

## Course Descriptions

<b>Course Number and Symbol</b>	<b>CHEM 520</b>		
<b>Course Title</b>	<b>Quantum Chemistry and its Application</b>		
<b>Credit Hours</b>	<b>2(2+0)</b>	<b>Level</b>	<b>Second</b>
Wave mechanics of the rigid diatomic rotor, wave mechanics of the simple harmonic oscillator, calculations of rotational vibration transition for diatomic molecules. Correction to the rigid rotor-harmonic oscillator model. Perturbation theory for solving Schrodinger equation. Group theory and quantum mechanics. Symmetry adapted linear combination. Symmetry and MO theory. Molecular vibration, IR and Raman Spectroscopy.			

<b>Course Number and Symbol</b>	<b>CHEM 523</b>		
<b>Course Title</b>	<b>Physical Methods in Inorganic Chemistry</b>		
<b>Credit Hours</b>	<b>2(2+0)</b>	<b>Level</b>	<b>Third</b>
Magnetism, electronic spectroscopy, magnetic resonance (NMR), electronic paramagnetic resonance (E.P.R) nuclear quadropole resonance (N.Q.R), Mössbauer spectroscopy, mass spectroscopy and x- ray single crystal analysis.			

<b>Course Number and Symbol</b>	<b>CHEM 524</b>		
<b>Course Title</b>	<b>Advanced Organometallic Chemistry</b>		
<b>Credit Hours</b>	<b>2(2+0)</b>	<b>Level</b>	<b>First</b>
A study of the Chemistry and Physical properties of compounds of the transition metals, clusters and carbenes, insertion reaction, oxidative addition, reductive elimination, homogeneous catalysis, bonded organometallic compounds, spectral and magnetic properties of compounds.			

<b>Course Number and Symbol</b>	<b>CHEM 530</b>		
<b>Course Title</b>	<b>Advanced Chemical Kinetics</b>		
<b>Credit Hours</b>	<b>2(2+0)</b>	<b>Level</b>	<b>First</b>
Kinetics of chain reaction in gaseous phase (linear, branched and explosions reaction). Kinetics of reaction in solution (homogenous catalysis, enzyme reaction, and reaction mechanism in solution). Heterogeneous reaction (gas-solid desorption, kinetics of reaction, application of transition state theory of surface reaction, and heterogeneous catalysis).			

<b>Course Number and Symbol</b>	<b>CHEM 531</b>		
<b>Course Title</b>	<b>Advanced Chemical Thermodynamics</b>		
<b>Credit Hours</b>	<b>2(2+0)</b>	<b>Level</b>	<b>Second</b>
Revision to thermodynamics, macroscopic and microscopic state, and application of statistical mechanics to thermodynamics functions, and some statistical calculations.			

<b>Course Number and Symbol</b>	<b>CHEM 532</b>		
<b>Course Title</b>	<b>Advanced Physical Chemistry</b>		
<b>Credit Hours</b>	<b>2(2+0)</b>	<b>Level</b>	<b>Third</b>
Comprehensive study of some selected topics in physical chemistry such as <ul style="list-style-type: none"> <li>• Physical Chemistry of Polymers</li> <li>• Surface Chemistry</li> <li>• Nuclear and Radiations chemistry</li> <li>• Photo-chemistry and Laser</li> <li>• Corrosion science</li> <li>• Catalysis.</li> </ul>			

<b>Course Number and Symbol</b>	<b>CHEM 540</b>		
<b>Course Title</b>	<b>Stereochemistry</b>		
<b>Credit Hours</b>	<b>2(2+0)</b>	<b>Level</b>	<b>First</b>
Static stereochemistry, Isomerism, symmetry, models, optical activity and optical stereoisomerism, chirality and the sequence rules, cyclic alkanes and stereochemistry. Dynamics stereochemistry: addition reaction, elimination reaction, substitution reactions, rearrangements, cyclic reaction. Identification of organic compounds including some illustrative examples of the use of these techniques in multi-step synthesis.			

<b>Course Number and Symbol</b>	<b>CHEM 541</b>		
<b>Course Title</b>	<b>Organic Spectroscopy</b>		
<b>Credit Hours</b>	<b>2(2+0)</b>	<b>Level</b>	<b>Second</b>
Applications of Spectroscopy: IR, NMR, MS, UV in the identification of organic compounds. Various examples of organic multi - steps preparations and the use of spectroscopy for the identification of its products.			

<b>Course Number and Symbol</b>	<b>CHEM 542</b>		
<b>Course Title</b>	<b>Special Topic in Organic Chemistry</b>		
<b>Credit Hours</b>	<b>2(2+0)</b>	<b>Level</b>	<b>Third</b>
Comprehensive study of some selected topics in organic chemistry such as <ul style="list-style-type: none"> <li>• Nano-composites.</li> <li>• Bio-polymers.</li> <li>• Polymers and petrochemicals.</li> <li>• Total synthesis of bioactive compounds.</li> <li>• Chemistry of surfactant.</li> </ul>			

<b>Course Number and Symbol</b>	<b>CHEM 550</b>		
<b>Course Title</b>	<b>Spectrometric Methods of Analysis &amp; Automation</b>		
<b>Credit Hours</b>	<b>2(2+0)</b>	<b>Level</b>	<b>First</b>
Atomic spectroscopy (atomic emission, atomic absorption, atomic fluorescence) and molecular spectroscopy (molecular emission and absorption in the UV-VIS region).			

<b>Course Number and Symbol</b>	<b>CHEM 551</b>		
<b>Course Title</b>	<b>Separation Methods</b>		
<b>Credit Hours</b>	<b>2(2+0)</b>	<b>Level</b>	<b>Second</b>
Chromatographic Methods, Theory, instrumentation and application.			

<b>Course Number and Symbol</b>	<b>CHEM 552</b>		
<b>Course Title</b>	<b>Electrochemical Methods of Analysis</b>		
<b>Credit Hours</b>	<b>2(2+0)</b>	<b>Level</b>	<b>Third</b>
Voltammetry, amperometric titration, coulometry, electrogravimetry, potentiometry, conductimetric titration and statistical analysis.			

<b>Course Number and Symbol</b>	<b>CHEM 600</b>		
<b>Course Title</b>	<b>Supervision</b>		
<b>Credit Hours</b>	<b>6</b>	<b>Level</b>	<b>Fourth</b>
Student perform research in one of the chemistry areas under the supervision of one of the department's staff according to the higher education and KSU regulations. The supervisor will be assigned by the department council based on the subject of the thesis project. The student has to defend his thesis at the end of the research project.			