		<b>SYLLABUS</b>
<b>Course Title</b>		<b>CHEMISTRY-I</b>
<b>Course Code</b>		BSC121
<b>Course Credit</b>	Lecture	: 04
	Practical	:03
	Tutorial	: 00
	Total	: 07
<b>Detailed Syllabus:</b>		
<b>Sr. No</b>	<b>Name of chapter &amp; Details</b>	<b>Session Allotted</b>
<b>SECTION-I</b>		
<b>1</b>	<b>PERIODIC PROPERTIES</b> Explanation and general trends of the periodic properties like Atomic and ionic radii, Ionization Potential, Electronegativity, Electron affinity. Pauli's method for the determination of ionic radius of isoelectric ions and problems based on it.	<b>05</b>
<b>2</b>	<b>CO-ORDINATION COMPOUNDS</b> Introduction, Formation of co-ordination compounds, Classification of Ligands, Co-ordination number and Werner's Theory, IUPAC Nomenclature of co-ordination compounds, Effective Atomic Numbers(EAN), Valance Bond Theory for complexes, Examples to explain VB Theory: 1. $[\text{NiCl}_4]^{2-}$ , 2. $[\text{Ni}(\text{CN})_4]^{2-}$ , 3. $[\text{Fe}(\text{CN})_6]^{3-}$ , 4. $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ , 5. $[\text{Co}(\text{NH}_3)_6]^{2+}$ , 6. $[\text{CoF}_6]^{3-}$ , Importance and applications of co-ordination compounds	<b>05</b>
<b>3</b>	<b>ELEMENTS OF THE FIRST TRANSITION SERIES</b> Introduction and definition, Electronic configuration, Reversal of energies of 3d and 4s orbitals, Physical properties: Metallic, Crystal structure, Conductivity, Density, Catalytic properties, Tendency of formation of alloys. Atomic properties: Atomic and ionic radii, Ionisation potential, Oxidation states and their stability. Magnetic properties: Spectral properties, Nonstoichiometric, interstitial compounds.	<b>05</b>
<b>4</b>	<b>BASIC OF ORGANIC CHEMISTRY</b> IUPAC nomenclature, Rules of IUPAC nomenclature, Priority order, Introduction of Hydrocarbon, Saturated and unsaturated hydrocarbons. Cycloalkanes, IUPAC Nomenclature of Cycloalkanes: monocyclic, bicyclic and tricyclic systems, Method of preparation of small ring cycloalkanes: Fund's method, Perkin Method, Sabatier and Sanderson's Method, Dieckmann method. Physical properties of cycloalkanes, Chemical properties of cycloalkanes,	<b>07</b>

	Substitution reactions, Addition reactions, Bayer's strain theory, Sachse-Mohr concept of stainless rings.	
5	<p><b>TYPES OF ORGANIC REACTION</b></p> <p>Homolytic and heterolytic fission, Nucleophiles and electrophiles, curly arrow rules, Reaction intermediates: carbocation, carbanion, free radical, Inductive effect (+I and -I), Types of organic reaction: Addition reaction, Elimination reaction, Substitution reaction, Rearrangement.</p> <p><math>S_N1</math> reaction mechanism, <math>S_N2</math> reaction mechanism, <math>E_1</math> reaction mechanism, <math>E_2</math> reaction mechanism.</p>	06
<b>SECTION-II</b>		
6	<p><b>THERMODYNAMIC</b></p> <p>Definition of thermodynamic term: system, surroundings. Types of systems, Intensive and extensive properties, State and path function and their differential, Thermodynamic processes, Concept of heat and work, First law of thermodynamics : Statement &amp; Mathematical form, Definition of internal energy and enthalpy, Bond dissociation energy and its calculation from thermochemical data, Heat capacity : Heat capacities at constant volume and pressure and their relationship <math>C_p - C_v = R</math>, Joule's law-joule Thomson coefficient and inversion temperature (only definition), Zeroth Law : mathematical treatment of zeroth law and its limitation and various statements of law.</p>	09
7	<p><b>ADSORPTION</b></p> <p>Introduction, Types of adsorption, Freundlich adsorption isotherms and its limitations, Langmuir adsorption isotherms at high &amp; low pressure and its limitations, Uses of adsorption.</p>	06
8	<p><b>MODES OF CONCENTRATION [CONCENTRATION CONCEPT WITH NUMERICALS]</b></p> <p>Preparation of standard solutions, Equivalent weight of acid and base, Equivalent weight of acid salt, Equivalent weight of an ion, Molarity with numerical, Normality with numerical, Molality with numerical, Formality with numerical, Strength of solutions, % concentration w/v, Volume fraction, Weight fraction.</p>	07
9	<p><b>ACIDS AND BASES</b></p> <p>Derivation of hydrolysis constant (<math>k_h</math>), Degree of hydrolysis (<math>h</math>), pH of salt of: Strong acid-weak base, Strong base-weak acid, Weak acid-weak base. Buffers solution- Buffer capacity, Mechanism of acidic and basic buffer solution, Derivation of equation for pH of acidic and basic buffer solution, Numericals- calculation of pH of buffer solutions.</p>	06
<b>LIST OF PRACTICALS: (6 HOURS PER WEEK)</b>		
<b>A. Organic qualitative analysis</b>		
<p>Aim: Determine the organic qualitative analysis Compounds containing one functional group such as phenolic, carboxylic acid, ester, amide, nitro, amine, aldehyde, ketone, alcohol, halogen, anilide, carbohydrate, and hydrocarbon.</p>		

