İZMİR INSTITUTE OF TECHNOLOGY  
FACULTY OF SCIENCE  
CHEMISTRY DEPARTMENT  
(To be applied starting with the 2011-2012 academic year)

<table>
<thead>
<tr>
<th>1st SEMESTER</th>
<th>PREREQUISITE</th>
<th>COREQUISITE</th>
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<tbody>
<tr>
<td>CHEM 100 Chemical Orientation (1-0) NC</td>
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<tr>
<td>CHEM 101 General Chemistry I (4-0) 4</td>
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<tr>
<td>CHEM 111 Technical English for Chemistry I (1-0) 1</td>
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<tr>
<td>CHEM 131 General Chemistry Laboratory I (0-4) 2 (COREQ.) CHEM 101</td>
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<tr>
<td>PHYS 101 General Physics I (2-2) 3</td>
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<tr>
<td>PHYS 111 General Physics I Laboratory (0-2) 1</td>
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<tr>
<td>MATH 141 Basic Calculus I (3-2) 4</td>
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<tr>
<td>ENG 101 Development of Reading and Writing Skills I (3-0) 3</td>
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Credits : 18

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<th>2nd SEMESTER</th>
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<tr>
<td>CHEM 102 General Chemistry II (4-0) 4</td>
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<td>CHEM 132 General Chemistry Laboratory II (0-4) 2 (COREQ.) CHEM 102</td>
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<td>PHYS 102 General Physics II (2-2) 3</td>
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<tr>
<td>PHYS 112 General Physics II Laboratory (0-2) 1</td>
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<tr>
<td>MATH 142 Basic Calculus II (3-2) 4</td>
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<tr>
<td>ENG 102 Development of Reading and Writing Skills II (3-0) 3</td>
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<tr>
<td>CS 102 Basic Computer Science and Programming (2-2) 3</td>
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Credits : 21

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<tr>
<td>CHEM 201 Analytical Chemistry I (3-0) 3 (PREREQ.) CHEM 101,CHEM 102</td>
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<tr>
<td>CHEM 203 Organic Chemistry I (3-2) 4 (PREREQ.) CHEM 101,CHEM 102</td>
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<td>CHEM 205 Mathematics for Chemist (3-2) 4 (PREREQ.) MATH 141,MATH 142</td>
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<td>CHEM 231 Analytical Chemistry Laboratory I (0-4) 2 (COREQ.) CHEM 201</td>
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<td>CHEM 233 Organic Chemistry Laboratory I (0-4) 2 (COREQ.) CHEM 203</td>
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<td>TURK 201 Turkish Language I (2-0) NC</td>
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Credits : 15
### 4th Semester

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>CHEM 202</td>
<td>Analytical Chemistry II</td>
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<td>PREREQ. CHEM 101, CHEM 102</td>
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<td>CHEM 204</td>
<td>Organic Chemistry II</td>
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<td>PREREQ. CHEM 101, CHEM 102</td>
<td>COREQ. CHEM 203</td>
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<tr>
<td>CHEM 206</td>
<td>Introduction to Quantum Chemistry</td>
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<td>PREREQ. CHEM 101, CHEM 102</td>
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<td>CHEM 234</td>
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<td>PREREQ. CHEM 101, CHEM 102</td>
<td>COREQ. CHEM 204</td>
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<td>TURK 202</td>
<td>Turkish Language II</td>
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<td>HIST 202</td>
<td>Principles of Atatürk II</td>
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**Credits:** 16

### 5th Semester

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<th>Course</th>
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<th>Prerequisite(s)</th>
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<tbody>
<tr>
<td>CHEM 301</td>
<td>Inorganic Chemistry I</td>
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<td>CHEM 303</td>
<td>Physical Chemistry I</td>
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<td>CHEM 305</td>
<td>Instrumental Analysis I</td>
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<td>CHEM 333</td>
<td>Physical Chemistry Laboratory I</td>
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<td>CHEM 335</td>
<td>Instrumental Analysis Laboratory</td>
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**Credits:** 18

### 6th Semester

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<th>Course</th>
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<th>Credits</th>
<th>Prerequisite(s)</th>
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<tbody>
<tr>
<td>CHEM 302</td>
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<td>CHEM 304</td>
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<td>CHEM 306</td>
<td>Instrumental Analysis II</td>
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<td>CHEM 310</td>
<td>Chemical Biology</td>
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<td>CHEM 334</td>
<td>Physical Chemistry Laboratory II</td>
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**Credits:** 18

