

## B.Sc. Chemistry Honours

### 6 Semester Course

#### List of Courses

Sl No	Name of the Course	Semester	Course Code	Credit	Marks in the Course	Name of the Programme	Programme Code	Course outcome		Introduction year of new course	BoS Date	Percentage of Revision	BoS Date
1	Organic chemistry-I, Physical Chemistry-I, Inorganic Chemistry-I (theory)	1	CEMA-P1-T	10	75	B.Sc. Chemistry Hons	CEMA	<p>gas behaviour including the distribution of velocities</p> <ul style="list-style-type: none"> <li>• Ideal gas model, real gas model – success and limitations</li> <li>• Foundation of thermodynamics and different processes and transformation of energies</li> </ul> <p>deal gas model, real gas model – success and limitations</p> <ul style="list-style-type: none"> <li>• Concept of shape of different orbital and term symbols;</li> <li>• Concept of shape of different orbital and term symbols</li> <li>• Estimate standard reaction enthalpy by various means</li> <li>• Concept of IP, EA and various scale of electro negativity</li> <li>• Concept of various type of crystal defect in ionic solids</li> <li>• Concept of physical properties (dipole moment, mp/bp, acidity and basicity)</li> <li>• Concept of molecular orbital                             <ul style="list-style-type: none"> <li>• Concept of chirality and stereochemistry</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Students learn here the principle of basic chemistry. This knowledge is directly useful in determining energy content of various useful substances like fuel or food, therefore might be helpful to the students in procuring jobs in industries related to food, fuel etc. Take home assignments are given.</li> </ul>				
2	Organic chemistry-I(Practical)	1	CEMA-P1-P	4	25	B.Sc. Chemistry Hons	CEMA	<ul style="list-style-type: none"> <li>• Qualitative analysis of organic compounds</li> </ul>	<ul style="list-style-type: none"> <li>• Students learn to detect functional groups in organic sample through mock test and internal assessments.</li> </ul>	2016-17	02.07.2016		

3	Organic chemistry-II, Physical Chemistry-II, Inorganic Chemistry-II (theory)	2	CEMA-P2-T	10	75	B.Sc. Chemistry Hons	CEMA	<ul style="list-style-type: none"> <li>• Origin of spontaneity of chemical and physical processes and concept of entropy</li> <li>• Two other thermodynamic properties – A and G, to express spontaneity and equilibrium</li> <li>• Reaction rate laws and its dependence on factors like concentration, temperature etc <ul style="list-style-type: none"> <li>• Concepts of reaction mechanism and theories for reaction rate - Collision theory and TST</li> <li>• Reaction pathway and progression (theoretical and practical aspect)</li> <li>• Type of reactions and mechanism</li> </ul> </li> <li>• Concept of hybridization and shape of molecules/ions</li> <li>• Concept of nuclear model</li> <li>• Concept of lattice energy and its application</li> </ul>	<ul style="list-style-type: none"> <li>• Students learn the fundamentals of reaction kinetics and catalysis. Such knowledge may enable a student to be employed in a production sector that requires catalytic conversion like biotech or pharmaceuticals companies.</li> </ul>			20	25.07.2015
4	Inorganic Chemistry -I (Practical)	2	CEMA-P2-P	4	25	B.Sc. Chemistry Hons	CEMA	Qualitative analysis of inorganic sin	<ul style="list-style-type: none"> <li>• Students learn to detect ions in a mixture; this skill helps them to be employed in chemical industries or in detection of heavy metals in soil/water etc. They are skilled to handle hazardous chemical.</li> </ul>				