## B. Volumetric analysis

- [1] To prepare a solution of acids and bases with define concentration.
- [2] To prepare a solution by dissolving 'x' gms  $\text{Na}_2\text{CO}_3$  in 100 ml solution and determine its concentration in terms of normality and molarity using given 0.1 N HCl solution.
- [3] To determine the normality, molarity and g/litre of xN NaOH and xN HCl using 0.05M  $\text{Na}_2\text{CO}_3$  solution.
- [4] To determine the molarity, g/litre and normality of each component in a given mixture of xN NaOH and xN  $\text{Na}_2\text{CO}_3$  the using 0.1 M HCl solution.
- [5] To determine the molarity, g/litre and normality of each component in a mixture of xN  $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$  and xN  $\text{H}_2\text{SO}_4$  using 0.1 N  $\text{KMnO}_4$  and 0.1 N NaOH solution.
- [6] To determine the molarity, g/litre and normality of each component in a mixture of xN  $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$  and xN  $\text{K}_2\text{C}_2\text{O}_4 \cdot \text{H}_2\text{O}$  using 0.1 N NaOH and 0.1 N  $\text{KMnO}_4$  solution.

### Instructional Method and Pedagogy:

1. Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
2. Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
3. Surprise tests/Quizzes/Tutorials will be conducted. Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
4. Surprise tests/Quizzes/Tutorials will be conducted.

### Students Learning Outcomes:


At the end of the course the students will be able to:

- **Identify** and correlate the properties of various elements to their periodic properties.
- **Draw** the structures of various metal complexes based on VBT.
- **Identify** the different types of organic reactions
- **Develop** skill in practical hand.
- **Apply** the concept of concentration to prepare solutions of various concentrations.

### Reference Books:

1. Concise Inorganic Chemistry by J.D.Lee, wiley india, 5th edition 2013
2. Textbook of Inorganic Chemistry by Soni P.L., Sultan Chand & Sons. 20th edition 2013
3. Advanced Inorganic Chemistry (3rd Edition) - FA.Cotton and G. Wikinson, Wiley Eastern Pvt.Ltd 6th edition, 2009
4. Advanced Inorganic Chemistry (Volume II) by Prakash Satya, S.Chand & Company Ltd. New Delhi, 2006
5. Organic reaction mechanisms by V.K. Ahluwaliya, Narosa publishing house 4th edition. 2011
6. Advanced Organic Chemistry by Arun Bahl and B.S.Bahl, S.Chand & Company Ltd. New Delhi, 18th edition 2010.
7. Organic Chemistry by Morrison and Boyd, Pearson Education Delhi 7h edition 2011

8. Solomons & Fryhle's Organic Chemistry by Solomon Graham T.W. and Fryhle Craig B., Wiley India (P) Ltd. New Delhi. 10th edition.
9. A Textbook of Physical Chemistry by P.L.Soni, S.Chand & Company Ltd. New Delhi, 22nd edition 2005.
10. Essentials of Physical Chemistry by Bahl B. S. and Tuli G. D., S.Chand & Company Ltd. New Delhi.
11. Elements of Physical Chemistry by Atkins Peter and Paula Julio, Oxford University Press New Delhi, 6th edition.
12. Analytical Chemistry, Chatwal G. R. and Arora M. Himalaya Publishing House Pvt. Ltd. Mumbai 1st
13. Analytical Chemistry: Theory and Practice. By Verma R. M., CBS Publishers & Distributors New Delhi 3rd edition.
14. Vogel's Textbook of Quantitative Chemical Analysis by Mendham J. and Denney R. C. Pearson Education Ltd. New Delhi 6th edition.
15. Wastewater Treatment Concepts and Design Approach by Karia G.L. and Christian R.A. 2nd edition