### 7th Semester

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<th>Corequisite(s)</th>
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<tr>
<td>CHEM 300</td>
<td>Summer Practice</td>
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<td>CHEM 401</td>
<td>Graduation Project I</td>
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<td>PREREQ. CHEM 101, CHEM 102</td>
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<tr>
<td>CHEM 411</td>
<td>Biochemistry</td>
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**Credits:** 12
### 8th SEMESTER

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<tr>
<td>CHEM 402</td>
<td>Graduation Projec II</td>
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<td>Non-technical Elective</td>
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**Credits:** 12

**Total Credits:** 130
İZMİR INSTITUTE OF TECHNOLOGY
FACULTY OF SCIENCE, CHEMISTRY DEPARTMENT
DESCRIPTION OF MANDATORY COURSES

CHEM 100 CHEMICAL ORIENTATION (1+0)NC
This course aims to inform freshmen about the program and department. Faculty members, graduate, and undergraduate students will discuss and share their experiences. Moreover, it is intended to make them aware of the profession as Chemist.

CHEM 101 GENERAL CHEMISTRY I (4+0)4

CHEM 102 GENERAL CHEMISTRY II (4+0)4

CHEM 111 TECHNICAL ENGLISH FOR CHEMISTRY I (1+0)1
The lecture is aimed to teach the basic concepts and terms of chemistry in English to the students of Chemistry Department. The lecture will be given by one of the Academic Staff of the Chemistry Department to the first year Chemistry students, in the first semester as one hour a week.

CHEM 112 TECHNICAL ENGLISH FOR CHEMISTRY II (1+0)1
The lecture is aimed to teach the basic concepts and terms of chemistry in English to the students of Chemistry Department. The lecture will be given by one of the Academic Staff of the Chemistry Department to the first year Chemistry students, in the second semester as one hour a week.

CHEM 121 GENERAL CHEMISTRY I (3+0)3

CHEM 122 GENERAL CHEMISTRY II (3+0)3

CHEM 131 GENERAL CHEMISTRY LAB. I (0+4)2
Experiments are related to the topics covered by CHEM 101 Course. Corequisite: CHEM 101
CHEM 132 GENERAL CHEMISTRY LAB. II (0+4)2
Experiments are related to the topics covered by CHEM 102 Course.
Corequisite : CHEM 102

CHEM 201 ANALYTICAL CHEMISTRY I (3+0)3
Prerequisite: CHEM 101, CHEM 102

CHEM 202 ANALYTICAL CHEMISTRY II (3+0) 3
Prerequisite: CHEM 101, CHEM 102

CHEM 203 ORGANIC CHEMISTRY I (3+2)4
Prerequisite: CHEM 101, CHEM 102

CHEM 204 ORGANIC CHEMISTRY II (3+2)4
Prerequisite: CHEM 101, CHEM 102, CHEM 203 (coreq.)

CHEM 205 MATHEMATICS FOR CHEMISTS (3+2)4
Prerequisite: MATH 141, MATH 142

CHEM 206 INTRODUCTION TO QUANTUM CHEMISTRY (3+2)4
Prerequisite: CHEM 101, CHEM 102
CHEM 221 ORGANIC CHEMISTRY II (4+0)4

CHEM 222 INTRODUCTION TO BIOCHEMISTRY (3+0)3
An introductory course describing the fundamentals of biochemistry subjects.

CHEM 231 ANALYTICAL CHEMISTRY LAB. I (0+4)2
Laboratory includes special projects to give the students actual hands on experience with the instruments and techniques discussed in lecture. Prerequisite or corequisite: CHEM 201

CHEM 232 ANALYTICAL CHEMISTRY LAB. II (0+4)2
Laboratory includes special projects to give the students actual hands on experience with the instruments and techniques discussed in lecture. Prerequisite or requisite: CHEM 202

CHEM 233 ORGANIC CHEMISTRY LAB. I (0+4)2
Experiments are related to the topics covered by CHEM 203 Corequisite: CHEM 203

CHEM 234 ORGANIC CHEMISTRY LAB. II (0+6)3
Experiments are related to the topics covered by CHEM 204. Corequisite: CHEM 204

CHEM 300 SUMMER PRACTICE (NC)

CHEM 301 INORGANIC CHEMISTRY I (4+0)4

CHEM 302 INORGANIC CHEMISTRY II (4+0)4
Coordination chemistry: Structures and isomers. Bonding. Electronic spectra of coordination compounds. Reactions and mechanisms. Spectroscopic techniques in inorganic chemistry. Prerequisite: CHEM 101, CHEM 102

