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Syllabus Revision

Amity Institute of Microbial Technology (AIMT)

Course Name	Page No.
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AMITY UNIVERSITY
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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY
(AIMT)

Master of Science (Industrial Microbiology)

Programme Code: MMC

Duration – 2 Years Full Time

(Programme Structure)

Choice Based Credit System (CBCS)

2021

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Program Learning Outcomes - PLO

- Students will be able to acquire, articulate, retain, and apply knowledge relevant to microbiology.
- Students will acquire and demonstrate competence in microbiology laboratory skills applicable to relevant industries and research.
- The student will communicate scientific concepts, experimental results, and analytical arguments clearly.
- Students will develop skill to become efficient entrepreneur, R & D or industry professional.

Credits Summary

M.Sc. Industrial Microbiology (02Years/ 04 Semesters)						
Semester	**Core Course (CC)**	**Domain Electives (DE)**	**Value Added Course (VAC)**	**Open Electives (OE)**	**Non-Teaching Credit Courses (NTCC)**	**Total**
I	22	3	4	-	2	**31**
II	16	3	4	3	2	**28**
III	17	3	4	3	5	**32**
IV	-	-	-	-	25	**25**
Total	**55**	**9**	**12**	**6**	**32**	**116**

CC = Core Course

DE = Domain Elective

OE = Open Elective

VA = Value Added Course

NTCC = Non-Teaching Credit Courses (NTCC)

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Program Name: M.Sc. –INDUSTRIAL MICROBIOLOGY

FIRST SEMESTER

Course Code	Course Title	Category	Lectures(L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
MMC 101	Introduction to Industrial Microbiology	CC	4	-	-	4
MMC 102	Microbial Physiology	CC	3	1	-	4
MMC 103	Enzyme Technology and Biosensors	CC	3	1	-	4
MMC 104	Microbial Genetics & Strain Improvement	CC	3	1	-	4
MMC 121	Introduction of Industrial Microbiology Lab.	CC	-	-	4	2
MMC 122	Microbial Physiology Lab.	CC	-	-	2	1
MMC 123	Enzyme Technology and Biosensors Lab.	CC	-	-	2	1
MMC 124	Microbial Genetics & Strain Improvement Lab.	CC	-	-	4	2
Domain Elective-I: Choose anyone from the following courses						
MMC 111	Biostatistics, IPR, Biosafety and Bioethics	DE	3	-	-	3
MMC 112	Industrial Safety & Management					
Value Added Courses						
BCS 111	Communication Skills – I	VA	1	-	-	1
BSS 111	Behavioral Science – I	VA	1	-	-	1

FLT 111 FLG 111 FLS 111 FLC 111	Foreign Language – I French German Spanish Chinese	VA	2	-	-	2
AND001	Aanandam I	NTCC	2	-	-	2
	TOTAL					**31**

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Program Name: M.Sc. –INDUSTRIAL MICROBIOLOGY

SECOND SEMESTER

Course Code	Course Title	Category	Lectures(L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits

MMC 201	Immunology	CC	4	-	-	4
MMC 202	Fermentation Technology and Metabolic Pathways	CC	3	-	-	3
MMC 203	Food and Dairy Microbiology	CC	3		-	3
MMC 221	Immunology Lab	CC	-	-	4	2
MMC 222	Fermentation Technology and Metabolic Pathways Lab	CC	-	-	4	2
MMC 223	Food and Dairy Microbiology Lab	CC	-	-	4	2
Domain Elective-II : Choose any one from the following courses						
MMC 211	Pharmaceutical Microbiology & Herbal Technology	DE	3	-	-	3
MMC 212	Nanobiotechnology					
Open Elective-I		OE				3
BCS 211	Communication Skills – II	VA	1	-	-	1
BSS 211	Behavioral Science – II	VA	1	-	-	1
FLT 211 FLG 211 FLS 211 FLC 211	Foreign Language – II French German Spanish Chinese	VA	2	-	-	2
AND002	Aanadam II	NTCC	2	-	-	2
	TOTAL					**28**

Note: -Term Paper/ Case Study topic distribution before summer vacations and will be evaluated in Third Semester.