		<b>SYLLABUS</b>
<b>Course Title</b>		<b>MICROBIOLOGY-I</b>
<b>Course Code</b>		BSM111
<b>Course Credit</b>	Lecture	: 4
	Practical	: 3
	Tutorial	: 0
	Total	: 7
<b>Detailed Syllabus:</b>		
<b>Sr. No</b>	<b>Name of chapter &amp; Details</b>	<b>Session Allotted</b>
<b>SECTION-I</b>		
<b>1</b>	<b>Overview of Microbiology</b> Introduction to groups of microorganisms – Algae, Bacteria, Fungi, Protozoa and viruses, Distribution of microbes in Nature – Occurrence and Habitat, Mile stones in Microbiology – Historical Development, Place of the Microorganisms in living world – Classification, Applications of Microorganisms in various fields – Scope of Microbiology	<b>10</b>
<b>2</b>	<b>Microscopy</b> Bright field Microscopy – Principle, Construction and working; Dark field Microscopy – Principle, Construction and working; Fluorescent Microscopy – Principle, Construction and working; Phase Contrast Microscopy – Principle, Construction and working; Electron Microscopy – Types, working and Limitations	<b>10</b>
<b>3</b>	<b>Staining</b> Types of Stains: Natural, Acidic and Basic Stains; Chemical structure of Stains, Physical and Chemical Theories of Staining, Staining of Bacteria – Simple and Differential Staining Procedures, General applications of stains other than bacteria	<b>8</b>
<b>SECTION-II</b>		
<b>4</b>	<b>Control of Microorganisms</b> Fundamentals of Microbial Control, Principle and Types, Definition of Sterilization, Disinfectant, Antiseptic, Sanitizer, Germicidal and Bactericides; Characteristics, Evaluation and Selection of Ideal antimicrobial agents; Physical agents of Microbial Control – (High and Low Temperatures, Desiccation, Osmotic pressure, Radiation, Ultraviolet lights, X- rays, Gamma rays, Surface and Interfacial tensions, Filtration), Chemical agents of Microbial Control (Phenolic compounds, Alcohol, Halogens, Heavy metals, Dyes, Detergents, Quaternary ammonium compounds, Aldehydes, Gaseous sterilization), Biological agents of Microbial control – Antibiotics - Types and Mode of Action	<b>15</b>

<b>5</b>	<b>Morphology of Bacteria</b> Size, Shape and Arrangement of bacteria, Structural and Chemical composition of bacterial cell wall, Bacterial Structures – Internal to Cell Wall, Bacterial Structures – External to Cell Wall, Bacterial Spores and Cyst – Sporogenesis	<b>13</b>
<b>LIST OF PRACTICALS: (6 HOURS PER WEEK)</b>		
<ol style="list-style-type: none"> <li>1) Principles, working and uses of the following laboratory instruments :           <ol style="list-style-type: none"> <li>a) Microscope</li> <li>b) Incubator</li> <li>c) pH meter</li> <li>d) Refrigerator</li> <li>e) Colorimeter</li> <li>f) Colony counter</li> </ol> </li> <li>2) Principles, working and uses of following sterilizers :           <ol style="list-style-type: none"> <li>a) Autoclave</li> <li>b) Hot air oven</li> <li>c) Steam sterilizer</li> <li>d) Bacteriological Filters</li> </ol> </li> <li>3) Preparation of glass-wares for sterilization and disposal of laboratory media and cultures</li> <li>4) Preparation of stains and reagents</li> <li>5) Study of permanent slides of bacteria and fungi</li> <li>6) Study of bacterial motility</li> <li>7) Monochrome staining           <ol style="list-style-type: none"> <li>a) Negative Staining</li> <li>b) Positive staining</li> </ol> </li> <li>8) Gram's staining</li> <li>9) Special staining of bacteria           <ol style="list-style-type: none"> <li>a) Capsule staining – Hiss's method</li> <li>b) Cell wall staining – Webb's method</li> <li>c) Spore staining – Schaeffer's method</li> <li>d) Metachromatic granule staining – Albert's method</li> </ol> </li> <li>10) Effect of Antibiotics on growth of microbes by agar cup and ditch method</li> </ol>		
<b>Instructional Method and Pedagogy:</b>		
<ul style="list-style-type: none"> <li>▪ Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.</li> <li>▪ Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.</li> <li>▪ Surprise tests/Quizzes/Tutorials will be conducted.</li> <li>▪ The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.</li> </ul> <p>Minimum ten experiments shall be there in the laboratory related to course contents.</p>		
<b>Students Learning Outcomes:</b>		
<p>On the completion of the course, students will be able to:</p> <ul style="list-style-type: none"> <li>▪ Understand the basics concepts and fundamentals of microbiology</li> <li>▪ Differentiate morphology of various microbes and their cellular structures</li> </ul>		

