

College of Science
Chemistry Department

Master of Science in Polymer Science

1426/1427

Introduction:

The Chemistry department is considered one of the oldest departments in the university. More over, it is not only one of the biggest departments in the faculty but also in the university. Currently there are 42 staff and 49 assistance lecturers, demonstrators, research assistants, technicians and administrators.

The department contains 30 laboratories equipped with a large number of sophisticated instruments as well as 24 laboratories for teaching students which also include numerous recent instruments.

The department has four specializations:

Organic chemistry , Physical chemistry , Inorganic chemistry and Analytical chemistry.

The department has a branch in the university studies center for girls which was established in 1402/1403 H and includes 15 university staff and about 24 assistant lecturers, demonstrators, technicians and administrators. This department contains a lot of laboratories and facilities.

The MSc program started in the department since 1400/1401 H program. This was followed by a PhD program which started in 1415/1416 H.

The number of researches and books which were published by the university staff more than 400 and 50 respectively. Moreover the department provided a great number of different consultants and services for the various national sectors.

The department also organizes specialized forum and short courses. This strengthens the relation between the department, the industrial and educational sectors in the kingdom.

Graduate students have numerous opportunities for working in many fields, among them , laboratories of oil companies, Royal commission of Jubail and Yanbu, Saudi Arabian standards organization, Saudi Basic industries corporation (SABIC), and in the governmental sectors. In addition, they have also the opportunities for working in industrial national private companies, in the field of metal industries and education.

Program Objectives:

- 1- This program aims at enriching the scientific researches in the field of polymer.
- 2- Reinforcing the cooperation between the university, the private sectors and the corresponding governmental institutions.
- 3- Preparing students to contribute in achieving the requirements of the industrial developments and the involvement in the labour market.

Admission Requirements:

In addition to requirements enumerated in the unified laws organizing the graduate studies in Saudi universities:

- 1) BSc in Chemistry.
- 2) It is possible to accept students from other departments as long as they fulfill the admission requirements of the unified law organizing the graduate studies in the Saudi Universities.
- 3) The students should pass the admission test and the interview held by the chemistry department.

Degree requirements:

- A) The MSc programs is based on courses and thesis. The courses are divided on three semesters. Each semester has four courses. The students must attended and pass successfully the exams of these courses.
- B- Preparing a thesis in the polymer science.

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Program Structure:

Twenty four credit hours and a thesis are required:

Number & Type of courses	Credit Hours
12 Core Courses	24
600 Thesis	-
Total	24

First Semester

Course Code	Course title	Credit Hours
561 Chem	Fundamentals of Polymer Science	2
562 Chem	Material Science	2
563 Chem	Biopolymers	2
564 Chem	Synthesis of Polymers	2
Total		8

Second Semester

Course Code	Course title	Credit Hours
571 Chem	Polymer Degradation and Stabilization	2
572 Chem	Characterization of Polymeric Materials	2
573 Chem	Selected Topics	2
574 Chem	Preparation and Characterization of Polymer	2
Total		8

Third Semester

Course Code	Course title	Credit Hours
581 Chem	Polymer Solutions	2
582 Chem	Polymer Transitions	1
583 Chem	Polymer Processing	3
584 Chem	Seminar	2
Total		8

Fourth Semester

Course Code	Course title	Credit Hours
600 Chem	Thesis	-
Total		-

Courses Description

Chem 561 Fundamentals 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 biodegradation.

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 functional groups .

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 e.g thermal analysis and spectroscopic techniques. Methods of molecular weight determination.

Chem 573 Selected Topics 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.

Chem 581 Polymer Solutions 2(2+0)

Study of polymer solutions, their thermodynamics properties e.g. vapor pressure, osmotic pressure, swelling pressure, thermodynamics criterion of solubility, entropy of mixing and internal energy. The thermodynamic of high elastic and glassy polymer solutions. Thermodynamics of copolymer solution with emphasis on 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, and 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 materials, biomedical applications, agricultural applications, optic fibers, biosensors, membranes.

Chem 600 Thesis

