		SYLLABUS	
Course Title		CHEMISTRY-III	
Course Code		BSC301	
Course Credit		Lecture	: 04
		Practical	:03
		Tutorial	: 00
		Total	: 07
Detailed Syllabus:			
Sr. No	Name of chapter & Details		Session Allotted
SECTION-I			
1	Wave Mechanics. Introduction of wave Mechanics, Postulates of wave Mechanics, Interpretation of ψ , ψ^2 , $\psi\psi^*$, Derivation of Schrodinger's equation in three dimensions (Cartesian Coordination), Eigen function & Eigen value, Orthogonal & Normalised wave function and problems on it.		28
2	Chemistry of Lanthanide Elements. Introduction, Occurrence & Important ores, Isolation of Lanthanide Elements from ore, Individual Isolation by (I) Ion Exchange Method (II) Solvent Extraction Method, Electronics Configuration with necessary Explanation, □ Oxidation State & their Stability, Magnetic properties, Colour (spectral) properties, Lanthanide Contraction, Misch Metal, Uses of Lanthanides & their Compounds.		
3	Carbonyl Compounds (Aldehydes and Ketones) Introduction and Nomenclature, Preparation of Carbonyl Compounds, Synthesis of Aldehydes, Synthesis of Ketones, Structure and Physical Properties, Reactivity and applications of carbonyl compounds, Understanding of reaction mechanism, Study of important name reactions involving carbonyl compounds, Active methylene compounds: Keto-enol tautomerism, Identification Tests for aldehydes and ketones		
4	Carboxylic Acid Compounds Introduction and Nomenclature, Nomenclature of mono and dicarboxylic acids, Preparation of monocarboxylic acid compounds, Physical Properties of mono carboxylic acid compounds, Acidity of Carboxylic acids, Effect of other functional groups on Acidity, activity and applications of carboxylic acids, Esterification of Carboxylic Acids, Mechanism of Esterification, Trans-Esterification, Introduction of Amino acids		

SECTION-II		
5	<p>Basic of some physical properties Introduction ,Surface tension and parachor (Drop method) & its method for determination ,Viscosity and its method for determination ,Refractive index and its method for determination ,Theory of Optical activity , Dipole moment and its method for determination ,Application and numerical, Examples</p>	
6	<p>Phase Rule and related theory of solutions Statement and meaning of the term – Phase, Components, Degree of freedom , Explanation of phase equilibrium of one component system – Water & Sulphur system ,Phase equilibria of two component system : Solid-liquid mixture – desilverization of lead (Pb-Ag) , Solid solution – compound formation with congruent melting point (Mg-Zn) , System of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$,Theory of liquid-liquid mixture ,Ideal liquid mixture ,Azeotropes , Lower and upper consolute temperature , Steam distillation,Short explanation of Raoult's law, Henry's law & Nernst's distribution law ,Examples</p>	28
7	<p>Fuels Introduction ,Calorific value ,Determination of calorific value- bomb calorimeter ,Characteristic of an idea fuel ,Classification of fuels ,Natural solid fuels-wood, peat, lignite and coal ,Types of coal ,Artificial solid Fuels Charcoal, cock, and briquettes ,High and low Carbonization of Coal ,natural gaseous fuels – natural gas and biogas ,Artificial gaseous fuels – coal gas, water gas, oil gas, Produces gas ,Advantages and dis advantages of solid liquid and gaseous fuels</p>	
8	<p>Synthetic drugs and dyes Drugs - Introduction ,Classification ,Synthesis and uses of sulpha trizole (cibazole) , phenacetin, paludrine, chloramphenicol, veronal Dyes – Introduction ,Classification ,Synthesis and uses of methylorange, Diamomblack -f malachite green, Indigotin ,Congored, Crystal violet, Anthraquinone</p>	
List of Practicals (6 Hours/Week)		
<p>1 Organic Qualitative Analysis [10 marks] [Minimum six bifunctional Organic Compounds should be given] Identification of an organic compound through the functional group analysis and determination of melting point or boiling point (Bifunctional organic compounds)</p> <p>2 Organic Volumetric Estimation: [10 marks] [Standard solution to be given]</p> <ol style="list-style-type: none"> To determine the amount of $-\text{CONH}_2$ in the given Acetamide solution To determine the amount of Phenol / m-cresol in the given solution To determine the amount of Aniline / p-toludine in the given solution To determine the amount of Ester in the given solution To determine the amount of Glucose in the given solution To determine the amount of $-\text{COOH}$ in the given carboxylic acid <p>3 Gravimetric Estimation (Any Three) [15 marks]</p> <ol style="list-style-type: none"> Estimation of Ba^{+2} as BaSO_4 Estimation of Fe^{+2} as Fe_2O_3 Estimation of Ni^{+2} as $\text{Ni}(\text{DMG})_2$ Estimation of Al^{+2} as Al_2O_3 		
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.
4. The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
5. Minimum ten experiments shall be there in the laboratory related to course contents.

