

## DEPARTMENT OF CHEMISTRY

The Department provides a two-years program of studies leads to the degree of Master of Science (M.Sc.) in Chemistry. The minimum requirements needed is 30 credit hours. The students must consider the following:

- 1) Students has to choose one of the available research areas (majors) at the department. And in accordance with the vacant places in laboratories and researchers faculty members of the board of this specialty, he also has to get an assent from one of the members to be his main supervisor.
- 2) Completion of four courses (15-to-18 credits) of major courses including the M.Sc. project (dissertation) (6 credits).
- 3) Completion of four courses (12 credits) to five courses (15 credits) from other majors.
- 4) Publishing a research paper in one of the scientific journals.

Nevertheless, students who want to enroll in a doctoral program (PhD) at the Department, in addition to what it stated above they have to perform 30 credits over three years and accomplish the following:

- 1) Successfully passing seven courses (21 credits) of his major (or near to his). These courses should be chosen under the direction of the supervisor.
- 2) Publishing three scientific research papers before the discussion of the PhD thesis (VIVA Examination).
- 3) Completion of PhD thesis (9 credits).

The following are the courses and their descriptions:

### 1) Physical Chemistry Courses

Code	Course Title	Credits
5505	Advanced Physical Chemistry	3
5506	Advanced Physical Chemistry	3
5507	Advanced Physical Chemistry	3
5508	Advanced Physical Chemistry	3
5509	Advanced Physical Chemistry	3
5510	Advanced Physical Chemistry	3
5511	Advanced Physical Chemistry	3
5512	Advanced Physical Chemistry	3
5513	Advanced Physical Chemistry	3
5514	Advanced Physical Chemistry	3
5515	Advanced Physical Chemistry	3
5516	Advanced Physical Chemistry	3
5517	Advanced Physical Chemistry	3
5518	Advanced Physical Chemistry	3

5519	Advanced Physical Chemistry	3
5520	Advanced Physical Chemistry	3
5599	M.Sc. or PhD. in Physical Chemistry	6

## 2) Analytical Chemistry Course

Code	Course Title	Credits
5521	Advanced Analytical Chemistry	3
5522	Advanced Analytical Chemistry	3
5523	Advanced Analytical Chemistry	3
5524	Advanced Analytical Chemistry	3
5525	Advanced Analytical Chemistry	3
5526	Advanced Analytical Chemistry	3
5527	Advanced Analytical Chemistry	3
5528	Advanced Analytical Chemistry	3
5529	Advanced Analytical Chemistry	3
5530	Advanced Analytical Chemistry	3
5531	Advanced Analytical Chemistry	3
5532	Advanced Analytical Chemistry	3
5533	Advanced Analytical Chemistry	3
5534	Advanced Analytical Chemistry	3
5535	Advanced Analytical Chemistry	3
5536	Advanced Analytical Chemistry	3
5599	M.Sc.in Analytical Chemistry	6

## 3) Inorganic Chemistry Courses

Code	Course Title	Credits
5537	Advanced Inorganic Chemistry	3
5538	Advanced Inorganic Chemistry	3
5539	Advanced Inorganic Chemistry	3
5540	Advanced Inorganic Chemistry	3
5541	Advanced Inorganic Chemistry	3
5542	Advanced Inorganic Chemistry	3
5543	Advanced Inorganic Chemistry	3
5544	Advanced Inorganic Chemistry	3
5545	Advanced Inorganic Chemistry	3
5546	Advanced Inorganic Chemistry	3
5547	Advanced Inorganic Chemistry	3
5599	M.Sc.in in Inorganic Chemistry	6

## 4) Organic Chemistry Courses

Code	Course Title	Credits
5553	Advanced Organic Chemistry	3
5554	Advanced Organic Chemistry	3
5555	Advanced Organic Chemistry	3
5556	Advanced Organic Chemistry	3
5557	Advanced Organic Chemistry	3

5558	Advanced Organic Chemistry	3
5559	Advanced Organic Chemistry	3
5560	Advanced Organic Chemistry	3
5561	Advanced Organic Chemistry	3
5562	Advanced Organic Chemistry	3
5563	Advanced Organic Chemistry	3
5599	M.Sc.in Organic Chemistry	6

### 5) Biochemistry Courses

Code	Course Title	Credits
5569	Advanced Biochemistry	3
5570	Advanced Biochemistry	3
5571	Advanced Biochemistry	3
5572	Advanced Biochemistry	3
5573	Advanced Biochemistry	3
5574	Advanced Biochemistry	3
5575	Advanced Biochemistry	3
5576	Advanced Biochemistry	3
5577	Advanced Biochemistry	3
5578	Advanced Biochemistry	3
5579	Advanced Biochemistry	3
5580	Advanced Biochemistry	3
5581	Advanced Biochemistry	3
5582	Advanced Biochemistry	3
5583	Advanced Biochemistry	3
5584	Advanced Biochemistry	3
5599	M.Sc.in Biochemistry	6

### Description of Physical Chemistry Courses

#### **5505 Advanced Physical Chemistry (3 Credits)**

Systematic review and extension the applications of the facts and theories for matter in state of aggregation and isolation, its thermodynamics and chemical dynamics.