- Compare the strategies involved in Bacteriology, Mycology and Virology
  - Perform various staining techniques
- Learn how to control microbes by using physical and chemical agents

**Reference book:**

1. Pelzar, M.J., Chan E.C.S., Krieg, N.R., Microbiology. Tata McGraw Hill Publication Co. Ltd. New Delhi.
2. Powar and Dagainawala, General Microbiology. Himalaya Publishing House, Mumbai.
3. Tortora, Funke & Case. Microbiology- An introduction. Pearson Education. Delhi.
4. Stainer, R. Y., Ingraham, J. L. General Microbiology. MacMillan Press Ltd., London.  
Frobisher M., Hinsdill, Crabtree and Goodheart. Fundamentals of Microbiology. W.B. Saunders Co. USA.

		<b>SYLLABUS</b>
<b>Course Title</b>		<b>BOTANY-I</b>
<b>Course Code</b>		BSB131
<b>Course Credit</b>	Lecture	: 04
	Tutorial	: 00
	Practical	: 03
	Total	: 07
<b>Detailed Syllabus:</b>		
Sr. No	Name of chapter & Details	Session Allotted
<b>SECTION-I</b>		
<b>1</b>	<b>Algae :</b> Brief Account on Plant Kingdom. General Characteristics: Occurrence; Ultrastructure of algal cell; Thallus Organization (Unicellular forms and Multicellular forms), Modes of reproduction. General outline classification: By Smith; Type studies: Distribution, Life cycle and systematic position of Volvox (Chlorophyceae); Chara (Characeae). Economic Importance of Algae (as food, fodder and fertilizer, Algal blooms.	<b>10</b>
<b>2</b>	<b>Fungi :</b> General Characteristics: Occurrence; Ultra structure of Fungal Cell, Thallus Organization; Mode of nutrition; Modes of reproduction. General outline classification by whittaker. Type studies: Distribution, life cycle and systematic position of <i>Mucor</i> (Zygomycotina). Economic importance of Fungi (as food and as medicine), Mushroom cultivation. Mycorrhiza.	<b>10</b>
<b>3</b>	<b>Bryophyta :</b> General Characteristics: Occurrence; Mode of reproduction; Type studies: Distribution, life cycle and systematic position of Marchantia	<b>8</b>
<b>SECTION-II</b>		
<b>4</b>	<b>Pteridophyta :</b> General Characteristics: Occurrence; morphology and mode of reproduction. Type studies: Distribution, life cycle and systematic position of Selaginella.	<b>6</b>
<b>5</b>	<b>Gymnosperms :</b> General Characteristics: Occurrence, morphology and reproduction. Type studies: Distribution, life cycle and systematic position: Cycas.	<b>6</b>



