## Courses Offered by the Department of Chemistry for the B.Sc. Degree

<table>
<thead>
<tr>
<th>Course No. &amp; Code</th>
<th>Course Title</th>
<th>Syllabus</th>
<th>Pre-requisite</th>
<th>Hours / Week</th>
</tr>
</thead>
</table>
(Practical: Selected practical experiments)                                                                 |               | 2 3 3        |
| C105             | General Chemistry (2)                            | (A): Chemical Equilibrium – Ionic Equilibrium – Basic of Qualitative Analysis – Solution Chemistry.  
(Practical: Selected practical experiments)                                                                 | C100          | 2 3 3        |
| C210             | Organic Chemistry (1)                            | Organic Reactions Mechanisms – Chemistry of Carbonyl Compounds  
(Practical: Selected practical experiments)                                                                                                                   | C105          | 3 3 4        |
| C211             | Organic Chemistry for Non-Chemistry Students     | Chemistry of Aliphatic Compounds – Chemistry of Selected Aromatic Compounds  
(Practical: Selected practical experiments)                                                                                                                  | C105          | 2 3 3        |
| C212             | Organic Chemistry (2)                            | Aromatic Compounds – Heterocyclic Compounds  
(Practical: Selected practical experiments)                                                                                                                   | C210          | 3 3 4        |
| C220             | Inorganic Chemistry (1)                          | Chemistry of the main groups (S, P- block elements): General properties of the main group elements of the first group to the seven group elements- use of main group elements in industry. (in a glasses, conductors, and semiconductors – fertilizers                                                                 | C100          | 2 - 2        |
| C230             | Physical Chemistry (1)                           | Chemical thermodynamics: Thermodynamics concepts- First law of thermodynamics-second law- Entropy changes of enthalpy and entropy with temperature-Gibb's free energy function and chemical potentials.  
Chemical kinetics: Concept and terminologies of chemical kinetics- Reaction rate laws- Effect of temperature on reaction rates- Theory of reaction rates                                                                 | C100          | 3 - 3        |
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<tbody>
<tr>
<td>C 232</td>
<td>Physical Chemistry (2)</td>
<td>Phase rule: Concept and terminologies of phase rule, phase rule equation, One , Two, Three component systems and their applications. Colloids: Preparation, properties- The stability of hydrophilic and hydrophobic sols, gels- Emulsions and Foams. Electrochemistry(I): Ionic conductivity and applications- Electrochemical cells and electrode potentials- The Nernst equation- Primary and secondary cells- Fuel cells.</td>
<td>C230</td>
<td>3 - 3</td>
</tr>
<tr>
<td>C 234</td>
<td>Computational Chemistry</td>
<td>Schrödinger equation- approximated methods- different computational methods.</td>
<td>C332</td>
<td>3 - 3</td>
</tr>
<tr>
<td>C 240</td>
<td>Introductory Quantitative Analysis</td>
<td>Statistical treatment of Analytical Data, Activity and Systematic Treatment of Equilibrium, Acid-Base equilibrium, Types of titration in volumetric analysis, Gravimetric analysis, Fundamentals of potentiometry &amp; Principles of UV, Vis-Spectrophotometry (Practical: Selected practical experiments )</td>
<td>C105</td>
<td>2 3 3</td>
</tr>
<tr>
<td>C 250</td>
<td>Physical and Inorganic Chemistry</td>
<td>General Properties of the Main Group Elements (S, P- block elements) (The First Group to Seventh Group) – First and Second Law of Thermodynamics (Entropy and Enthalpy and Their Change With Temperature – Chemical Potential). (Practical: Selected practical experiments )</td>
<td>C100</td>
<td>2 3 3</td>
</tr>
<tr>
<td>C 311</td>
<td>Stereochemistry and spectroscopy</td>
<td>Spectroscopy (I) (UV, IR) – Spectroscopy (II) (MS, NMR) – Stereochemistry – (Practical: Spectroscopy and Stereochemistry)</td>
<td>C212</td>
<td>3 3 4</td>
</tr>
<tr>
<td>C 312</td>
<td>Biochemistry and Natural products</td>
<td>Biochemistry (I): Chemistry of carbohydrates – Amino acids &amp; Proteins Natural Products (I):– Lipids Terpenes - Steroids. (Practical: Biochemistry)</td>
<td>C311</td>
<td>3 3 4</td>
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<tr>
<td>C 313</td>
<td>Photochemistry and Reactive Intermediates</td>
<td>Photochemistry – Reactive Intermediates</td>
<td>C212</td>
<td>3 - 3</td>
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<tr>
<td>C 320</td>
<td>Inorganic chemistry lab(1)</td>
<td>Preparation of simple and double salts – preparation of metal complexes – characterization by spectrophotometric and conductometric methods.</td>