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Program Name: M.Sc. –INDUSTRIAL MICROBIOLOGY

THIRD SEMESTER

Course Code	Course Title	Category	Lectures(L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
MMC 301	RDT & Genomics	CC	3	1	-	4
MMC 302	Environment & Agricultural Microbiology	CC	3	-	-	3
MMC 303	Clinical Microbiology	CC	3	1	-	4
MMC 321	RDT & Genomics Lab	CC	-		4	2
MMC 322	Environment & Agricultural Microbiology Lab	CC	-	-	4	2
MMC 323	Clinical Microbiology Lab	CC	-	-	4	2
Domain Elective-III: Choose any one from the following courses						
MMC 311	Instrumentation & Techniques in Microbiology	DE	3	-	-	3
MMC 312	Marine Microbiology					
MMC 313	Cellular Microbiology					
Open Elective- II		OE				3
MMC 330	Term Paper	NTCC	-	-	-	3
BCS 311	Communication Skills – III	VA	-	-	-	1
BSS 311	Behavioral Science – III	VA	-	-	-	1
FLT 311 FLG 311 FLS 311 FLC 311	Foreign Language – III French German Spanish Chinese	VA	-	-	-	2

AND 003	Aanandam III	NTCC	2	-	-	2
	TOTAL					**32**

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Program Name: M.Sc. –INDUSTRIAL MICROBIOLOGY

FOURTH SEMESTER

Course Code	Course Title	Lectures(L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
MMC 460	Research Project & Dissertation	-	-	-	25
	TOTAL	-	-	-	**25**

Total Credits (29+26+30+25) = 110

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Introduction to Microbiology	MMC 101	4:0:0	4	1

A. Course Learning Outcomes (CLO)

CLO 1	Introduction and historical information on Microorganisms and their use in different industries
CLO 2	Acquire experimental skills of microbial handling
CLO 3	Demonstrate the advanced application of Microbes in emerging areas

B. Syllabus

Module I: - Bacteriology

Morphological features and arrangement of bacterial cells; eubacterial cell structure: Gram-positive and Gram-negative bacteria; Extracellular appendages: flagella- arrangement, basic structure, function; pili- different types, related functions; fimbriae- occurrence, function; glycocalyx- composition and role and capsule- microcapsule and slime.

Structure of gram-negative and gram-positive bacterial cell wall, spheroplasts, L-forms, periplasm; molecular and chemical structure of cell membrane; bacterial cytoskeleton (tubulin and actin filaments); General characteristics of archaea, archaeal cell wall, and cell membrane; Bacterial reproduction- Binary fission and other forms of reproduction in bacteria, endospore-formation, and biological role; general account of mycoplasma.

Module II: - Virology

The general properties of viruses, nomenclature, and classification of viruses; morphology and ultrastructure; capsids and their arrangements; types of envelopes

Viral structure- different types, Viral genomes- dsDNA, segmented DNA genomes. ssDNA, dsRNA. ssRNA (+) strand, ssRNA (+) sense with DNA intermediate, ssRNA (-) sense, Ambisense RNA genomes, Viral assembly; virus-related agents (viroids, prions).

Cultivation of viruses in embryonated eggs, experimental animals, and cell cultures.

Module III: - Mycology

General features of fungi, Classification of fungi, Different forms- Hyphae and non-motile unicells, motile cells, spores, dormancy, growth of population, and colonies. Nutrition, heterothallism, sex hormones in fungi, physiological specialization in fungi, fungi and ecosystem- saprophytic parasitic, mutualistic and symbiotic relationship with plants and animals, Reproduction in fungi: asexual, sexual, and parasexual.

Classification of fungi; Introduction to different classes- Acrasiomycetes, Myxomycetes, Chytridiomycetes, Oomycetes, Zygomycetes, Ascomycotina, Basidiomycotina, Deuteromycetes.

