# JAYPEE INSTITUTE OF INFORMATION AND TECHNOLOGY

## M.Sc. Microbiology

### Semester I

# MICROBIAL PHYSIOLOGY AND DIVERSITY

| | | | |
|---|---|---|---|
| **Course Code** | **19M21BT111** | **Semester:** Odd | **Semester:** I<br>**Session: 2022-2023**<br>July to December |
| **Course Name** | **Microbial physiology and diversity** | | |
| **Credits** | 4 | **Contact Hours** | 3-1-0 |

| | | |
|---|---|---|
| **Faculty (Names)** | **Coordinator(s)** | Dr. Susinjan Bhattacharya |
| | **Teacher(s) (Alphabetically)** | Dr. Susinjan Bhattacharya |

| **COURSE OUTCOMES** | | **COGNITIVE LEVELS** |
|---|---|---|
| C110.1 | Classify the Diversity amongst archae, eubacteria and other microorganisms | Understanding level (Level 2) |
| C110.2 | Demonstrate ecological diversity, habitat interaction and microbial relationship. | Understanding level (Level 2) |
| C110.3 | Identify microbial nutritional, growth requirements and associated physiological mechanisms. | Applying level (Level 3) |
| C110.4 | Analyze the different modes of metabolism in microorganisms. | Analyzing level (Level 4) |

| **Module No.** | **Title of the Module** | **Topics in the Module** | **No. of Lectures for the module** |
|---|---|---|---|
| **1.** | Microbial taxonomy and evolution of diversity | Phylogenetic and genotypic classification, Classic and molecular characteristics, Phylogenetic trees | 2 |
| **2.** | The Archae (Extremophiles and their diversity) | Introduction to Archaeal Taxonomy and Metabolism, **Phylum Crenarchaeota:** Habitat and energy metabolism, cold dwelling microbes (artic and antartic regions), hyperthermophiles. **Phylum Euryarchaeota**: extremely halophilicarchea, taxonomy and physiology of halophilicarchea. Methanogens – diversity and physiology. **Thermoplasmatales**– thermoplasma, **Hyperthermophilic euryarcheota**: Thermococcales and Methanopyrus. | 4 |

| | | | |
|---|---|---|---|
| **3.** | Gram negative and positive eubacteria | Diversity, characteristic features and significance : Spirochaetes - aerobic / microaerophilic motile, helical / vibriod - non motile gram negative curved bacteria - gram | 5 |
| | | negative and positive rod and cocci - gram negative straight, curved & helical rods - sulfur reducing bacteria - - rickettisias and chlamydias – mycoplasmas - endosymbionts.<br>Mycobacteria – Nocardioformis. Anoxygenic phototrophic bacteria – oxygenic photosynthetic bacteria – aerobic chemolithotrophic bacteria – budding and appendaged bacteria – sheathed bacteria – non photosynthetic bacteria - Myxobacteria – archeobacteria. | |
| **4.** | Diversity of other microorganisms | Distribution, importance, structure and characteristics of the fungal divisions, slime molds, the algal divisions, protozoans, general properties of viruses, their structures and classification, bacteriophages | 7 |
| **5.** | Microbial Diversity of various habitats | Microorganisms in nature ecosystem,Ecological groups of Microorganisms, Microbial population interactions, Human-Microbe Interactions, The soil habitat, Water as a Microbial Habitat,Microflora of air, Microflora of foodstuff | 5 |
| **6.** | Microbial nutrition and growth | Nutritional requirements of Microorganisms- Autotrophs, Heterotrophs, Chemotrophs, Copiotrophs and Oligotrophs. Transport Mechanisms - Diffusion- Facilitated Diffusion,Active transport- Group translocation. Different phases of growth - Growth curve - Generation time - Factors influencing microbial growth - Temperature, pH, Pressure, Salt concentration, Nutrients - synchronous growth and continuous cultivation. Diauxic growth, Sporulation - Endospore formation in bacteria. Chemotherapeutic agents as growth inhibitors | 5 |
| **7.** | Bacterial photosynthesis | Photosynthetic microorganisms, photosynthetic pigments, and generation of reducing power by cyclic and non-cyclic photophosphorylation, electron transport chain in photosynthetic bacteria. Carbon dioxide fixation pathways. | 5 |