#### **5506 Advanced Physical Chemistry(3 Credits)**

Advanced studies in experimental physical chemistry. Emphasis on the rehelogical; electrochemical; and optical techniques.

#### **5507 Advanced Physical Chemistry (3 Credits)**

Lectures and discussions based on special advanced topics in physical chemistry. Topics discussed are in the areas of equilibria; structures and changes.

- 5508 Advanced Physical Chemistry(3 Credits)**  
Weekly independent studies in the references and periodicals of physical chemistry, with emphasis on summarizing the inter-disciplinary issues in physical chemistry research.
- 5509 Advanced Physical Chemistry(3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications in colloidal science, including lyophobic colloids, association and colloidal electrolytes.
- 5510 Advanced Physical Chemistry(3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications in optical spectroscopy. Topics include rotational and vibrational spectroscopy; electronic spectroscopy of molecules; magnetic resonance spectroscopy.
- 5511 Advanced Physical Chemistry(3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications in kinetics. Topics include physical and chemical kinetics.
- 5512 Advanced Physical Chemistry(3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications in polymer degradation and stabilization. emphasis on the thermal ,photo and gamma effect on the polymers.
- 5513 Advanced Physical Chemistry (3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications in photochemistry. emphasis on mechanism and experimental in the photochemistry; photolyzed reactions; vision and photography.
- 5514 Advanced Physical Chemistry(3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications in radiation and nuclear chemistry, topics include radiation chemistry and its applications.
- 5515 Advanced Physical Chemistry(3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications in classical solutions. Topics include solutions of nonelectrolytes; dilute solutions of nonelectrolytes; and solutions of electrolytes.

**5516 Advanced Physical Chemistry(3 Credits)**

Lectures and discussions on advanced principles, techniques and applications in polymer solutions. Topics include some fundamentals; dilute solutions; and concentrated solutions.

**5517 Advanced Physical Chemistry(3 Credits)**

Lectures and discussions on advanced principles, techniques and applications in polymer science. Topics include structures; characteristics; processing of polymers.

**5518 Advanced Physical Chemistry(3 Credits)**

Lectures and discussions on advanced principles, techniques and applications in material chemistry. One or more topics alloys and corrosion ceramic and corrosion; polymers and degradation of polymers are included.

**5519 Advanced Physical Chemistry (3 Credits)**

Lectures and discussions on advanced principles, techniques and applications in environmental physical chemistry, including aquatic and atmospheric physical chemistry.

**5520 Advanced Physical Chemistry(3 Credits)**

A short lecture/ seminar series on current research areas followed by an experimental or theoretical research problem as an introduction to research in physical chemistry.

**5599 M.Sc. /PhD. Research Project in Physical Chemistry (6 Credits)**

**Description of Analytical Chemistry Course**

**5521 Advanced Analytical Chemistry (3 Credits)**

Systematic review and extension the applications of the facts and theories for classical and modern methods of chemical analysis.

**5522 Advanced Analytical Chemistry(3 Credits)**

Advanced studies in experimental analytical chemistry. Emphasis on electrochemical; chromatographic; and spectroscopic techniques of analysis.

- 5523 Advanced Analytical Chemistry(3 Credits)**  
Lectures and discussions based on special advanced topics in analytical chemistry. Topics discussed are in the areas of electrochemical; spectroscopic and chromatographic methods of analysis.
- 5524 Advanced Analytical Chemistry(3 Credits)**  
Weekly independent studies in the references and periodicals of analytical chemistry, with emphasis on summarizing the interdisciplinary issues in analytical chemistry research.
- 5525 Advanced Analytical Chemistry(3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications in physical analytical chemistry. Topics discussed include and extensive use of the fact and theories of chemical sciences in issues of chemical analysis.
- 5526 Advanced Analytical Chemistry(3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications in chemical separation. Topics include solvent extraction; ion exchange; paper, thin layer and column; and gas chromatography.
- 5527 Advanced Analytical Chemistry(3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications in analytical chromatography for biology- students. Topics include paper; thin layer and column chromatography; gas chromatography. Emphasis and applications oriented to biology.
- 5528 Advanced Analytical Chemistry(3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications in analytical chromatography for chemistry-students. Topics include paper; thin layer and column chromatography; gas chromatography. Emphasis and applications oriented to chemistry.
- 5529 Advanced Analytical Chemistry (3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications in electrochemical analysis. Emphasis on potentiometric methods; electrogravimetric and coulometric methods; and voltametric methods.