Module IV: Phycology

Introduction of algae: Occurrence and distribution, thallus structure, characteristics, nutrition, classification and reproduction, green algae, diatoms, euglenoids, brown Rhodophyta, pyrrophyta, Lichens and their biological significance.

Module V: - Other eukaryotic microorganisms

Protozoa- general account, Diversity, cellular structure, classification, reproduction, life cycles, nutrition

Helminthes- general account, reproduction, classification, flatworms, thorny-headed worms, tapeworms, flukes, nematodes

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Prescott's Microbiology by J. Willey, L. Sherwood and C. J. Woolverton. 10th edition. McGraw Hill Education. 2017.
2. Brock Biology of Microorganisms by M. Madigan, K. Bender, D. Buckley, W. Sattley, D. Stahl. 15th Edition. Pearson Education. 2018.
3. Alcamo's Fundamentals of Microbiology by J. C. Pommerville. 10th Edition. Jones and Bartlett Learning. 2013.

4. General Microbiology by R. Stanier, J. Ingraham, M. Wheelis, R.Painter. 5th edition. Macmillan, Hampshire & London Publishers. 1992.
5. Microbiology by M. Pelczar, E. Chan & R. Reid. 4th Edition. McGraw Hill Education. 1998

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Course Name	Course Code	LTP	Credit	Semester
Microbial Physiology	MMC 102	3:1:0	4	1

A. Course Learning Outcomes (CLO)

CLO 1	Able to describe the principals of metabolism and growth process in microbes
CLO 2	Explain the principals of microbial metabolism and nutrition based on experimental results
CLO 3	Evaluate and relate contemporary issues with reference to microbial physiology

B. Syllabus

Module 1: -Principles of Microbial Nutrition

Bacterial nutrition: Basic nutritional requirements, nutritional classification, Membrane transport - Simple diffusion and facilitated diffusion. Passive transport - glucose transporter, anion transporter and porins. Primary active transporters - P type ATPases, V type ATPases, F type ATPases. Secondary active transporters - lactose permease, Na+ -glucose symporter. ABC transporters. Ion channels - voltage-gated ion channels (Na+ /K+ voltage-gated channel), ligand-gated ion channels (acetyl choline receptor), aquaporins, bacteriorhodopsin. Ionophores.

Module II: - Microbial Metabolism

Aerobic Respiration - Concept of aerobic respiration, anaerobic respiration and fermentation. Sugar degradation pathways i.e. EMP, ED, Pentose phosphate pathway, TCA cycle. Electron transport chain: components of the respiratory chain, comparison of mitochondrial and bacterial. ETC, electron transport phosphorylation, uncouplers and inhibitors.

Lipid metabolism: Biosynthesis of fatty acids and lipids. Oxidation of fatty acids. Nucleotide metabolism: Biosynthesis of purine and pyrimidine nucleotides. Catabolism of nucleotides. Inorganic Nitrogen assimilation- nitrate and ammonia assimilation; General account of amino acid biosynthesis and protein utilization, Bacterial photosynthesis- Carbon dioxide fixation.

Module III: - Microbial Growth

Introduction to microbial growth, components of culture media, different types of media, phases of growth, growth curve, the kinetics of growth, measurement of growth, continuous & batch culture, synchronous growth, chemostat, and turbidostat.

Microbial growth in response to environment - Temperature (psychrophiles, mesophiles, thermophiles, extremophiles, thermodurics, psychrotrophs), pH (acidophiles, alkaliphiles), solute and water activity (halophiles, xerophiles, osmophilic), Oxygen (aerobic, anaerobic, microaerophilic, facultative aerobe, facultative anaerobe), barophilic.

Module IV: Bacterial Secretion Systems

Bacterial secretion system: Introduction; Sec secretion pathway; SecB secretion pathway; SRP pathway; Tat pathway; Type I, Type II, Type III (T3SS; injectisome, injectosome), Type IV, Type V, Type VI; Sec A2, Sortases and Type VII secretion systems.