Students Learning Outcomes:

On the successful completion of the course, students will be able to:

- Understand the concepts and applications of periodic properties, bonding & shapes of molecules, first transition series elements, reaction of alkyl halides and cycloalkanes, Thermodynamics, and adsorption phenomena.
- Apply the concepts of acid, base, pH, and modes of concentration in various tests of simple chemicals.]
- Perform various chemical tests for simple organic & inorganic chemicals.

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. Ahluwalia, 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 7th 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



SYLLABUS

Course Title	MICROBIOLOGY-III
Course Code	BSM 301
Course Credit	Lecture : 4
	Tutorial : 0
	Practical : 3
	Total : 7

Detailed Syllabus:

Sr. No	Name of chapter & Details	Session Allotted
SECTION-I		
1	<p>Introduction: Microbial Diversity</p> <p>Introduction: Microbial evolution and diversity.</p> <p>Microbial Taxonomy: Introduction and Overview; Classification Systems – Taxonomic ranks of microorganisms, Major characteristics used in taxonomy, Phylogeny – Survey of prokaryotic phylogeny and phylogenetic groups of eukaryotes.</p>	28
2	<p>Prokaryotic Diversity</p> <p>Introduction to Achaea and Eubacteria;</p> <p>Gram Negative bacteria: General features; Aerobic/Microaerophilic motile, helical vibroid, Non-motile curved bacteria, Aerobic/Microaerophilic rods and cocci, Facultative anaerobes – rods, curved and helical bacteria, Dissimilatory Sulfate reducers, Anaerobic cocci, Phototrophic bacteria.</p> <p>Gram Positive bacteria: General features; Endospore forming rods and cocci, Asporogenous rods, Mycobacteria and Actinomycetes.</p>	
3	<p>Diversity Of Some Unusual Prokaryotes :</p> <p>General features of bacteria with unusual morphology: Rickettsia and Chlamydia, Budding and appendaged bacteria, Sheathed bacteria, Bacteria with gliding motility, Mycoplasma.</p> <p>General features of bacteria with extreme environments: Thermophiles, Halophiles, Acidophiles, Barophiles, Methanogens.</p>	

