveal the applications of advanced diagnostic techniques like DNA array technology, biosensors and nanotechnology.

**Course content**

* Introduction
* Historical perspective of Molecular Diagnosis,
* importance of Molecular diagnostic,
* development of group specific and strain specific nucleic acid based diagnostics,
* basis for selection of gene/nucleotide sequence of pathogenic organism to target for detection.
* Application of restriction endonuclease analysis for identification of pathogens,
* principle of development of pathogen specific DNA probes,
* Southern and Northern hybridization.

**Teaching strategies/methods:** Class room lectures, seminars, review leading scientific articles,group discussion, and practical sessions at microbial and molecular laboratories.

**Assessment criteria:** Written examinations, assignments, seminar presentation, review articlepresentation.

**Role of instructors and students:**

* **Instructors:** Deliver lecture, interactive learning, supervise assignments and exampapers.
* **Students:** Attend classes, active interactions in the class room and student presentation,intensive studies and preparation of assignments and reports, presentation of assignments as per the instruction of the instructors.

**Teaching support and input:**

1. **Teaching/Learning**
	* White board
	* White board markers and dusters
	* Transparencies and overhead projector
	* Laptop and LCD projector
	* Video conference facility

**Reading material**

1. Mayer G. (2010). The Chemical Biology of Nucleic Acids. John Wiley & Sons, Ltd.
2. Fitzgerald-Hayes M. and Reichsman F: (2010). DNA and Biotechnology. 3rd ed. Academic Press, MA, USA
3. LeVine H. (2006). Genetic Engineering. 2nd ed. ABC-CLIO, Inc.
4. Clark D.P.and Pazdernik N.J. (2012). Biotechnology Academic Cell Update. Academic

 Press, MA, USA.

1. Dale J.W. . (2012). From Genes to Genomes. Concepts and Applications of DNA

 Technology. 3rd. ed. John Wiley & Sons, Ltd.

1. Hartwell L.H.. (2011). From Genes to Genomes. The McGraw-Hill Companies, Inc

7. Schleef M. (2001) Plasmids for Therapy and Vaccination. Wiley-Vch Verlag GmbH.

 8. Grandi G. (2004) Genomics, Proteomics and Vaccines. John Wiley & Sons, Ltd.

9. Dübel S. (2007) Handbook of Therapeutic Antibodies. Vol I. Wiley-Vch Verlag GmbH & Co.

 KGaA.

1. Smith, J. (2009). Biotechnology, 5th ed. Cambridge University Press, New York.
2. Orwig, Kyle E., Hermann, Brian P. (Eds.) (2011). Male Germline Stem Cells: Developmental and Regenerative Potential.
3. Series: Stem Cell Biology and Regenerative Medicine.
4. Stem Cells and Regenerative Medicine: From Molecular Embryology to Tissue Engineering. Appasani, Krishnarao, Appasani, Raghu K. (Eds.) (2011). Series: Stem Cell Biology and Regenerative Medicine