- 5530 Advanced Analytical Chemistry(3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications in analytical neurology. Topics include electrochemical sensors with emphasis on electrochemical biosensors.
- 5531 Advanced Analytical Chemistry(3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications in solvent extractions. Topics include factors favoring solvent extraction; quantitative treatment of solvent extraction equilibria; ion-association complexes; extraction reagents.
- 5532 Advanced Analytical Chemistry (3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications in pollutant analysis. Topics include pollutions due to major elements found in living matter and earth's crust; minor elements induced environmental problems; hazardous of organic compounds.
- 5533 Advanced Analytical Chemistry(3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications in industrial products analysis. Emphasis on one or more topics for the analysis of industrial products such as foods; water; etc.
- 5534 Advanced Analytical Chemistry(3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications in complexes in analytical chemistry.
- 5535 Advanced Analytical Chemistry(3 Credits)**  
Lectures and discussions on advanced principles , techniques and applications in food analysis.
- 5536 Advanced Analytical Chemistry (3 Credits)**  
A short lecture / seminar series on current research areas followed by an experimental or theoretical research problem as an introduction to research in analytical chemistry.
- 5599 M.Sc. Research Project in Analytical Chemistry (3 Credits)**

## Description of Inorganic Chemistry Courses

- 5537 Advanced Inorganic Chemistry (3 Credits)**  
Systematic review and extension the applications of the facts and theories on structure , reactivity and periodicity.
- 5538 Advanced Inorganic Chemistry (3 Credits)**  
Advanced studies in experimental inorganic chemistry. Emphasis on modern techniques of preparation and characterization of inorganic complexes.
- 5539 Advanced Inorganic Chemistry (3 Credits)**  
Lectures and discussions based on special advanced topics in inorganic chemistry .Topics discussed are in the areas of reactions and structures of inorganic systems.
- 5540 Advanced Inorganic Chemistry (3 Credits)**  
Weekly independent studies in the references and periodicals of inorganic chemistry, with emphasis on summarizing the inter-disciplinary issues in inorganic chemistry research.
- 5541 Advanced Inorganic Chemistry(3 Credits)**  
Lectures and discussions on advanced principles , techniques and applications in physical inorganic chemistry . Topics discussed include and extensive use of the fact and theories of chemical sciences in issues of inorganic structure and mechanism.
- 5542 Advanced Inorganic Chemistry(3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications in theoretical inorganic chemistry .Emphasis on theories and computational chemistry for characterization of inorganic compounds.
- 5543 Advanced Inorganic Chemistry(3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications in inorganic spectroscopy. Emphasis on notational and, vibration, electronic and magnetic resonana spectroscopy in inorganic characterization.



**5544 Advanced Inorganic Chemistry(3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications in inorganic reaction mechanism.

**5545 Advanced Inorganic Chemistry (3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications on metal extractions in inorganic chemistry.

**5546 Advanced Inorganic Chemistry (3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications in organometallic chemistry.

**5547 Advanced Inorganic Chemistry (3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications in bioinorganic chemistry.

Courses from 12 to 16 can be prepared on the request of the staff.

**5599 M.Sc. Research Project in Inorganic Chemistry (3 Credits)**

### **Description of Organic Chemistry Courses**

**5553 Advanced organic Chemistry (3 Credits)**  
Systematic review and extension the applications of the facts and theories in symthetic and structural organic chemistry.

**5554 Advanced organic Chemistry(3 Credits)**  
Advanced studies in experimental organic chemistry .Topics include techniques in synthesis and cauterization on identification of organic compounds by spectroscopic techniques.

**5555 Advanced organic Chemistry (3 Credits)**  
Lectures and discussions based on special advanced topics in organic chemistry. Topics and discussed are in the areas of organic molecules.

**5556 Advanced organic Chemistry(3 Credits)**  
Weekly independent studies in the references and periodicals of organic chemistry, with emphasis on summarizing the inter-disciplinary issues in organic chemistry research.