Module V: - Yeast & Solvent tolerance in microbes:

Cytology and Physiology of wine Yeasts: types of wine yeast, the biology, and cytology of yeasts, alternative nuclear phase and alternative life cycles of yeast, homothallism, and heterothallism. morphology of yeast during vegetative multiplication, sexual reproduction, and spore formation, colonial morphology, formation of pseudo and true mycelia of yeast, active dry/compressed yeast. Habitat & distribution of solvent tolerant organisms, genes for solvent tolerance; Partition coefficient log P as an index of solvent tolerance in Microorganisms, different form of yeast biomass used in breweries.

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Lehninger Principles of Biochemistry by David L. Nelson and Michael M. Cox. Fifth Edition, W.H. Freeman and Company;2008
2. Microbial Physiology by Albert G. Moat and John W. Foster. Third Edition John Wiley and Sons;2002
3. Freeman WH (2001) Biochemistry, Stryer 5th edition

4. Biochemistry by Geoffrey L. Zubay. 4th Edition. Brown Co, USA. 1999
5. The Physiology and Biochemistry of Prokaryotes by D. White, J. Drummond, C. Fuqua. 4th Edition. Oxford University Press. 2011.
6. Microbial Biochemistry by G. N. Cohen. 2nd Edition. Springer. 2014.
7. Caldwell D.H. 1995 Microbial Physiology and Metabolism. Win C Brown publishers.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Enzyme Technology and Biosensors	MMC 103	3:1:0	4	1

A. Course Learning Outcomes (CLO)

CLO 1	Distinguish the fundamentals of enzymes, properties, characteristics, and mechanism.
CLO 2	Compare methods for production, purification, immobilization, and applications of enzymes.
CLO 3	Discover the current and future trends of enzyme technology, protein engineering and biosensor design.

B. Syllabus

Module I: - Introduction to Enzymology & Enzyme Kinetics

Enzyme: Classification, Active site, mechanism of enzyme action.

Enzyme kinetics: factors affecting rates of enzyme-mediated reactions. Michaelis-Menton equation and its significance in enzyme kinetic studies. Lineweaver-Burke plot, Haldane-Briggs relationship, Anomalous kinetics of competitive, uncompetitive, non – competitive inhibition, End product inhibition with examples. Co-enzymes and Co-factors: Substrate enzyme relationship. Classification of co-enzymes as group transfer, hydrogen transfer, co-enzymes, function of nucleotide co-enzymes, CoA, NAD.NADP, FMN/FAD, Biotin, Folic acid, Vit.-B-12.

Module II: - Enzyme Purification

Importance of enzyme purification, different sources of enzymes. Extracellular and intracellular enzymes. Physical and Chemical methods used for cell disintegration. Enzymefractionation by precipitation (using Temperature, salt, solvent, pH, etc.), liquid-liquid extraction, ionic exchange, gel chromatography, affinity chromatography, and other special purification methods. Enzyme crystallization techniques. Criteria of purity of enzymes, large-scale enzyme extraction, purification, and stabilization.

Module-III: **- Enzyme Immobilization**

Physical and Chemical techniques for enzyme Immobilization - adsorption. Matrix entrapment, encapsulation. cross-linking. covalent binding - examples; Advantage and disadvantage of different Immobilization techniques. Overview of applications of immobilized enzyme systems, the effect of pH, temperature on immobilized reaction kinetics.

Module IV: - Protein Engineering

Design and construction of novel proteins and enzymes, Conformation of proteins in general and enzymes in particular, Effect of amino acids on the structure of proteins, Structure-function relations of enzymes, Physical methods such as x-ray crystallography for determination of protein structure, Site-directed mutagenesis for specific protein function, Gene shuffling and chimeric enzymes. Over expression and folding of proteins. Specific examples of enzyme engineering. A general account and applications of designer enzymes including- Abzymes, ribozymes

Module V: - Biosensors

Definitions, history, and market needs. Target analytes. Sensors based on: nucleotides, antigen-antibody, enzymes, and whole cells. Transducers: electrodes, photometric and acoustic. Signal processing. Case studies: immuno-sensors. Clinical, environmental, industrial, and military applications, future prospects.