SECTION-II		
4	<p>Eukaryotic Diversity:</p> <p>Fungi: General Characteristics; Definition, Occurrence, Structure, Reproduction, Classification and Introduction to major divisions of fungi, Economic Importance of fungi.</p> <p>Algae: General Characteristics; Definition, Occurrence, Ultra Structure, Reproduction, Economic Importance of Algae,</p> <p>Protozoa: General Characteristics; Definition, Occurrence, Ultra Structure, Reproduction, Economic Importance of Protozoa.</p>	
5	<p>Akaryotic Diversity (Viruses):</p> <p>Introduction and general characteristics: Definition, Structure, Classification, Cultivation and Enumeration of Virus.</p> <p>Bacterial Viruses: Classification, Lytic life cycle (T₄ Phage), lysogenic life cycle (λ Phage and μ Phage), RNA Phage (MS13).</p> <p>Animal Viruses: Classification, Replication, Cytocidal effects, Viruses and Cancer, Vibroids.</p> <p>Plant Viruses: Classification, Structure and Reproduction of TMV, Economic importance, Prions.</p>	28
List of Practicals (6 Hours/Week)		
<ol style="list-style-type: none"> 1. Isolation of gram negative bacteria from given sample 2. Identification of gram negative bacteria from given pure culture using biochemical media (<i>E.coli</i>, <i>Enterobacter aerogens</i>, <i>Proteus</i>, <i>Salmonella</i>) 3. Isolation of gram negative bacteria from given sample 4. Identification of gram negative bacteria from given pure culture using biochemical media (<i>Bacillus megaterium</i>, <i>Bacillus subtilis</i>, <i>Staphylococcus aureus</i>, <i>Streptococcus</i>) 5. Identification of Fungi on the basis of Morphological Characteristics. 6. Cultivation of yeast from different natural samples and its morphological characterization using microscopic observation 7. Microscopic observation of different algae from given samples 8. Isolation and cultivation of bacteriophage of <i>E.coli</i> from the given sewage sample 9. Isolation and microscopic observation of Actinomycetes from the given sample (Demonstration) 		

10. Isolation and microscopic observation of Halophiles from the given sample (Demonstration)
11. Isolation and microscopic observation of Thermophiles from the given sample (Demonstration)

Instructional Method and Pedagogy:

1. Lectures will be conducted with the aid of multi-media projector, black board, Audio/Video clips etc relevant to the content.
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.
4. The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
5. Minimum ten experiments shall be there in the laboratory related to course contents.

Students Learning Outcomes:


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

- Introduce concept of molecular phylogeny and microbial diversity.
- Discuss non-cultivable microorganisms, archaea & extremophile. Their adaptation to extremity; halophily, thermophily, acidophily and the applications of the products from extremophile.
- Introduce detail account of different type of diversity eg, akaryotic diversity, eukaryotic diversity, Prokaryotic diversity, etc.

Reference Books:

1. Willey, J. M., Sherwood, L., Woolverton, C. J., & Prescott, L. M. (2008). *Prescott, Harley, and Klein's microbiology*. New York: McGraw-Hill Higher Education.
2. Atlas, R. M. (2015). *Principles of Microbiology*. Mcgrawhill Exclusive.
3. Modi, H.A. *Elementary Microbiology - Vol -I*, Akta Prakashan, Nadiyad.
4. Modi, H.A. *Elementary Microbiology - Vol -II*, Akta Prakashan, Nadiyad
5. Dubey, R. C. & Maheshwari, D. K. (2014). *A Text Book of Microbiology*, S. Chand & Company Ltd.
6. Tortora, G. J., Funke, B. R., & Case, C.L. (2007) *Microbiology-An Introduction*. Pearson.
7. Powar & Daginawala, *General Microbiology Vol-II*. Himalaya Publishing House, Mumbai.

8. Stainer, R.Y., Ingraham, J.L., Wheelis, M.L., Painter, R.K. (1992). General Microbiology. MacMillan Press Ltd., London.
9. Pelczar, M. J., Chan, E. C. S., Krieg, N. R. (2005). Microbiology. Tata McGraw Hill Publication Pvt. Ltd., New Delhi.
10. Salle, S.J., Fundamental Principals of Bacteriology, Tata McGraw Hill Publication Co. Ltd. New Delhi.
11. Frobisher, Hinsdill, Crabtree & Goodherat (1974). Fundamentals of Microbiology. W.B Saunders Co.
12. Purohit, S. S., Microbiology-Fundamentals and Applications. Agrobios Publications, Delhi.
13. Mani, A., Selwaraj, A. M., Narayanan L. M., and Arumngam, N., Microbiology, Saras Publication, Delhi.
14. Kaur, H., Encyclopedia of Microbiology, Anmol Publication, Delhi.
15. Patel, R. J., Patel K. R. (2015). Experimental Microbiology, Vol-I, Aditya Publications, Ahmedabad, India.