CHEM 303 PHYSICAL CHEMISTRY I (4+0)4
The properties of gases. The first law. The second law. The phase rule and chemical reactions. Equilibrium electrochemistry. Ions and electrochemical cells. Prerequisite: CHEM 101, CHEM 102

CHEM 304 PHYSICAL CHEMISTRY II (4+0)4
Molecules in motion: the kinetic theory of gases, ion transport and molecular diffusion. The rates of chemical reactions, The kinetics of complex reactions, Molecular reaction dynamics. Quantum theory and model systems. Prerequisite: CHEM 101, CHEM 102
CHEM 305 INSTRUMENTAL ANALYSIS I (3+0) 3
Prerequisite: CHEM 101, CHEM 102

CHEM 306 INSTRUMENTAL ANALYSIS II (3+0) 3
Optic Spectroscopic, Electroanalytical and Chromatographic instruments: Infrared Spectroscopy, Raman Spectroscopy, Modern electroanalytical chemistry, (Potentiometry, Coulometry, Voltammetry), Separation techniques, Gas chromatography, Liquid chromatography.

CHEM 310 CHEMICAL BIOLOGY (3+0) 3
An introductory course describing the fundamentals of chemical biology subjects. The chemistry of life, the cell structure and genetics will be explained.

CHEM 321 PHYSICAL CHEMISTRY (3+0) 3

CHEM 332 INORGANIC CHEMISTRY LAB (0+4) 2
Experiments related to topics covered in CHEM 301 and CHEM 302.

CHEM 333 PHYSICAL CHEMISTRY LABORATORY I (0+4) 2
Experiments related to topics covered in CHEM 303.
Corequisite: CHEM 303

CHEM 334 PHYSICAL CHEMISTRY LAB. II (0+4) 2
Experiments related to topics covered in CHEM 304.
Corequisite: CHEM 304

CHEM 335 INSTRUMENTAL ANALYSIS LAB. I (0+4) 2
Experiments related to topics covered in CHEM 305.
Corequisite: CHEM 305.

CHEM 351 SEPERATION TECHNIQUES (3+0) 3
The theories behind various types of analytical separation methods including; chromatography, extraction, and electrophoresis. Gas and liquid chromatography, supercritical fluid extraction, solid phase microextraction, capillary and gel electrophoresis. Types of detectors used in analytical separation methods.
CHEM 352 INTRODUCTION TO ENVIRONMENTAL CHEMISTRY (3+0)3
Atmospheric pollutants; oxides of carbon, sulphur dioxide, hydrogen sulphide, oxides of nitrogen, ozone, chlorofluoro hydrocarbons. The hydrosphere; the water cycle, the chemistry of water. Water pollution; metals, dissolved oxygen, the treatment of sewage. The lithosphere; soil, chemical weathering. Pollution of lithosphere; soil pollution, solid wastes, hazardous and toxic wastes.

CHEM 353 INTRODUCTION TO CHEMOMETRICS (3+0)3
The following topics will be covered in this course: Basic statistics, simple comparative experiments, hypothesis testing, design of experiments and optimization, classification and clustering techniques, pattern recognition, principle component analysis (PCA), multivariate regression and calibration methods, genetic algorithms for variable selection and optimization methods.

CHEM 362 INTRODUCTION TO BIOLOGICAL CHEMISTRY (3+0)3
An introductory course describing the fundamentals of biological chemistry subjects.

CHEM 371 INTRODUCTION TO SOLID STATE CHEMISTRY (3+0)3
This course will have general coverage of solid state chemistry and applications.

CHEM 391 COMPUTATIONAL CHEMISTRY I (3+0)3
Some numerical techniques applied to chemistry. Computer simulation methods; Monte Carlo and Molecular Dynamics simulations and some applications.
Prerequisite: CHEM 211, CS 102

CHEM 392 SURFACTANT SCIENCE (3+0)3

CHEM 393 INTRODUCTION TO CHEMICAL KINETICS (3+0)3
The rates of Chemical reactions, The kinetics of complex reactions , Molecular reaction Dynamics, Kinetics in the liquid phase, Kinetics of processes at solid surfaces.

CHEM 394 INTRODUCTION TO NUCLEAR CHEMISTRY (3+0)3

CHEM 401 GRADUATION PROJECT I (0+4)NC
A course to guide students about professional opportunities and issues to inform about the recent advances in the areas of Chemistry research. Lecture will be conducted by the related instructor and respected Chemists from industry for one year term.
CHEM 402 GRADUATION PROJECT II (0+6)3
Continuation of CHEM 401

CHEM 411 BIOCHEMISTRY (2+2)3

CHEM 451 ATOMIC AND MOLECULAR SPECTROMETRY (3+0)3
Review of modern instrumental analysis techniques, recent developments in instrumental designs and applications.