| | | | |
|---|---|---|---|
| **8.** | Bacterial Respiration | Bacterial aerobic respiration, components of electron transport chain, free energy changes and electron transport, oxidative phosphorylation and theories of ATP formation, inhibition of electron transport chain. Electron transport chain in some heterotrophic and chemolithotrophic bacteria.<br>Bacterial anaerobic respiration: Introduction. Nitrate, carbonate and sulfate as electron acceptors.<br>Electron transport chains in some anaerobic bacteria.<br>Catalase, super oxide dismutase, mechanism of oxygen toxicity. | 5 |
| **9.** | Bacterial Chemolithotrophy | Physiological groups of chemolithotrophs, ammonia oxidation by members of Genus Nitroso group, nitrite oxidation by Nitro group of genera. | 4 |
| | | Oxidation of molecular hydrogen by *Hydrogenomonas* species. Ferrous and sulfur/sulfide oxidation by *Thiobacillus* species. | |
| **Total number of Lectures** | | | **42** |

**Evaluation Criteria**

| **Components** | **Maximum Marks** |
|---|---|
| T1 | 20 |
| T2 | 20 |
| End Semester Examination | 35 |
| TA | 25 (Presentation, Assignments) |
| **Total** | **100** |

**Project based learning:** The students are assigned a project to learn latest methods used in Microbial Physiology and Diversity which are of Biotech industry relevance.

**Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. ( Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)**


| | |
|---|---|
| **1.** | Microbial Diversity by Colwd , D. 1999, Academic Press. |
| **2.** | Prescott L M, J P Harley and D A Klein (2005). Microbiology. Sixth edition, International edition, McGraw Hill. |
| **3.** | Advances in Applied Microbiology. Vol. 10. Edited by Wayne W. Umbreit and D. Pearlman. Academic Press. |
| **4.** | Brocks Biology of Microorganisms. 8th Edition. (International Edition - 1997) by Michael T. Madigan, John M. Martinko. Jack Parker. Prentice Hall Internation Inc. |
| **5.** | Microbial Ecology. Fundamentals and Applications by. Ronald M. Atlas and Richard Bartha. 2nd and 4th Edition. The Benjamin Cummins Publication Co. Inc. |
| **6.** | David white. The physiology and biochemistry of prokaryotes. Oxford university press. 4th edition (2011). |

# BIOSTATISTICS AND APPLICATION

| | | | |
|---|---|---|---|
| **Course Code** | **15B1NBT832** | **Semester:** Odd (specify Odd/Even) | **Semester:** I **Session: 2022-2023** July to December |
| **Course Name** | **Biostatistics and Its applications** | | |
| **Credits** | 4 | **Contact Hours** | 4 |

| | | |
|---|---|---|
| **Faculty (Names)** | **Coordinator(s)** | Dr Shalini Mani |
| | **Teacher(s) (Alphabetically)** | Dr Shalini Mani |

| **COURSE OUTCOMES** | | **COGNITIVE LEVELS** |
|---|---|---|
| **C430-3.1** | Explain the various statistical methods to design a biological studies and data representation. | Understanding (Level 2) |
| **C430-3.2** | Apply different statistical methods and approaches to study the significance of a study. | Apply (Level 3) |
| **C430-3.3** | Examine the relationship between different parameters of a study. | Analyze (Level 4) |
| **C430-3.4** | Choose appropriate statistical methods, tools and resources including prediction, validation and evaluation of the biological studies. | Evaluate (Level 5) |

