



AMITY UNIVERSITY
— UTTAR PRADESH —

COURSE CURRICULUM

Annexure 'CD – 01'

Course Title: Biosensors: Fundamentals and Applications

Course Code:

Credit Units: 04

Level: PG

Course Objectives:

The course will highlight

1. Significance of Biosensors
2. Fundamentals and Applications.
3. Understanding of Biosensing Technology. Biomedical applications

Pre-requisites:

- Basic knowledge of Sensors, bio recognition Agent

L	T	P/ S	SW/ FW	TOTAL CREDIT UNITS
03	-	2	-	04

Course Contents/Syllabus:

	Weightage (%)
Module I Introduction to Biosensors	25
Descriptors/Topics Definitions, biological inspiration, types of sensors, target analytes, various recognition, Recognition event : Catalytic, Single and multiple enzyme, Bio Affinity: Labeled and Label free, whole cell sensing – bacteria, yeast, mammalian cell, Generation of Biosensor; Biomolecule Immobilization Techniques, Enzyme Kinetics	
Module II Basic Design and Transducer	20
Descriptors/Topics Considerations calibration, dynamic Range, signal to noise, sensitivity, selectivity, Interference Recognition/Transduction membrane protein sensors: ion channels, Types of Transducer, Optical; Fiber Optic, ECL, Surface Plasmon Resonance, Electro chemical; FET, Impedance, Piezoelectric; Cantileaver	
Module III Applications of Biosensors	20
Descriptors/Topics Biosensors and diabetes management, Microfabricated biosensors and point-of-care diagnostics systems, Noninvasive biosensors in clinical analysis; Surface plasmon resonance and evanescent wave biosensors, Biosensor in cancer and HIV early diagnosis.	
Module IV Applications of Nanomaterials in Biosensors	35
Nano Materials in biosensors; Carbon based Nano Material, Metal oxide and nano particle, Quantum dots, Role of nano material in Signal Amplifications, Detection and Transducer Fabrication	

Student Learning Outcomes:

Develop insight the basics of biosensing technology
Develop and Design the biosensor for specific application
Comprehend the gap between the conventional technology and the biosensor

Pedagogy for Course Delivery: Course content delivery will involve power point presentations and explanation on board as required.

- The class will be taught using theory and recent scientific research.
- Specific case studies will be taken up.

Lab/ practicals detail, if applicable:

List of experiments:

1. Immobilization methods
 - (i) Absorption
 - (ii) Covalent Binding
 - (iii) Entrapment
2. Attachment of Nanomaterials with GOx
3. Fabrication of GOx Biosensors

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	End Term Examination
70	30	100

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					End Term Examination
Components (Drop down)	Mid term exam	Home assignment	Quiz/ Viva/ Seminar	Attendance	Theory

Weightage (%)	15	5	5	5	70

Lab/ Practical/ Studio Assessment:

	Continuous Assessment/Internal Assessment				End Term Examination		
Components (Drop down)	Lab records	Viva	Work ethics	Internal exam			
Weightage (%)	5	10	5	10			

Text & References:

1. Introduction to Biosensors by Jeong-Yeol Yoon; Publisher: Springer-Verlag New York Ed.1
2. Recognition Receptors in Biosens.by Mohammed Zourob; Publisher: Springer-Verlag New York Ed.1
3. Novel Approaches in Biosensors and Rapid Diagnostic Assays by Zvi Liron; Publisher: Springer US Ed.1

Any other Study Material:

- Review articles
- Research articles
- Web site informations
- Notes