5	Organic chemistry-III, Physical Chemistry-III, Inorganic Chemistry-III (theory)	3	CEMA-P3-T	10	75	B.Sc. Chemistry Hons	CEMA	<ul style="list-style-type: none"> <li>• Thermodynamic conditions for chemical equilibrium</li> <li>• Applications of La Chatelier's Principle, vant' Hoff Isotherm <ul style="list-style-type: none"> <li>• Requirement of quantum mechanics with the limitations of classical physics</li> </ul> </li> <li>• Operator algebra, Schrodinger equation for simple model system and quantization <ul style="list-style-type: none"> <li>• Reactivity of carbonyl compounds</li> </ul> </li> <li>• Study of aromatic compounds <ul style="list-style-type: none"> <li>• Diels-Alder reaction to get cyclic molecules</li> </ul> </li> <li>• Concept of various acid-base theory and acid-base titration curves</li> <li>• Redox and formal potential, feasibility of reaction and Redox potential diagram</li> <li>• Concept of Molecular orbital and bonding</li> </ul>	<ul style="list-style-type: none"> <li>• The students learn the procedure and mechanism of aromatic substitution and how this can be applied towards synthesis of compounds such as paracetamol or aspirin. This would make the students employable in medicinal enterprises.</li> </ul>				
6	Inorganic Chemistry-II (Practical)	3	CEMA-P3-P	4	25	B.Sc. Chemistry Hon	CEMA	cept of analysis of inorganic salt m	<ul style="list-style-type: none"> <li>• Students learn to detect ions in a mixture; this skill helps them to be employed in chemical industries or in detection of heavy metals in soil/water etc.</li> </ul>	2016-17	02.07.2016		

7	Organic chemistry-IV, Physical Chemistry-IV, Inorganic Chemistry-IV (theory)	4	CEMA-P4-T	10	75	B.Sc. Chemistry Hons	CEMA	<ul style="list-style-type: none"> <li>• Concept of activity and the effect of ion-ion interactions towards the electrolytic solutions</li> <li>• Nature of migration of ions in electrolytic solution in the presence of an electric field <ul style="list-style-type: none"> <li>• Electrochemical cell, thermodynamic properties of cell reaction, Nernst equation</li> </ul> </li> <li>• Application of concept of EMF to the analysis of potentiometric titration</li> <li>• Quantum mechanical solution of some basic mode of motions - vibration and rotation</li> <li>• Concept of generation of s, p d orbitals from quantum mechanical solutions <ul style="list-style-type: none"> <li>• Use of organometallic compounds in organic synthesis</li> <li>• Study of aromatic and nitrogen containing compounds</li> </ul> </li> <li>• Designing organic synthesis through disconnection approach</li> <li>• Concept of oxidation state, hydride, halide - their group trends</li> </ul>	<ul style="list-style-type: none"> <li>• The course includes properties and synthesis of aromatic nitro compounds which enables student to work in chemical industries, concept of retrosynthesis which is essential for designing synthesis of organic molecules. The course includes a unit on electrochemistry, the knowledge is necessary for working on fuel cells or in designing corrosion controls.</li> </ul>				
8	Physical Chemistry-I (Practical)	4	CEMA-P4-P	4	25	B.Sc. Chemistry Hons	CEMA	<ul style="list-style-type: none"> <li>• Experimental elucidation of conductometric titration to evaluate important physical parameter</li> <li>• Experimental understanding of kinetic behavior of chemical reaction.</li> </ul>	<ul style="list-style-type: none"> <li>• Students learn to measure pH, such knowledge is essential in analysing pathological samples like blood, urine or for testing quality of water, soil, food, medicine etc.</li> </ul>				

