



ALAGAPPA UNIVERSITY

[A State University Accredited with 'A+' Grade by NAAC]
Karaikudi – 630 003
Tamil Nadu



MATERIALS FOR SENSORS

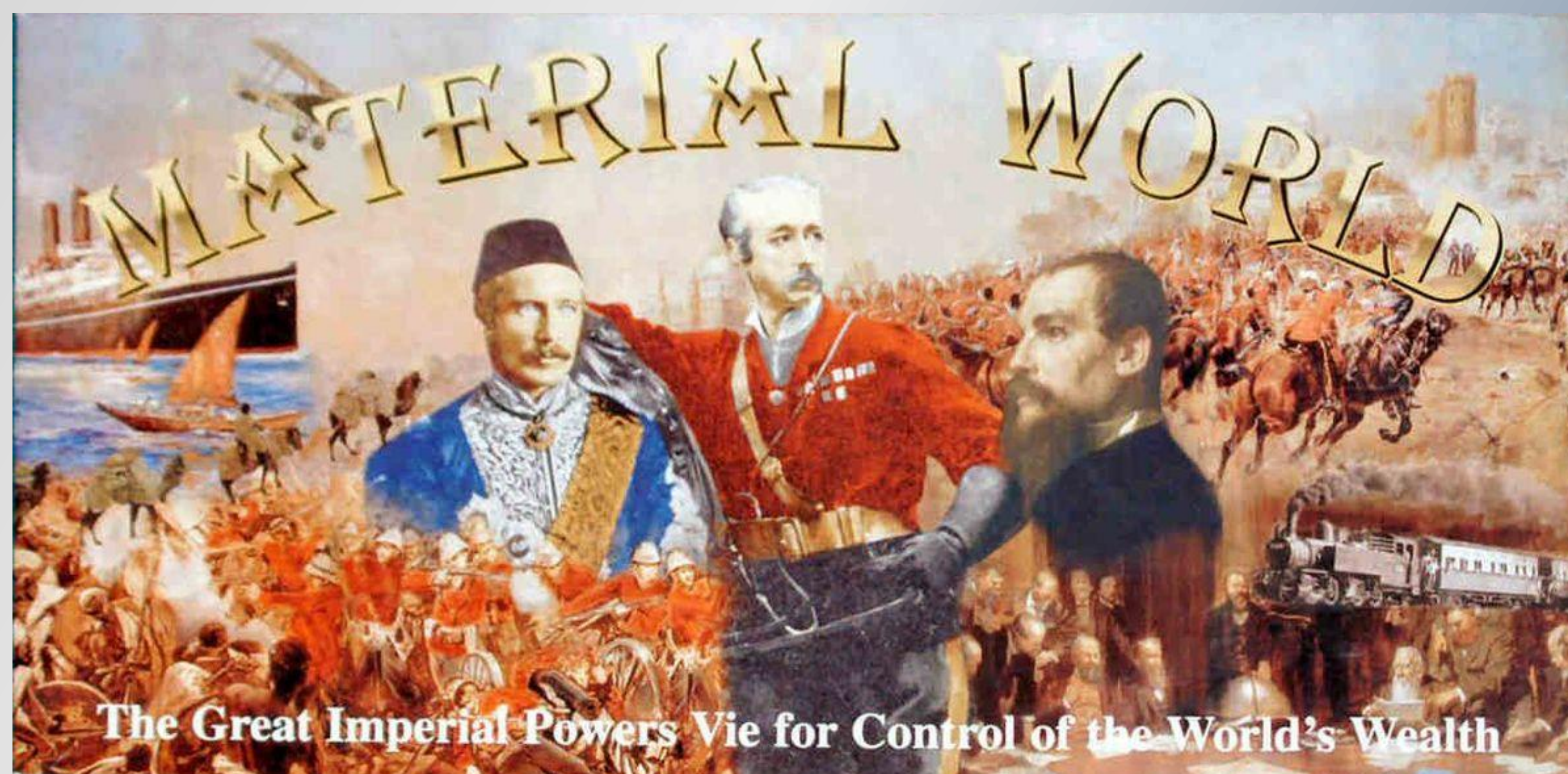
Value added course

(Course Code : VAC-BEBS-03)