| **Module No.** | **Title of the Module** | **Topics in the Module** | **No. of Lectures for the module** |
|---|---|---|---|
| **1.** | Introduction | Application and use of Biostatistics as a science, scope. | 1 |
| **2.** | Study design in various fields of research | general principles of study design and its implications for valid inference | 1 |
| **3.** | Sampling theory | Sampling scheme, simple/ systematic/ stratified/ cluster sampling, Sources of data collection | 2 |
| **4.** | Data presentation | Graphical, tabular, Mathematical, finding the central tendency, measure of variations | 3 |
| **5.** | Overview of different statistical methods used in the field of biological sciences. | Hypothesis testing, T-test, Chi square test, ANOVA, Sign Test, Wilcoxon Signed Rank Test, Wilcoxon Rank Sum Test, odds ratio, Binomial/normal/Poisson distribution of probabilities, determination of power of study and sample size calculation, regression analysis, correlation analysis, | 12 |
| **6.** | Analysis of data source | Assess data sources and data quality for the purpose of selecting appropriate data for specific research questions | 4 |

| | | | |
|---|---|---|---|
| **7.** | Selection of statistical methods | Identifying the appropriate statistical methods to be applied in a given research setting, applying the selected methods and analysis. | 4 |
| **.** | Application of Biostatistical analysis. | Designing various studies of medical/ health/ Microbial/Agricultural/Genetics/Pharamaceutical science related studies.<br>Data analysis using different methods<br>Result interpretation | 7 |
| **9.** | Case studies | Based on various research studies and systematic reviews. | 4 |
| **10.** | SPSS, Stats at the bench | Introduction to SPSS, Entering data in SPSS editor. Solving the compatibility issues with different types of files. SPSS and working with descriptive statistics. | 4 |
| **Total number of Lectures** | | | **42** |
| | | | |

**Evaluation Criteria**

| **Components** | **Maximum Marks** |
|---|---|
| T1 | 20 |
| T2 | 20 |
| End Semester Examination | 35 |
| TA | 25 (assignment, class test, quiz) |
| **Total** | **100** |

**Project Based learning:** Students will learn to represent the data of various fields using various statistical methods. Students will also be able to select the appropriate statistical tool for analysis of different data set and interpret the outcome of any study.

**Recommended Reading material:** Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)


| | |
|---|---|
| 1. | Marcello Pagano, Kinberlee Gauvreau, Principle of Biostatistics. |
| 2. | Stephen W Looney, Biostatistical methods, Humana Press |
| 3. | Alan J Cann, Maths from Scratch for Biologist, John Willey and Sons Limited Press. |
| 4. | M Bremer, R W Doerge, Statistics at the Bench, Cold Spring harbor Lab Press. |
| 5. | B K Mahajan, Methods in Biostatistics, VII edition, Jaypee Bothers Medical Publishers, 2010. |

# MICROBIAL GENETICS & MOLECULAR BIOLOGY

| | | | | |
|---|---|---|---|---|
| **Course Code** | **19M21BT115** | **Semester:** Odd | **Semester: I**<br>**Session : 2022-2023**<br>July to December | |
| **Course Name** | Microbial Genetics & Molecular Biology | | | |
| **Credits** | 3-1-0-<br>4 | | **Contact Hours** | 4 |

| | | |
|---|---|---|
| **Faculty (Names)** | **Coordinator(s)** | Dr. Sonam Chawla |
| | **Teacher(s) (Alphabetically)** | 1. Dr. Sonam Chawla<br>2. Dr. Vibha Gupta |

| **COURSE OUTCOMES:** Upon completion of the course, students will be able to | | **COGNITIVE LEVELS** |
|---|---|---|
| CO112.1 | Explain fundamental principles of molecular biology and technological advances in the field | Understanding Level (C2) |
| CO112.2 | Apply knowledge of microbial genome architecture and gene regulation | Apply Level (C3) |
| CO112.3 | Analyse various methods of gene transfer and extrachromosomal inheritance | Analysis Level (C4) |
| CO112.4 | Interpret different aspects of DNA mutations, DNA repair, Linkage & Mapping | Understanding Level (C2) |