9	Physical Chemistry-V (theory)	5	CEMA-P5-T	6	50	B.Sc. Chemistry Hons	CEMA	<ul style="list-style-type: none"> <li>• Understanding of crystal lattice and the basic principle of X-ray diffraction</li> <li>• Electrical properties like dipole moment and polarizability of the molecules <ul style="list-style-type: none"> <li>• Explanation of surface and interfacial phenomenon and general idea about colloidal particles and self-associating systems <ul style="list-style-type: none"> <li>• The effect of solute on thermodynamic properties of a solution</li> </ul> </li> <li>• Understanding of phase diagram of matter and the role of thermodynamic parameters on the equilibrium between phases</li> </ul> </li> <li>• Description of the relationship between microscopic and bulk properties of matter</li> <li>• Concept of partition function and its relationship to different thermodynamic properties <ul style="list-style-type: none"> <li>• Concept of statistical thermodynamics in calculating chemically significant quantities</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• The unit on surface science provides a basis to work in chemical plants designing storage devices, heterogeneous catalysis.</li> </ul>				
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10	Organic chemistry-V, (theory)	5	CEMA-P6-T	5	50	B.Sc. Chemistry Hons	CEMA	<ul style="list-style-type: none"> <li>Methodologies for synthesis of chiral and heterocyclic molecules</li> <li>Synthesis and use of common drugs</li> <li>Synthesis of amino acids and peptides, including Merrifield synthesis</li> <li>Structure elucidation by modern spectroscopy</li> </ul>	<ul style="list-style-type: none"> <li>The students gets acquainted with spectroscopic methods of identifying functional groups/organic compounds, these are the modern tools employed in forensic studies. The unit on heterocyclic chemistry includes synthesis, uses and action of common drugs like Nifedipine, amlodipine, ranitidine, chloroquine. These would help the students working in the medicinal industries.</li> </ul>				
11	Inorganic Chemistry-V (theory)	5	CEMA-P7-T	5	50	B.Sc. Chemistry Hons	CEMA	<ul style="list-style-type: none"> <li>Concept of crystal field stabilization energy and Orgel diagram</li> <li>Concept of Homogeneous and heterogeneous catalysis by organometallic compounds</li> <li>Concept of EAN and 18-electron rule</li> <li>Chemistry of some typical Bio-molecules related to life processes</li> </ul>	<ul style="list-style-type: none"> <li>The students get idea about the importance of ligands to control magnetic and optical properties. Seminars are regularly arranged on the specialized field.</li> </ul>				

12	Physical chemistry-II, Organic Chemistry -II (Practical)	5	CEMA-P8-P	10	65	B.Sc. Chemistry Hons	CEMA	<ul style="list-style-type: none"> <li>• Determination of important physical parameter using potentiometer</li> <li>• Experimental elucidation of properties of liquids such as viscosity and surface tension <ul style="list-style-type: none"> <li>• Laboratory synthesis of organic molecules</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Students learn to measure surface tension, viscosity of liquids which is required in industries preparing food, adhesives, cosmetics, oil and pharmaceuticals petrochemical industries. The department arranged regularly industrial visit for students for better industrial exposure.</li> </ul>				
13	Organic chemistry-VI, Physical Chemistry-VI, (Theory)	6	CEMA-P9-T	8	50	B.Sc. Chemistry Hons	CEMA	<ul style="list-style-type: none"> <li>• Concepts of photochemical and photophysical processes with theoretical models and correlation with experimental methods to investigate photochemical reactions</li> <li>• Understanding molecular spectra - including rotational, vibrational and electronic spectra and recognizing relationship between molecular properties and molecular spectra <ul style="list-style-type: none"> <li>• Study of Bio-molecules</li> <li>• Advance level separation technique</li> <li>• Study of natural products <ul style="list-style-type: none"> <li>• Pericyclic reactions</li> </ul> </li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• The students get acquainted with advance level separation technique which will be helpful for research carrier.</li> </ul>				