<b>6</b>	<p><b>Morphology of Angiosperms :</b>  Leaf: Type of leaf, petiole, Shape of leaf, Venation, Apex, Surface, Modified leaves; Stipules and modifications; Phyllotaxy.  Flower: Parts, Bracteoles, Pedicel, Unisexual and bisexual flowers, Position, Calyx, Corolla, Perianth, Androecium, Gynoecium.  Flower type: Complete, incomplete, actinomorphic, zygomorphic, and irregular;  Inflorescence: Racemose, Cymose and Special.  Types of fruits.</p>	<b>16</b>
<b>LIST OF PRACTICALS: (6 HOURS PER WEEK)</b>		
<ol style="list-style-type: none"> <li>1. To Study characters, Structure and reproduction of Algae.</li> <li>2. To Study characters, Structure and reproduction of Fungi.</li> <li>3. To Study characters, Structure and reproduction of Bryophytes.</li> <li>4. To Study characters, Structure and reproduction of Pteridophytes.</li> <li>5. To Study characters, Structure and reproduction of Gymnosperm.</li> <li>6. To Study morphological characters of Leaf and.</li> <li>7. To Study morphological characters of Flower.</li> <li>8. To Study Types of Inflorescence.</li> <li>9. To Study morphological characters of Androecium &amp; Gynoecium.</li> <li>10. To Study of morphological characters of floral diversity within the University Campus.</li> </ol>		
<b>Instructional Method and Pedagogy:</b>		
<ol style="list-style-type: none"> <li>1. Lectures will be conducted with the aid of multi-media projector, black board, Audio/Video clips etc relevant to the content.</li> <li>2. Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.</li> <li>3. Surprise tests/Quizzes/Tutorials will be conducted.</li> <li>4. The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.</li> <li>5. Minimum ten experiments shall be there in the laboratory related to course contents.</li> </ol>		
<b>Students Learning Outcomes:</b>		
<p>At the end of the course the students will be able to:</p> <ol style="list-style-type: none"> <li>1. State the meaning of scientific terms.</li> <li>2. Differentiate between various groups of Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperm.</li> <li>3. Practically identify the various groups of plant kingdom</li> <li>4. Understand the morphology, structure and functions of various parts of plants.</li> <li>5. Learn the taxonomical terminology and understand the meaning of the same.</li> <li>6. Learn to observe the variation in flora within the campus.</li> <li>7. During lab hours, students will experience the benefits of team work which will foster their flexibility and responsiveness, especially the ability to respond to change.</li> </ol>		
<b>Reference Books:</b>		
<ol style="list-style-type: none"> <li>1. Das, Dutta and Ganguli College Botany.</li> <li>2. College Botany Volume I &amp; II By Anjaria</li> <li>3. Bryophytes by B.R. Vashistha</li> <li>4. Pteridophytes by B.R. Vashistha</li> <li>5. Gymnosperms by B.R. Vashistha</li> <li>6. Vasishtha B.R. And Sinha A. K. - Botany for degree students Part 1 ALGAE; S.</li> <li>7. Chand &amp; Company Ltd, 1st edition, revised 2005.</li> <li>8. Botany for degree students Part 2 FUNGI Vasishtha B.R. And Sinha A. K. -; S. Chand &amp; Company Ltd, 1st edition, revised 2005.</li> </ol>		

9. A Textbook of Botany, 4th Edition Singh V., Pande P.C., Jain D.K.; Rastogi publications, 2013.
10. Plant Taxonomy, Sharma, O.P.; 1st edition, reprint; New Delhi: Tata McGraw-Hill Publishing Co. Ltd., 1993(2002) .



# SYLLABUS

<b>Course Title</b>		<b>ENGLISH AS SECOND LANGUAGE - BEGINNER LEVEL-I</b>		
<b>Course Code</b>		ESL102		
<b>Course Credit</b>		Lecture	: 03	
		Tutorial	: 00	
		Practical	: 00	
		Total	: 03	
<b>Detailed Syllabus:</b>				
<b>Sr. No</b>	<b>Name of chapter &amp; Details</b>			
<b>Unit No.</b>	<b>Context</b>	<b>Topics</b>	<b>Learning objectives</b>	<b>Session Allotted</b>
<b>SECTION-I</b>				
<b>1</b>	Social	VOCAB HOUSIE	Students will be able to enhance their language by learning various vocabularies related to family & relations, seasons, food, restaurants and its type, shopping, festivals and occasions, common ailments and using them in day to day conversation.	<b>22</b>
<b>2</b>	Social/Professional	LISTEN & LEARN	Students will get exposure to listen to audios based on making inquiry, bookings & reservations, complaints, ordering food, conversation on leisure time activities and movie reviews. They will further be able to construct their own short conversations on all of the above.	
<b>3</b>	Social	GIVING DIRECTIONS	Students will be able to understand and express different ways of giving directions by appropriate usage of prepositions.	

4	Social/Professional/Academic	DESCRIBING PEOPLE, PLACE & INSTANCES	Students will get an opportunity to identify personality traits, adjectives related to describing people, places and instances. Further they will showcase their understanding in various contexts.	
<b>SECTION-II</b>				
5	Social/Professional/Academic	TELEPHONING	Students will learn and use phrases that are used in telephoning in different contexts like making inquiry, appointment, request, ordering food. They will be able to demonstrate their learning using appropriate model of conversation.	<b>23</b>
6	Social/Academic	IDIOMS & PHRASES	Students will be able to explain literal and figurative meaning of idioms and will use them in daily life conversation.	
7	Academic/Professional	READING	Students will get exposure of reading strategies like skimming & scanning and thus, will be able to comprehend the text, informative charts, graphs and tabular representations.	
8	Academic	WRITING EMAILS	Students will be able to compose emails regarding application, permission, complaint, apology & compliment using the phrases suitable in each context.	

**Students Learning Outcomes:**

At end of the course, students will:

- Understand variety of academic, social and professional conversations.
- Speak on a variety of topics in academic, social and professional contexts.
- Read and understand language in academic, social and professional contexts.
- Write and express ideas in routine academic, social and professional contexts.