| **Module No.** | **Subtitle of the Module** | **Topics in the module** | **No. of Lectures for the module** |
|---|---|---|---|
| **1.** | **The nature of Genetic material** | Discovery of DNA and experimental evidence, The structure of DNA and RNA; Melting of DNA, Superhelicity, Genome architecture, Chromatin arrangement, nucleosome formation, C value paradox, central dogma | 02 |
| **2.** | **DNA replication and repair** | DNA replication mechanism, enzymes involved and models of DNA replication, DNA methylation, inhibitors of DNA replication, DNA damage and repair: Molecular basis of spontaneous and induced mutations, types of mutation, Ames test, DNA repair pathways - excision, mismatch, photoreactivation,<br>Double Strand Break Repair | 06 |
| **3.** | **DNA transcription** | Transcription machinery - various transcription enzymes and cofactors, initiation, elongation and termination, enhancer sequences and control of transcription, Structure and function of RNA polymerase, Post-transcriptional processes: RNA processing, Capping and polyadenylation, rRNA and tRNA processing, RNA Editing; RNAi and miRNAs,<br>Antisense RNA | 07 |
| **4.** | **DNA** | The genetic code and protein structure, Mechanisms of | 06 |

| | | | |
|---|---|---|---|
| | **translation** | translation - initiation complex, ribosomes and tRNA, factors, elongation and termination, *in vitro* translation systems, polycistronic/monocistronic synthesis, inhibitors of translation, stringent response in bacteria, Post-translational processes: Protein modification, folding, chaperones, transportation; protein degradation | |
| **5.** | Methods of gene transfer in Bacteria | Transformation - natural transformation systems, mechanism, chemical-mediated and electro-transformation; Conjugation - nature of donor strains and compatibility, interrupted mating and temporal mapping, F plasmid, Hfr transfer, horizontal gene transfer | 04 |
| **6.** | Plasmids & Movable genetic elements | Plasmid types, detection, replication, partitioning, copy-number control, properties of some known plasmids, Extrachromosomal inheritance | 04 |
| **7.** | Genetic control mechanism in prokaryotes | Operons, lac system, trp system for negative & positive gene regulation, lambda phage, complex operons | 04 |
| **8.** | Viral genome & Methods of gene transfer in Viruses | Introduction to viral genetics, viral life cycles and phage replication, Transduction - Generalized and specialized transduction; gene mapping by specialized transduction | 03 |
| **9.** | Linkage and gene Mapping | Recombination (homo and heterologous), linkage symbolism, single and double cross overs, linkage maps, genetic analysis | 03 |
| **10.** | Technological advances | Recombination as a molecular biology tool, Genetically modified organisms (GMOs) and applications | 03 |
| **Total number of Lectures** | | | 42 |

**Evaluation Criteria**

| **Components** | **Maximum Marks** |
|---|---|
| T1 | 20 |
| T2 | 20 |
| End Semester Examination | 35 |
| TA | 25 |
| **Total** | **100** |

**Project based Learning:** Students were asked to select any disease that is a result of disturbance at cellular level and present their research findings/understanding covering pathophysiological mechanisms, clinical and economic consequences of the disease to the class. The class was also asked to come prepared on the topic so as to contribute during discussions/ brain-storming for alternative solutions to currently accepted clinical approaches to the disease. This real-world example of concepts developed during the lectures reinforced their knowledge in the genetics and molecular biology areas.

| **Recommended Reading material:** Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format) | |
|---|---|
| **1.** | Lewin's Genes XII by Jocelyn E. Krebs, Elliott S. Goldstein and Stephen T. Kilpatrick Jones and Bartlett Publishers, Sudbury, Massachusetts, 2018. |
| **2.** | Molecular Biology of the Gene by J.D. Watson, T.A. Baker, S.P. Bell, A. Gann, M. Levin, R. Losick, 7th edition, Benjamin Cummings, San Francisco, USA, 2013. |

| | |
|---|---|
| **3.** | Molecular Biology of the Cell by B. Alberts, A. Johnson, J. Lewis, M. Raff, K. Roberts, P. Walter, 6th edition, Garland Science, New York and London, 2017. |
| **4.** | Lehninger Principles of Biochemistry Seventh Edition – David L. Nelson; Michael M. Cox, 2017 |
| **5.** | An Introduction to Genetic Analysis by Suzuki DT, Griffiths AJF, Miller JH and Lewontin RC, WH freeman and Company, New York |

