

Department of Chemistry

Chairperson:	Al-Ghoul, Mazen H.
Professors:	Haddadin, Makhlof J.; Sultan, Rabieh F.
Associate Professors:	Al-Ghoul, Mazen H.; Bouhadir, Kamal I.; Halaoui, Lara I.; Hasanayn, Faraj A.; Saliba, Najat I.
Assistant Professors:	El-Rassy, Houssam T.; Ghaddar, Tarek H.; Ghauch, Antoine, R.; Kaafarani, Bilal R.; Patra, Digambara
Lecturer:	^P Fares, Fares
Instructors:	Deeb, Hana H.; Abi Rafii, Randa R.; Sadek, Samar A.; Abi Rafii, Randa R.; ^P Abi Saab, Manal; ^P Abramian, Lara; ^P El-Batlouni, Hazar; Deeb, Hana H. ; ^P Matar, Farah; Sadek, Samar A.;
Assistant Instructors:	Dakik, Rajaa; ^P El-Harakeh, Mayssa; ^P Jaafar, Amer; Ramadan, Hiba

Graduate Program

The department offers the MS degree in chemistry. Graduate students may specialize in analytical, inorganic, organic, or physical chemistry. Of the minimum 21 graduate course credits required for the MS degree, a minimum of six credits must be graduate courses in the special field of chemistry in which the student concentrates. At least six additional credits must be graduate courses in chemistry outside the student's field of specialization. CHEM 361 is a requirement for all graduate students.

The research interests of the chemistry faculty include the following: synthetic heterocyclic chemistry; synthesis of biomaterials for drug delivery; synthesis of carbocyclic DNA analogs; reactive intermediates; cage compounds; coordination and organometallic chemistry; supramolecular chemistry; photocatalysis; photoelectrochemistry of semiconductors; synthesis, assembly, and physical properties of nanostructured materials; surface chemistry; irreversible nonequilibrium thermodynamics and statistical mechanics; nonlinear dynamics in chemistry; generalized hydrodynamics; chemical waves; patterns and fractals in precipitate and metal electro-deposition systems; laboratory and field investigations of atmospheric chemistry processes; design and synthesis of novel photo-active dendrimers; self-assembled mono-layers (SAMs) of bioactive material and poly-peptides on metal surfaces; study of electronic structure of unsaturated transition metal complexes and their reactions; discotic liquid crystals; synthesis of electron-deficient materials for organic electronics and opto-electronics applications; organic light emitting diodes (OLEDs), organic field effect transistors (OFETs), and organic solar cells; molecular recognition; and, solid-state stacking of organic materials; biocatalysis; control of inorganic phase growth; developing new probe molecules based on nanocapsules, nanocrystals, curcumin and PAHs for physical and biophysical studies; fluorescence sensing and spectroscopic investigation on multi-component analysis and biosensor development; fluorescence spectroscopy, imaging and applications; hybrid solid materials; luminescence, solid surface room temperature phosphorescence (SS-RTP) and diffuse reflectance spectrometry (DRS); monitoring of organic and inorganic pollutants in industrial effluent under rigorous conditions; nanoscopy and single molecule studies in physical and biophysical chemistry; new methods for depollution of water contaminated by organic pollutants; photophysical and Biophysical Chemistry; probe Chemistry; use of the reductive properties of Zero Valent Iron for the degradation of pesticides and chlorinated organic compounds in water.

- CHEM 301 Structure of Inorganic Compounds 3.0; 3 cr.**
Electronic absorption spectra of complex inorganic molecules; vibrational, NMR, NQR, EPR, and Mössbauer spectroscopy; physical methods of determination of the structure of inorganic molecules. *Annually.*
- CHEM 303 Chemistry of the Coordination Compounds 3.0; 3 cr.**
Applications of Orgel and Tanabe-Sugano diagrams; factors affecting stability of coordination compounds; stereochemistry; trans-effect; stabilization of oxidation states; mechanisms of the reactions of coordination compounds; catalysis by coordination compounds. *Annually.*
- CHEM 304 Mechanisms of Inorganic Reactions 3.0; 3 cr.**
Mechanisms of substitution reactions in octahedral and square planar metal complexes; mechanisms of oxidation-reduction, metal ion catalysis and photochemistry; application of symmetry rules to inorganic reactions; fluxional molecules. *Alternate years.*
- CHEM 311 Advanced Organic Chemistry 3.0; 3 cr.**
Electronic interpretation of organic reactions; correlation of inductive, resonance, and steric effects with reactivity of molecules; chemistry of carbocations, carbanions, carbenes, carbenoids, and radicals as intermediates in characteristic organic reaction mechanisms. *Annually.*
- CHEM 313 Physical Organic Chemistry 3.0; 3 cr.**
Organic reactions mechanisms, linear free energy relationships, solvent and reagent correlations, isotope effects, catalysis in weak and strong acid and base medium, organic photochemistry and pericyclic reactions. *Alternate years.*
- CHEM 314 Heterocyclic Chemistry 3.0; 3 cr.**
A general survey of the synthesis and reactions of selected classes of heterocyclic compounds; spectroscopic properties and structural relationships. *Alternate years.*
- CHEM 315 Chemistry and Technology of High Polymers 3.0; 3 cr.**
An introduction to the chemistry of high polymers; types, mechanisms, and kinetics of polymerization; structure, characterization, and properties of macromolecules; preparation, processing, and uses of the more common condensation and addition polymers used in plastics, elastomers, and fibers. *Alternate years.*
- CHEM 316 Chemistry of Synthetic Polymers for Biomedical Applications 3.0, 3 cr.**
An introduction to the chemistry of synthetic polymers and their applications in the biomedical field; nomenclature, preparations, reactions, synthesis, mechanisms, characterization, biocompatibility and biodegradability. A general presentation of biomedical applications of synthetic polymers in bones, joints, teeth, artificial organs, synthetic skin, contact lenses, time-release drug delivery, and gene delivery. *Alternate years.*
- CHEM 317 Synthetic Organic Chemistry 3.0, 3cr.**
A survey of new reagents and synthetic procedures used in advanced organic synthesis; oxidation and reduction reagents in organic synthesis; protecting groups; carbon-carbon bond formation; functional groups inter-conversions. *Alternate years.*
- CHEM 321 Quantum Chemistry 3.0; 3 cr.**
Wave mechanics, solutions of time-independent Schrödinger equation, particle in a box, harmonic oscillator, angular momentum, H-atom, atomic orbitals, variational theorem, perturbation theory, polyelectronic atoms, Slater determinants, term symbols, Hückel MO theory, electronic wave functions, SCF and CI calculations. *Alternate years.*