14	Analytical Chemistry-I, Inorganic Chemistry-VI (theory)	6	CEMA-P10-T	8	50	B.Sc. Chemistry Hons	CEMA	<ul style="list-style-type: none"> <li>• Concept of complexometric, permanganometric, argentometric titrations</li> <li>• Concept of co-precipitation and post precipitation</li> <li>• Concept of Errors in chemical analysis</li> <li>• Analysis of water, soil and air sample</li> <li>• Concept of magnetic and spectral properties of Lanthanides and Actinides elements</li> <li>• Basic idea of nano technology</li> </ul>	<ul style="list-style-type: none"> <li>• Analytical chemistry part contains principle of basic analytic tools like gravimetric analysis, estimation of ore , cement, alloys, EDTA titration, complexometric, redox, argentometric titrations, analysis of water and air samples , chromatographic techniques and error analysis. Any chemical industry or metallurgical enterprise would require such knowledge.</li> </ul>				
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15	Analytical Chemistry-I, Organic Chemistry-III, Physical Chemistry-III, Inorganic Chemistry-III (Practical)	6	CEMA-P11-P	10	85	B.Sc. Chemistry Hons	CEMA	<ul style="list-style-type: none"> <li>• Estimation of complex bio molecules such as amino acids and vitamin</li> <li>• Experimental analysis of ore and alloy</li> <li>• Experimental analysis of synthesized organic molecules by modern spectroscopy</li> <li>• Separation of organic molecules from a mixture employing column and thin layer chromatography</li> <li>• Application of Spectrophotometry to study reaction kinetics</li> <li>• Experimental elucidation of thermodynamics of liquid mixtures</li> <li>• Estimation of individual metal ions and metal ions in mixture spectrophotometrically and titrimetrically</li> </ul>	<ul style="list-style-type: none"> <li>• Students get hand on experience on estimation of ore, cement, alloys, water samples and chromatographic techniques.</li> </ul>			20	25.07.2015
16	General Chemistry , Physical Chemistry	1	CEMG-P1-T	2	50	B.Sc. Chemistry Hons	CEMA	Concept on quantum numbers, Concept of Stability of nucleus and nuclear energy, Concept of electro negativity, electron affinity and ionisation energy, Speed of a chemical reaction may be defined, measured and	<ul style="list-style-type: none"> <li>• Students learn here the principle of basic chemistry. Lab quiz and viva are regularly taken to keep students updated.</li> </ul>				
17	Organic Qualitative Analysis	1	CEMG-P1-P	1	25	B.Sc. Chemistry Hons	CEMA						
18	Inorganic Chemistry, Organic Chemistry	2	CEMG-P2-T	2	50	B.Sc. Chemistry Hons	CEMA	Concept of hybridization and shape of molecules/ions, Concept of Molecular orbital and bonding, Concept of lattice				20	25.07.2015

19	Quantitative Analysis of inorganic sample(s) Qualitative Analysis of Single Inorganic Compound	2	CEMG-P2-P	1	25	B.Sc. Chemistry Hons	CEMA	energy and its application, Concept of various acid-base theory, Concept of redox and formal potential, feasibility of reaction, Study of reaction intermediates and reaction mechanism, Stereochemistry of organic compounds, Chemistry of carbonyl compounds,	Lab quiz and surprise tests are taken to examine the skill and knowledge students acquired.				
20	Inorganic Chemistry	3	CEMG-P3-T	1	25	B.Sc. Chemistry Hons	CEMA	Concept of oxidation state , hydride, halid of different main group elements, Concept of oxo and peroxy compound, Concept of polymeric compounds, Know the various type of reaction of different elements, Separation and identification of various	<ul style="list-style-type: none"> <li>• Students learn here the stability of complex and their availability in nature. Career consultation via arranging seminars.</li> </ul>				
21	Systematic Qualitative analysis of unknown mixture of solid inorganic salts	3	CEMG-P3-P	2	50	B.Sc. Chemistry Hons	CEMA						
22	General Chemistry, Organic Chemistry, Physical Chemistry	4	CEMG-P4-T	3	75	B.Sc. Chemistry Hons	CEMA	Comparative study on group-IB and group II-B elements, Reaction study of different functional groups and organometallic compounds, Study of aromatic compounds and nitrogen containing molecules, Chemistry of biomolecules, The second law of thermodynamics, entropy and free, Chemical equilibrium, solubility and solubility product, Colligative properties of a solution, azeotropic and eutectic behaviour, Colloids and their characteristic	Take home assignments are given.				









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