# BIOMOLECULES

| | | | |
|---|---|---|---|
| **Course Code** | **19M21BT113** | **Semester:** Odd | **Semester:** I<br>**Session: 2022-2023** July-December |
| **Course Name** | **Biomolecules** | | |
| **Credits** | 4 | **Contact Hours** | 4 |

| | | |
|---|---|---|
| **Faculty (Names)** | **Coordinator(s)** | Dr. Priyadarshini |
| | **Teacher(s) (Alphabetically )** | Dr. Priyadarshini, Prof. Reema Gabrani |

| **COURSE OUTCOMES** | | **COGNITIVE LEVELS** |
|---|---|---|
| **C113.1** | Explain the biomolecule's structure and function | Understand Level(C2) |
| **C113.2** | Analyze bioenergetics and metabolic pathways for physiological and Pathological conditions | Analyze Level (C4) |
| **C113.3** | Apply the concepts of enzymes, hormones and signaling | Applying Level (C3) |
| **C113.4** | Illustrate the basics in genomics and proteomics | Understand Level(C2) |

| **Module No.** | **Title of the Module** | **Topics in the module** | **No. of Lectures for the module** |
|---|---|---|---|
| **1.** | Carbohydrates and bioenergetics | Chemical composition and bonding; Carbohydrates: Classification, basic chemical structure; General reactions of the functional groups; Physiological significance; Metabolism of carbohydrate: Glycolysis, TCA, gluconeogenesis, PPP, ATP role; Respiratory chain and Oxidative phosphorylation | 11 |
| **2.** | Lipids | Classification, structure and function of major lipid sub classes; chylomicrons, LDL, HDL, and VLDL; Pathological changes in lipid levels. Formation of micelles, monolayers, bilayer, liposomes; biosynthesis of fatty acids and ketogenesis | 7 |

| | | | |
|---|---|---|---|
| **3.** | Proteins | Amino acids: Classification, Properties,<br>Protein Structure: primary, secondary, tertiary and quaternary structure; separation techniques; biosynthesis of non-essential amino acids and catabolism of protein and amino acids in born errors of metabolism. Enzymes: kinetics, functions | 7 |
| **4.** | Nucleotides | Nucleic acid structure, Nucleotides and nucleosides; metabolism of purines and pyrimidines | 6 |
| **5.** | Hormones | Characteristics of hormones/signalling molecules; function, signal transduction | 6 |
| **6.** | Introduction to Genomics and proteomics | DNA sequence analysis methods; gene disease association; Introduction and scope of proteomics | 5 |
| **Total number of Lectures** | | | **42** |

**Evaluation Criteria**

| **Components** | **Maximum Marks** |
|---|---|
| T1 | 20 |
| T2 | 20 |
| End Semester | 35 |
| Examination TA | 25 (Presentation, Assignments) PBL: 7 marks |
| **Total** | **100** |

**PBL:** Students will choose any biomolecule/ hormone linked to a particular disease. How is it commercially used as a therapeutic molecule or as a target to manage the disease? The understanding of biomolecules is required for Biotechnology companies including patent firms.

**Recommended Reading material:** Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)


| | |
|---|---|
| **1.** | JM Berg, L Stryer, J Tymoczko, G Gatto,"Biochemistry", 9thEd.SanFrancisco,2019WHFreeman |
| **2.** | Ljsbrand Kramer,"Signaltransduction",AcademicPress,2015Harper |
| **3.** | VW Rodwell, D Bender, K M Botham, P J Kennelly, P A Weil**,** "Harper's Illustrated Biochemistry", 31st Ed. McGraw-Hill Lange 2018 |
| **4.** | Jeremy M. Berg,"Biochemistry"8thEd.W.H.Freeman2015 |
| **5.** | D L Nelson and M M Cox, "Lehninger PrinciplesofBiochemistry",7thEd.WHFreeman2017 |