OFFERED BY

DEPARTMENT OF BIOELECTRONICS AND BIOSENSORS

We live in a material world that control economic growth by transforming natural resources into different commodities and application materials for betterment of human lives. Materials exists in various forms and types. Recent advancements of nanoscience and technology enabled development of efficient and cost effective application devices using nano scaled materials. This course designed for imparting knowledge on nano scale material physical and chemical properties. Understanding the basic nanoscale and bulk properties of polymer, metal, carbon and food quality control is made in other four units.



COURSE OBJECTIVES

- ❖ Gaining knowledge on nanoscale materials
- ❖ Understanding types of polymers at nanoscale and their applications in products development
- ❖ Applications of metal metal oxides in material development
- ❖ Understanding role of carbon material in material development
- ❖ Food quality assement by sensor developed using materials

Course Coordinator Contact

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**Offered during
Weekend / Holidays**

Syllabus

I Semester

Course code VAC- BEBS- 03	Value added course	Materials for Sensors	Weekly	Hours: 5
Objectives	To impart knowledge on various properties of materials To introduce the basics of nanomaterials, types and preparation methods and techniques To introduce polymer chemistry and their application To expose different types of metal oxide materials and applications. To study the properties of various carbon materials and their applications To understand role of chemistry in day to day life			
Outcomes for each unit	After completing the course, the students have: gained knowledge on nanaomaterial properties and their applications known the application and various properties of polymers understood the importance of metal metal oxides in sensing, environmental applications gained knowledge on carbon materials and their applications understood about role of chemistry in everyday life			
Unit I	NANOMATERIALS Historical development of nanomaterials - Classification of nanomaterials- Synthesis methods Chemical routes Vapor growth Thin films methods: chemical vapor deposition, physical vapor deposition (sputtering, laser ablation), Langmuir-Blodgett growth Mechanical methods: ball milling, mechanical attrition Sol-gel			
UnitII	POLYMERS Polymers: monomer, oligomer and polymer, Average Molecular Weight, Molecular weight, Distribution & Poly dispersity Index, Classification of polymers, structure of polymer. Types of polymerization. Polymerization Techniques: Mass Polymerization, Bulk Polymerization, Solution Polymerization, Emulsion Polymerization, Suspension Polymerization, Mechanisms with explanation. Classification of Polymers: Natural and synthetic polymers, Biopolymers, thermoplastic, thermosets, Elastomers, Fibers etc.			
Unit III	Metal and Metal oxides in sensors Definition-Physical Properties of Metals and metal oxides- Transition metal oxide TiO ₂ , SnO ₂ , WO ₃ , ZnO, CuO, RuO ₂ , Mn ₂ O ₃ , IrO ₂ , Fe ₂ O ₃ , Fe ₃ O ₄ , and other oxide, Hydroxy appetites, lanthanum oxides – applications in gas sensing, chemical sensing and environmental applications, food industries. .			
Unit IV	Carbon and its allotropes Carbon and its compounds-properties- types of carbon- geometry-hybridization- application of carbon and its compounds in sensor field (carbon, carbon composites, MWCNT, carbon dots, dopped carbon).			
Unit V	Chemistry in everyday life and materials from waste Dairy Products: Composition of milk and milk products. Analysis of fat content, minerals in milk and butter Artificial sweeteners. Flavours: Artificial food colorants:. Analysis of pesticide residues in food.Oils and fats:			
Reference and Text Books: -				

1. F. W. Billmeyer Jr., Text Book of Polymer Science, Ed. Wiley-Interscience, 1984. 2. V. T. Gowariker, N. V. Viswanathan, and J. Sreedar, Polymer Science, 1988. 3. M. Morton, Rubber Technology, Chapman Hall, 1995

P.T Moseley, J Crocker. Sensor materials CRC press. 2020. ISBN. 1000157253, 9781000157253