		SYLLABUS	
Course Title		BOTANY-III	
Course Code		BSB311	
Course Credit		Lecture	: 04
		Tutorial	: 00
		Practical	: 03
		Total	: 07
Detailed Syllabus:			
Sr. No	Name of chapter & Details		Session Allotted
SECTION-I			
1	ANATOMY Classification and theories of root and shoot apex; Cambium: types and functions; Types of Vascular Bundles; Stellar evolution and Types of Stele; Normal and Anomalous Secondary Growth; Nodal anatomy; Leaf fall and wound healing		28
2	EMBRYOLOGY Structure and development of microsporangium and male gametophyte; Structure and development of megasporangium and female gametophyte; Types of embryo sac: Monosporic, Bisporic, Tetrasporic (Fritillaria type); Structure and types of plant ovule; Pollination: Definition, Types and Agents; Pollination in Salvia and Calotropis; Fertilization and Dicot and Monocot Embryo Development.		
3	SYSTEMATIC BOTANY Principles of taxonomy; ICBN: Principles and rules; Typification; Priority; Herbarium techniques: Plant collection and preparation of Herbarium; Some important Herbaria of India; Role of Herbaria and Botanical Gardens; Chemotaxonomy and numerical taxonomy		
SECTION-II			

4	PLANT RESOURCE UTILIZATION AND CONSERVATION Biodiversity; Medicinal plants; Pulp and Paper; Plants used as Avenue trees; General account of ICAR, CSIR, BSI, NBPGR and DBT	
5	ECOLOGY Edaphic factors: Composition of soil; Soil formation- Origin and development of soil; Soil type; Soil moisture; Soil profile; Soil erosion; Soil conservation; Effect of Water, Light and Temperature on soil; Biological clocks; Remote sensing; Ecological adaptation in Hydrophytes and Xerophytes	28
List of Practicals (6 Hours/Week)		
<ol style="list-style-type: none"> 1. To study shoot apex through permanent slides as well as by mounting of hydrilla stem. 2. To study root apex through permanent slides as well as by mounting of onion root. 3. To study cambium through different plant materials. 4. Permanent slides of cambium and cork cambium. 5. To study different types of vascular bundles. 6. To study different types of stele through permanent slides. 7. To Study secondary growth in Sunflower stem, root and salvadora stem through permanent slides as well as temporary slide preparation. 8. Double stain permanent preparation of Salvadora stem secondary growth. 9. To study nodal anatomy 10. Water holding capacity of soil. 11. To determine the soil pH 12. Test for the presence of carbonate, nitrate and deficiency of replaceable bases. 13. Test for the presence of inorganic salts in the soil samples. 14. Pollen germination 15. Permanent slide of T.S. of Anther, Pollen grain on stigma 16. To study the different types of ovules through permanent slides. 17. Permanent slide of female gametophyte. 18. Exposition and mountings of Endosperm haustoria: Cucumis Seeds. 19. To study seed germination in different media. 20. Herbarium preparation 21. To study medicinally important plants 22. Prepare the report on three domestic herbal medicines utilized in your regions. 23. Vernacular name, scientific name, family <div style="margin-left: 40px;">Classification</div> <div style="margin-left: 40px;">Introduction</div> 		

Chemical composition

Applications

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.
4. The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
5. Minimum ten experiments shall be there in the laboratory related to course contents.

