

# Courses Description

## First Semester

### **CHEM 561: Fundamental of Polymer Science 2(2+0)**

Basic concepts of polymers, methods of classification and mechanisms of polymerization, Introduction to state of phases, Basic concept of phase transformation. Specific features of the ordered-state, practical importance of the theory of phase and phase change. Introduction to true polymer solution and interaction in polymer solution.

### **CHEM 562: Material Science 2(2+0)**

Behavior of materials and this includes relationship between structures and properties of polymeric materials, ceramic, the link between the fine structure of materials and their physical and mechanical properties.

### **CHEM 563: Biopolymers 2(2+0)**

Biopolymers of industrial importance. Methods of their synthesis, modifications, and degradations, Physical and chemical properties. Applications of Biopolymers in industry and their contribution in improving the environment.

### **CHEM 564: Synthesis of Polymers 2(2+0)**

Different methods of polymers synthesis, polymerization techniques and technical factors affecting them, copolymers synthesis, methods of controlling structure and composition of copolymers, special emphasis on catalysts and their methods of preparation, their role and their important industrial applications in the field of polymers, reactions of polymer function groups.

## Second Semester

### **CHEM 571: Polymer Degradation and Stabilization 2(2+0)**

Physical and chemical parameters which affect the stability of polymers, mechanisms of polymer degradation, chemical and physical methods used to improve the stability of polymers against different parameters, and in particular environmental and aging parameters.

### **CHEM 572: Characterization of Polymeric Materials 2(2+0)**

Techniques used for physical and chemical characterization of polymeric materials. gthermal analysis and spectroscopic techniques. Methods of molecular weight determination.

**CHEM 573: Selective Courses 2(2+0)**

Rheology of polymers and other subjects in the field of polymer.

**CHEM 574: Preparation and Characterization of Polymer 2(0+2)**

Preparation of some polymers, training on the methods of polymer characterizations.

## Third Semester

**CHEM 581: Polymer Solutions 2(2+0)**

Study of polymer solutions, their thermodynamics properties e.g. vapors pressure, osmotic pressure, swelling pressure, thermodynamics parameters of solubility, entropy of mixing and internal energy. The thermodynamic of high elastic and glassy polymer solutions. Thermodynamics of copolymer solution with emphasis on the various applications.

**CHEM 582: Polymer transitions 1(1+0)**

Mechanisms of crystallizations and factors affecting them. Glass transition and its relationship with the chemical structure of polymers. Methods used for the determination of the glass transition of polymers, practical importance of the thermomechanical methods.

**CHEM 583: Polymer Processing 3(2+1)**

Rheological and mechanical properties, different methods used in polymer processing e.g. extrusion blowing, reforming. The effect of processing parameters on the properties of the final products. Standard methods used for testing the properties of the final products e.g. ASTM and others. Experiments on polymers processing and measuring some of the mechanical properties of polymers. Arranging of some visits to production and processing facilities in the industrial zones.

**CHEM 584: Seminar 2(2+0)**

Various applications of polymers in different fields, particularly the recent applications e.g. electronics materials, smart material, biomedical applications, agricultural applications, optic fibers, biosensors, membranes, etc.

## Fourth Semester

**CHEM 600: Supervision**

The supervision will be determined based on the subject of the thesis. In case of being the principal supervisor from outside the department, the assistant supervisor must be from the chemistry department and should be specialized in polymer science.