# MICROBIOLOGY LAB- I

| | | | |
|---|---|---|---|
| **Course Code** | **19M25BT111** | **Semester:** Odd | **Semester:** I<br>**Session: 2022-2023**July to December |
| **Course Name** | Microbiology Lab-I | | |
| **Credits** | 4 | **Contact Hours** | 8 |

| | | |
|---|---|---|
| **Faculty (Names)** | **Coordinator(s)** | Dr. Garima Mathur |
| | **Teacher(s) (Alphabetically )** | Dr. Garima Mathur,Dr. Shalini Maini, Prof. Indira P. Sarethy, Dr. Shazia Haider |

| **COURSE OUTCOMES** Students will be able to | | **COGNITIV E LEVELS** |
|---|---|---|
| **CO1** | Understand various culture media, their applications and methods of sterilization | Level II (Understand) |
| **CO2** | Apply standard microbiological techniques for isolation, culturing and enumeration of microorganisms | Level III (Apply) |
| **CO3** | Make use of different methods for microbial identification and characterization | Level III (Apply) |
| **CO4** | Analyze quantitation techniques of biomolecules | Level IV (Analyze) |

| **Module No.** | **Title of the Module** | **List of Experiments** |
|---|---|---|
| **1.** | **Isolation of microorganisms from different sources** | Media preparation & sterilization – Bacteria; Media preparation & sterilization – fungi; Preparation of agar plants and slants; Culturing microorganisms on agar media by streaking / stab / point inoculation; Serial dilution of microbial culture; Estimation of microbial growth by colony counting |
| **2.** | **Characterization of Microorganisms** | Microbial diversity – characterization of bacteria & fungi; IMVIC Test; Computational tool for strain identification |
| **3.** | **Microbial Growth** | Effect of substrate / culture conditions on microbial growth; To study diauxic growth in bacteria; Data presentation & Analysis |
| **4.** | **Analytical Techniques** | Preparation of buffers; quantitative determination of proteins, carbohydrates, nucleic acids |

**Project Based Learning**: Students are acquainted with various microbiological skills that are commonly used in research and development. Students will also be familiarized with knowledge of computational tools, molecular biology techniques and data analysis, that may play a pivotal role in developing skillset that may be used in various biotechnological and allied sectors

| S.No | List of Experiment | We ek |
|---|---|---|
| | **Introduction & GLP** | **Week 1 – Week 3** |
| **1** | **Isolation of microorganisms from different sources** | |
| (a) | Media preparation & sterilization – Bacteria | |
| (b) | Media preparation & sterilization – fungi | |
| (c) | Preparation of agar plants and slants | |
| (d) | Culturing microorganisms on agar media by streaking / stab / point inoculation | |
| (e) | Serial dilution of microbial culture | |
| (f) | Estimation of microbial growth by colony counting | |
| **2** | **Characterization of Microorganisms** | **Week 4- Week 6** |
| (a) | Microbial diversity – characterization of bacteria & fungi | |
| (b) | IMVIC Test | |
| (c) | Computational tool for strain identification | |
| **3** | **Microbial Growth** | **Week 7 – Week 9** |
| (a) | Effect of substrate / culture conditions on microbial growth | |
| (b) | To study diauxic growth in bacteria | |
| (c) | Data presentation & Analysis | |
| **4** | **Molecular Biology** | **Week 10 – Week 12** |
| (a) | Isolation of DNA from bacteria | |
| (b) | Isolation of bacteria from fungi | |
| (c) | Agarose Gel Electrophoresis | |

# PRESENTATION AND COMMUNICATION SKILLS

| | | | |
|---|---|---|---|
| **Course Code** | **19M21HS111** | **Semester: Odd** | **Semester: I**<br>**Session: 2022-2023** July-Dec |
| **Course Name** | **Presentation and Communication Skills** | | |
| **Credits** | 2 | **Contact Hours** | 2-0-0 |

| | | |
|---|---|---|
| **Faculty (Names)** | **Coordinator(s)** | Dr. Ankita Das |
| | **Teacher(s) (Alphabetically)** | Dr. Ankita Das |

| **COURSE OUTCOMES** | | **COGNITIVE LEVELS** |
|---|---|---|
| **C101.1** | Develop an in-depth understanding and appreciate the subtle aspects of English as a communication tool. | Understand (C2) |
| **C101.2** | Assess the communication challenges of a diverse, global marketplace | Analyze (C4) |
| **C101.3** | Create & Compose different forms of Professional writing | Create (C6) |
| **C101.4** | Evaluate the effectiveness of sample Presentations | Evaluate (C5) |
| **C101.5** | Apply the acquired skills in delivering effective presentations | Apply (C3) |