LIST OF PRACTICAL (6 Hours/Week)

1. Isolation of gram negative bacteria from given sample
2. Identification of gram negative bacteria from given pure culture using biochemical media (*E.coli*, *Enterobacter aerogens*, *Proteus*, *Salmonella*)
3. Isolation of gram negative bacteria from given sample
4. Identification of gram negative bacteria from given pure culture using biochemical media (*Bacillus megaterium*, *Bacillus subtilis*, *Staphylococcus aureus*, *Streptococcus*)
5. Identification of Fungi on the basis of Morphological Characteristics.
6. Cultivation of yeast from different natural samples and its morphological characterization using microscopic observation
7. Microscopic observation of different algae from given samples
8. Isolation and cultivation of bacteriophage of *E.coli* from the given sewage sample
9. Isolation and microscopic observation of Actinomycetes from the given sample (Demonstration)
10. Isolation and microscopic observation of Halophiles from the given sample (Demonstration)
11. Isolation and microscopic observation of Thermophiles from the given sample (Demonstration)

Students Learning Outcomes:

After Successful completion of the above course, students will be able to:

- Recognize role of tissues in plant growth
- Learn the composition of soil
- Understand the system of plant nomenclature
- Observe the various events of plant fertilization

- 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.

Text books:

- Text book of Botany ,B. P. Pandey,edition,2011,s.chand publications
- Introductory Botany, Bendre-Pande,2008,rastogi publications
- College Botany, Das, Dutta and Ganguli,2011,new central book agency
- Text book of Botany ,B. P. Pandey; Mishra
- The practical botany ,B. P. Pandey,2011, s.chand publication
- College Botany Vol I ,Gangulee, Das, and Dutta,2011, new central ,book agency

Reference Books:

1. The Embryology of Angiosperm, Bhojwani & Bhatnagar, 2014,vikas publishing house.
2. Plant anatomy; 4th edition, Fahn, A edition 4, pergamon press.
3. Plant Anatomy, Tayal M.S.
4. Ecology and Environment, Sharma, P.D.
5. Plant Physiology , V. Verma,2007, Ane Books India

Additional Resources:

1. <https://www.youtube.com/watch?v=NRF70bKapgU>
2. <https://youtu.be/QR-rXiJu05w>
3. https://youtu.be/YZGs_s4JkEs
4. <https://en.wikipedia.org/wiki/Fertilisation>
5. www.biologydiscussion.com › ... › Stages › Stages of Embryology in Plants



SYLLABUS

Course Title	ENGLISH AS A SECOND LANGUAGE - LEVEL-II
Course Code	ESL201
Course Credit	Lecture : 03
	Tutorial : 00
	Practical : 00
	Total : 03

Detailed Syllabus:

Sr. No	Name of chapter & Details			
Unit No.	Context	Topics	Learning objectives	Session Allotted
SECTION-I				
1	Social	FEEL THE FORMS....	Students will be able to study and fill up several types of forms they come across in their daily life.	22
2	Social	VOCAB HOUSIE	Students will be able to enhance their language by learning various vocabulary related to family & relations, seasons, food & culture, restaurants and its type, shopping, festivals and occasions.	
3	Social	LISTEN & LEARN	Students will listen audios of recorded tapes, telephonic conversation, descriptive audios etc. to pick up foreign accent by identifying the phonemes of certain letters like 't', 'k', 'p' etc.	
4	Academic	POLISH YOUR PUNCTUATION	Students will be able to understand the importance of punctuation and use it appropriately in the text	
5	Academic	READ TO DESCRIBE	Students will be able to read and understand a variety of descriptive text	

			on person, place, situation and instance.	
SECTION-II				
6	Academic	TELL ME ABOUT	Students will learn to write description of a place (native, city, college). Also they will learn to describe their friend's personality, any instance or situation	23
7	Professional	WATCH YOUR WORDS & MIND YOUR MANNERS	Students will be able listen telephonic conversations and identify the phrases used to express apology, permission, request, agreeing, disagreeing, offering etc.	
8	Professional	BAY OF SURVEY	Students will learn to draft the appropriate questions for a questionnaire keeping the purpose, audience and the topic of the survey and compile the data and finally present it through data representation charts.	
9	Professional	LET'S LEARN TO DOCUMENT	Students will be able to write a report based on the data compiled using appropriate format and tone. Also, they will be able to write various types of letters like complain letters, letters on agreeing/disagreeing or offering help etc.	
Students Learning Outcomes:				
At end of the course, students will:				
<ul style="list-style-type: none"> • 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. 				