<td>C321</td>
<td>- 3 1</td>
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<tr>
<td>C 331</td>
<td>Physical Chemistry Lab. (1)</td>
<td>Experiments based on: Chemical kinetics, Phase rule, and electrochemistry.</td>
<td>C230 *</td>
<td>- 3 1</td>
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<tr>
<td>C 332</td>
<td>Physical Chemistry (3)</td>
<td>Quantum chemistry: Pre-Schrödinger equation- Schrödinger equation and its application to translational, vibrational, and rotational motion of a particle. Theory of gases: The kinetic molecular gas model- numerical values of molecular velocities and their distribution in three dimensions – Average quantities from the distribution law – equipartition principle - the molecular gas collisions and the mean free path, Tronsport properties. Molecular spectroscopy: Types and patterns of free energies of gas molecules- experimental and theoretical treatment for studies on rotational vibrational, Raman and electronic spectra-spectral analysis using NMR and ESR.</td>
<td>C232</td>
<td>3 - 3</td>
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<tr>
<td>C 333</td>
<td>Nuclear and Radiation Chemistry</td>
<td>Radioactivity- nature of radioactive rays and its types – the kinetics of radioactive decay and growth- structure of nuclei- the nuclear potential- nuclear reactions and nuclear reactors- nuclear fission.</td>
<td>C232</td>
<td>3 - 3</td>
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<tr>
<td>C 334</td>
<td>Corrosion Chemistry</td>
<td>Principles of corrosion- electrochemical reactions (polarization and passivity)- Forms of corrosion- Anodic and cathodic protection.</td>
<td>C332</td>
<td>3 - 3</td>
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<tr>
<td>C343</td>
<td>Environmental chemistry analyses</td>
<td>Environmental Sampling – Analysis Using Modern Instrumental Techniques – Chemistry of Natural Water – Water Pollution – Waste Water Treatment – Environmental Toxicology – Analysis of Selected Contaminants (Heavy Metals and Organometalic compounds).</td>
<td>C105</td>
<td>3 - 3</td>
</tr>
<tr>
<td>C400</td>
<td>Research Project \ Article</td>
<td>An essay or research article in one of the different fields of chemistry</td>
<td>Accomplishing of 100 C.H</td>
<td>2 - 2</td>
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<tr>
<td>C 411</td>
<td>Petroleum Chemistry and Chromatography</td>
<td>Chromatography – Petroleum Chemistry and Petrochemicals (Practical: Chromatography &amp; Petroleum)</td>
<td>C212</td>
<td>L 3, P/T 3, C 4</td>
</tr>
<tr>
<td>C 414</td>
<td>Selected Topics in Organic Chemistry</td>
<td>Topics Suggested by the Department.</td>
<td>Department consent</td>
<td>L 3, P/T 3, C 3</td>
</tr>
<tr>
<td>C 423</td>
<td>Special topics in inorganic chemistry</td>
<td>The title and topics are to be determined by the chemistry Department</td>
<td>Department consent</td>
<td>L 3, P/T - , C 3</td>
</tr>
<tr>
<td>C 431</td>
<td>Physical chemistry Lab(2)</td>
<td>Experiments based on: surface chemistry, catalysis and electrochemistry (II)</td>
<td>C232,C331</td>
<td>L - , P/T 3, C 1</td>
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<tr>
<td>C 434</td>
<td>Applied Catalysis</td>
<td>preparation and characterization- Homogeneous and heterogeneous catalysis- Role of catalytic reactions in the chemical industry- Synthesis of methyl alcohol- Synthesis of different chemicals from ethyl alcohol- Esterfication reaction (Practical: Selected practical experiments)</td>
<td>C332</td>
<td>2 3 3</td>
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<tr>
<td>C 437</td>
<td>Selected topics in physical chemistry</td>
<td>Topics to be suggested by chemistry Department</td>
<td>Department consent</td>
<td>3 - 3</td>
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<tr>
<td>C444</td>
<td>Selected topic in analytical chemistry</td>
<td>Topics to be suggested by chemistry Department</td>
<td>Department consent</td>
<td>3 - 3</td>
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<tr>
<td>C 460</td>
<td>Analytical Chemistry For Biology Students</td>
<td>Acid –Base Titration, Precipitation Titrations, Complexometric Titrations, Redox Titration, Gravimetric Analysis, Potentiometric Titrations, Ultraviolet/Visible Spectrophotometry, Atomic Spectrometry, Conductometry and Modern Voltammetric techniques, Analytical Separations, HPLC, Electrophoresis (Practical: Selected practical experiments)</td>
<td>C105</td>
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<td>C 465</td>
<td>Analytical Chemistry For Geology Students</td>
<td>Acid –Base Titration, Precipitation Titrations, Complexometric Titrations, Redox Titration, Gravimetric Analysis, Potentiometric Titrations, Ultraviolet/Visible Spectrophotometry, Atomic Spectrometry, Conductometry and Modern Voltammetric techniques, Analytical Separations, Chemical Sensors, XRF, XRD, GC/MS, ICP (Practical: Selected practical experiments )</td>
<td>C 105</td>
<td>2 3 3</td>
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* May be in parallel