- 5557 Advanced organic Chemistry (3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications in physical organic chemistry . Topics discussed include and extensive use of the fact and theories of chemical sciences in issues of organic synthesis and structure.
- 5558 Advanced organic Chemistry(3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications in organic synthesis. Emphasis on modern synthetic methods and instrumental techniques frequently used.
- 5559 Advanced organic Chemistry(3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications in stereochemistry. Topics covered include optical isomerism and geometrical isomerism.
- 5560 Advanced organic Chemistry (3 Credits)**  
Lectures and discussions on advanced principles , techniques and applications in organic polymer chemistry. Topics include polymerization reactions; common synthetic and natural polymers; and reactions of polymers.
- 5561 Advanced organic Chemistry(3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications in organic chemistry of natural products ,with particular reference to terpenes and steroids ;emphasizing modern techniques;structure proofs ;and mechanistic concepts.
- 5562 Advanced organic Chemistry(3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications in organic reaction mechanism .Topics discussed include mechanisms of organic reactions involving carbonium ions, carbanions, carben and free radical.
- 5563 Advanced organic Chemistry(3 Credits)**  
Lectures and discussions on advanced principles, techniques and applications in heterogeneous cyclic compounds. Topics include synthesis and reaction mechanism for heterocyclic compounds; with emphasis on the chemical and biological interests.

Courses from 12 to 16 can be prepared on the request of the staff.

**5599 M.Sc. Research Project in Organic Chemistry(3 Credits)**

**Description of Biochemistry Courses**

**5569 Advanced Biochemistry(3 Credits)**

Systematic review and extension the applications of the facts and theories on structure and metabolism in biological molecules.

**5570 Advanced Biochemistry (3 Credits)**

Advanced studies in experimental biochemistry. Emphasis on physical method of characterization of molecules of biological interests.

**5571 Advanced Biochemistry(3 Credits)**

Lectures and discussions based on special advanced topics in biochemistry. Topics discussed are in the areas structures; functions and reactions in biochemical systems.

**5572 Advanced Biochemistry(3 Credits)**

Weekly independent studies in the references and periodicals of biochemistry. with emphasis on summarizing the inter-disciplinary issues in biochemical research.

**5573 Advanced Biochemistry(3 Credits)**

Lectures and discussions on advanced principles, techniques and applications in physical biochemistry. Topics discussed include and extensive use of the fact and theories of chemical sciences in issues of biochemical systems.

**5574 Advanced Biochemistry(3 Credits)**

Lectures and discussions on advanced principles , techniques and applications in metabolism. Emphasis on metabolism of biologically important compounds; and intermediate metabolic process.

**5575 Advanced Biochemistry(3 Credits)**

Lectures and discussions on advanced principles, techniques and applications on composition and structure in biochemistry; with emphasis on DNA and RNA.

**5576 Advanced Biochemistry(3 Credits)**

Lectures and discussions on advanced principles, techniques and applications in enzymes, with emphasis on the kinetic of enzymes and their functions.

**5577 Advanced Biochemistry(3 Credits)**

Lectures and discussions on advanced principles, techniques and applications in proteins. Emphasis on the synthesis of nucleic acids and proteins , and the control of their processes.

**5578 Advanced Biochemistry(3 Credits)**

Lectures and discussions on advanced principles, techniques and applications in steroids ,with emphasis on their structure and synthesis.

**5579 Advanced Biochemistry(3 Credits)**

Lectures and discussions on advanced principles, techniques and applications in clinical biochemistry, with emphasis on quantitative analysis of body fields such as bold and urea.

**5580 Advanced Biochemistry(3 Credits)**

Lectures and discussions on advanced principles, techniques and applications in lipids, including chemical and physical characteristics of lipids and their metabolism.

**5581 Advanced Biochemistry(3 Credits)**

Lectures and discussions on advanced principles, techniques and applications in hormones, with emphasis on their role in biochemical systems.

**5582 Advanced Biochemistry(3 Credits)**

Lectures and discussions on advanced principles, techniques and applications in analytical biochemistry ,including theoretical and practical techniques as applied to biochemical system.

**5583 Advanced Biochemistry(3 Credits)**

Lectures and discussions on advanced principles, techniques and applications in nutrition chemistry, with emphasis on vitamins and minerals ;and toxicity of nutrients.

**5583 Advanced Biochemistry(3 Credits)**

A short lecture/ seminar series on current research areas followed by an experimental or theoretical research problem as an introduction to research in biochemistry.

**5599 M.Sc. Research Project in Biochemistry(3 Credits)**