| **Module No.** | **Title of the Module** | **Topics in the Module** | **No. of Lectures for the module** |
|---|---|---|---|
| **1.** | **Communication Process, Grammar, and Vocabulary** | ● Communication: Definition, Model, Channel, Goals<br>● Process of Communication: *Linear Concept, Shannon Weaver Model, the Two-Way Process*<br>● Communication Traits: *Communication Apprehension, Style, Argumentativeness* and | 5 |

| | | | |
|---|---|---|---|
| | | *Verbal Aggressiveness*<br>● Grammar: *denotative* and *connotative* words, subject-verb agreement<br>● Techniques of Vocabulary Building | |
| **2.** | **Intercultural Communication** | ● Recognizing cultural diversity: variations in a diverse world<br>● Developing Cultural Intelligence: *High-Context Cultures* and *Low-Context Cultures*<br>● Time as a cultural factor: *Monochronic* and *Polychronic* Time<br>● Challenges of Intercultural Communication<br>● Developing Cultural Competency and Guidelines for adapting. | 5 |
| **3.** | **Business Etiquettes, and Presentation Skills** | ● Ekman's classification of communicative movements<br>● Face Facts, Positive Gestures, Negative Gestures, Lateral Gestures<br>● Preparing and Delivering a Presentation<br>● Using Audio-Visual Aids: Presentation Support<br>● Sample Presentations:<br>1. Steve Jobs, *Three Stories of my Life* (Stanford University Commencement Address, 2005)<br>2.Dr. Shashi Tharoor, *Britain does owe India reparations* (Oxford Union Debate) | 5 |
| **4.** | **Communication for Conflict Management** | ● Stages in the Negotiation Process<br>● Strategies of Conciliation<br>● Solving Deadlocks<br>● Reaching an Agreement | 5 |
| **5.** | **Communication for Employment** | ● Guidelines for writing a Resume, Types of Resumes<br>● Interviews: Purpose and Types.<br>● Interviews: Preparation, Process, Common Mistakes to Avoid.<br>● Group Discussion: Stages (Forming, Storming, Norming, Performing, Adjourning)<br>● Formal/Informal Group Dynamics | 5 |
| **6.** | **Technical Communication** | ● Characteristics of a Report<br>● Types of Report<br>● 5 W's and 1 H of a Report<br>● Structure, Format, Parts of a Report<br>● Referencing, and Documentation | 5 |
| **Total number of Lectures** | | | **30** |

Project Based Learning: Students will be given a project which would require them to work in groups of 5-6 members, identify a TEDTalk and analyse its significance/relevance to the course. While the task of identifying the talk would help them revisit the entire course, analyzing and underlining its significance would help them attain an in depth understanding of the chosen topic. The most important learning however would be to appreciate and understand the importance of team work.

| **Evaluation Criteria**<br>**Components Maximum**<br>**Marks** |
|---|
| Mid Term Examination (Presentation)<br>30 End Semester Examination 40<br>TA 30(Assignment/ Viva)<br>**Total 100** |

| **Recommended Reading material:** Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format) | |
|---|---|
| **1** | C.L.Bovee, J.V.Thill, Roshan Lal Raina, *Business Communication Today*, 13th Ed, Pearson Education, 2017. |
| **2** | R.C. Sharma and Krishna Mohan, *Business Correspondence and Report Writing*, Mc Graw Hill Education, 2016. |
| **3** | Meenakshi Raman and Sangeeta Sharma, *Technical Communication: Principles and Practice*, Oxford University Press, 2015. |
| **4** | Anna Koneru, *Professional Communication*, Mc Graw Hill Education Pvt Ltd., 2017. |
| **5** | Murli Krishna, *Communication Skills for Engineers*, Pearson, 2014. |
| **6** | Meenu Dudeja, *Communication Skills for Professionals*, Satya Prakashan, 2017. |
| **7** | Barun K. Mitra, *Personality Development and Soft Skills*, Oxford University Press, 2012. |