CHEM 452 SPECIAL TOPICS IN ANALYTICAL CHEMISTRY (3+0)3
Selected analytical methods used in many areas of science. Modern developments in analytical chemistry appeared on current literature. Topics covered may vary each year depending on the students interest.

CHEM 453 ELECTROCHEMISTRY (3+0)
Fundamentals of electrochemistry and electroanalysis. Types of electroanalytic methods. Ion selective interfaces and electrodes. Electrochemical sensors and their applications in various fields including biochemistry and medicine. Electrochemical detectors applied to other analytical techniques.

CHEM 464 SELECTED TOPICS IN BIOCHEMISTRY (3+0)3
Metabolism (chemical reactions in cell) in Biochemistry.

CHEM 466 BIOINORGANIC CHEMISTRY (3+0)3

CHEM 471 TRANSITION METAL CHEMISTRY (3+0)3

CHEM 472 ORGANOMETALLIC CHEMISTRY (3+0)3
CHEM 473 SPECTROSCOPIC METHODS IN INORGANIC CHEMISTRY (3+0)
This course will have general coverage of EPR, Electronic and Photoelectron spectroscopy, Vibrational (IR, Raman), one and two dimensional NMR, Mass spectrometry and their applications.

CHEM 481 REACTION MECHANISM IN ORGANIC CHEMISTRY (3+0)
Polar mechanisms, free-radikal mechanisms, Pericyclic mechanisms, Transitional-metal-catalyzed and mediated mechanisms.

CHEM 482 SPECTROSCOPIC METHODS IN ORGANIC CHEMISTRY (3+0)
Analysis and interpretation of organic materials by means of IR, MS and NMR (1H and 13C) techniques.

CHEM 483 SELECTED TOPICS IN ORGANIC CHEMISTRY (3+0)
Contents vary according to student’s research interest.

CHEM 484 INTRODUCTION TO BIOORGANIC AND MEDICINAL CHEMISTRY (3+0)
Since bioorganic chemistry involves both organic chemistry and biochemistry, through the course students will encounter all of the following topics at the introductory level: organic synthesis of small molecules, biological activities of those small molecules and their mechanism(s) of action, and structure-activity relationships of the known analogous structures.

CHEM 491 COMPUTATIONAL CHEMISTRY II (3+0)
Electronic structure methods; semi-empirical, ab-initio methods. Density Functional Theory and their applications in chemistry.

CHEM 492 INTRODUCTION TO COLLOID CHEMISTRY (3+0)
Definition and classification of colloids. Particle size. Electrical double layer. Van Der Waals forces. DLVO theory. Steric effects. Thermodynamics of interfaces.

CHEM 493 INTRODUCTION TO POLYMER SCIENCE (3+0)
This course covers basic concepts of polymer chemistry and polymer physics. Some of these concepts are as follows: polymerization processes, (condensation, free radical, ionic, and coordination), polymerization mechanisms (step-growth and chain growth), characterization of polymers (molecular mass determination, thermal analysis, and spectroscopic techniques), structure-property relationships of bulk polymers, industrial polymers (plastics, fibers, coatings, adhesives), and rubbers.

CHEM 494 POLYMER COMPOSITES (3+0)
This course offers an overview of nanocomposite materials, particularly polymer-based composites. It mainly includes the definition and classification of nanocomposites, composite preparation methods, engineering surfaces and interfaces, characterization techniques of nanostructures, and applications of these materials in various disciplines. This course also provides the ability to select appropriate components and processing techniques to obtain tailor-made composite materials.
CHEM 495 PHOTOCHEMISTRY (3+0)3
Fundamental principles of photochemistry and photophysics will be the subject of this course along with basic instrumentation to observe photochemical processes.

CHEM 496 MOLECULAR PHOTONICS (3+0)3
The concept of molecular photonics, molecular materials and its applications in nanophotonics, photobiology and biological imaging will be provided.

CHEM 497 INTRODUCTION TO MASS SPECTROMETRY..(3+0)3
Giving Information about Mass Spectrometry and its application.

CHEM 499 INDUSTRIAL CHEMISTRY (3+0)3
Main inorganic industrial chemicals and their manufacturing processes with special emphasis on their economic aspects. Development of interrelationships of different industries with regard to their raw materials and product.