

## INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR

1. **Name of the Academic Unit:** Bioscience and Biotechnology

2. **Subject Name:** Basic Biosensor Laboratory **L-T-P: 0-0-3 Credits:** 2

3. **Pre-requisites:** Science of Living Systems

4. **Syllabus and reference books:**

### **Syllabus:**

The overall goal of this course is to provide a basic introduction of biosensor technology, demonstrate working principles and fundamentals of biosensors, and discuss their importance in biomedical application (diagnostics), bioprocess control, environmental monitoring etc. The course will primarily deal with application of biosensor technologies for medical diagnostics applying chemical, mechanical, thermal and electrical-based sensors that could be used in detecting blood sugar, heart beat/blood pressure, O<sub>2</sub> saturation in the blood and electrical activity of the heart. At the end students would be given to design some of the sensor as a part of do it yourself (DIY) project.

### **Reference Books:**

- (1) *Biosensors: an introduction*. Eggins, B. R. Springer-Verlag.
- (2) Handbook of biosensors and biosensor kinetics. Sadana, A., & Sadana, N. Elsevier.
- (3) Biosensors Technology: Fundamentals and Applications. Ed by R. P. Buch. CRC press.
- (4) Smart Biosensors Technology. Ed by G. K. Knopf and Amarjeet Bassi, CRC Press.
- (5) Biosensing: Methods, Applications and Technology, Ed by Rushika Patel. Nova Scientific Publishers.
- (6) Recent Advances in Biosensors Technology. Ed by Vivek Chaturvedi and others. Bentham Book.

### 5. Lab-wise break-up:

Sl. No.	Topic	Laboratory hours
1.	Introduction, basic principle and application of biosensor technologies particularly in biomedical diagnostics, bioprocess and environmental monitoring.	3
2.	Analog vs digital biosensors, smart and portable biosensors. Arduino technologies.	3
3.	Chemical sensor: Detection of blood sugar through conventional chemical methods and glucometer (glucose biosensor). Basic principle, detection technologies and clinical applications.	3
4.	Spectrophotometry-based sensor: Determination of blood O <sub>2</sub> saturation through O <sub>2</sub> sensor (oximeter). Basic principle, detection technologies and clinical applications.	3
5.	Mechanical and sound sensors: Detection of heartbeat through stethoscope. Measurement of blood pressure using manual and digital blood pressure monitor. Basic principles, detection technologies and clinical applications.	6
6.	Electrical sensors: Detection of normal electrical activity of the heart using ECG machine. Basic principle and clinical applications.	3
7.	Sensors for Bioprocess monitoring and control.	3
8.	DIY activity to fabricate and design anyone of the following: Digital BP monitor/Digital oximeter/Glucometer/Digital Stethoscope.	6
<b>Total number of hours</b>		<b>30</b>