Soran University – Faculty of Science – Chemistry Department

Programme for 3rd Year Chemistry

Subject: Nanotechnology for the life sciences

Course Code: 3Y-1S-NANLSC

Contact hours a week: 2 hours theoretical

Total Credit: 2 units

Academic year 2014-2015

Designed by: Dr. Hazhir Teymourian

Biofunctionalization of Nanomaterials

Unit 1: Biofunctionalization of Fluorescent Nanoparticles

1.1. Introduction

1.2. Fluorescent Nanoparticle Probes

1.3. Bioconjugation of Fluorescent Nanoparticles

1.4. Design of Biocompatible Coatings

1.5. Applications

Unit 2: Biofunctionalization of Carbon Nanotubes

2.1. Introduction

2.2. Carbon Nanotubes – Types, Structures and Properties

2.3. Synthesis of Carbon Nanotubes

2.4. Approaches to Aqueous Solubilization of Carbon Nanotubes

2.5. Applications of Biofunctionalized Carbon Nanotubes

Unit 3: Biofunctionalization of Magnetic Nanoparticles

3.1. Introduction

3.2. Functionalization of Magnetic Nanoparticles for In Vitro Protein/Cell Separation

3.3. Functionalization of Magnetic Nanoparticles for Biochemical/Chemical Synthesis of Therapeutic Drugs and Their Intermediates

3.4. Functionalization of Magnetic Nanoparticles for In Vivo Bio-imaging, Drug Targeting and Tumor Hyperthermia Treatments

Unit 4: Biofunctionalization of Gold Nanoparticles

4.1. Introduction

4.2. General Synthetic Routes

4.3. Preparative-scale Synthesis and Solution-phase Characterization of DNA-directed Nanoparticle Assemblies

4.4. Bifunctional Proteins for Programmable Assembly of Nanoparticles

4.5. Strategies for Eliminating Nonspecific Interactions and Enabling Specific Binding with Biomolecules

4.6. Biological Applications

Unit 5: Biofunctionalization of Metallic Nanoparticles and Microarrays for Biomolecular Detection

5.1. Introduction

5.2. Nanoparticles and their Biofunctionalization

5.3. Substrates and their Biofunctionalization