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

Suggested Readings

1. Allosteric Enzymes - Kinetic Behaviour. 1982. by B.I. Kurganov. JohnWiley and Sons. Inc., New York.
2. Biotechnology. Volume 7 A - Enzymes in Biotechnology. 1983 Edited byH. J. Rehm and G. Reed. Verlag Chemie.

3. Handbook of enzyme biotechnology: Edited by Alan Wiseman. Pp. 276. Published by Ellis Horwood Ltd., Chichester, U.K. and distributed by John Wiley and Sons Ltd., 1975.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Microbial Genetics & Strain Improvement	MMC 104	3:1:0	4	1

A. Course Learning Outcomes (CLO)

CLO 1	Understanding of genetic material and ability to explain the processes and mechanism behind mutagenesis and recombination
CLO 2	Ability to explain genome expression and genetic regulatory mechanisms
CLO 3	Capability to do genetic analysis of microbes and apply knowledge for strain improvement

B. Syllabus

Module-I: **-Introduction**

Genetic material- nature, properties. Types, properties, structure, and chemical nature of DNA and RNA. C- value paradox, denaturation-renaturation kinetics topology, DNA superhelicity, linking number. Organization of prokaryotic and eukaryotic chromosomes and genomes. Repetitive DNA, Transposition: Structure of Transposons, mechanism of transposition, transposon mutagenesis. Plasmids: Plasmids as extrachromosomal genetic elements; types and properties. Structure different plasmids: Col E1, F1, R, and Ti plasmids.

Module-II: **-Mutagenesis& Recombination**

Molecular basis of mutations, Types of gene mutations, suppression of mutations. Radiation induced mutations, toxicity testing. Systems that safeguard DNA – DNA methylation and DNA repair mechanisms –Daughter – strand gap repair (in lesions) bypass synthesis, transcription-coupled DNA repair, Direct reversal of DNA damage, excision repair, mismatch repair, error-prone repair, homologous recombination and repair, end-joining repair, SOS repair

Genetic recombination; Hollyday model, Meselson-Radding model, and illegitimate recombination.

Bacterial Conjugation: mechanism, interrupted mating, mapping genes in bacteria. Bacterial Transformation: competence, the molecular mechanism of transformation, mapping by transformation. Bacterial Transduction: Specialized and generalized transduction, co-transduction and linkage, mapping by co-transduction.

Module-III: - **Maintenance and Expression of Genetic Information**

Mechanism, regulation of prokaryotic & eukaryotic DNA replication.

The mechanism, regulation of prokaryotic & eukaryotic RNA transcription. Role of enzymes and transcription factors. Post-transcriptional modification of RNA- splicing, editing capping, polyadenylation, mRNA stability, and export from the nucleus. Processing of other RNA's ribosome formation; RNA dependent synthesis of RNA and DNA.

Genetic code and mechanisms of translation in prokaryotes & eukaryotes. Regulation of translation, inhibitors of translation. Post–translation processes: Protein modification, folding, chaperones, transportation; The Signal Hypothesis, protein degradation.

Module-IV: - **Gene Regulation**

Organization of gene in prokaryotes and Eukaryotes - Introduction, Operon concept, lac and Trp operons, promoters and repressors, regulation of gene expression - Transcriptional control - promoters, terminators, attenuators and anti-terminators; Induction and repression; the lac operon - catabolite repression; Biosynthesis; trp operon - upstream activator sequences and enhancers, two-component regulatory systems. Translational control - ribosome binding, codon usage, antisense RNA; post-translational control.

Global, stringent, and heat-shock response in bacteria.

Module-V: - Isolation, selection, and Screening of industrial microorganisms.

Strain improvement for the selected organism: mutation and screening of improved cultures, random and strategic screening methods, strategies of strain improvement for primary, secondary metabolites with relevant examples. Use of recombinant DNA technology, protoplast fusion techniques for strain improvement of primary and secondary metabolites. Production of recombinant molecules in the heterologus system, problems associated with strain improvement program, improvement of characters other than products, and its application in the industry. Preservation of cultures after strain improvement program.

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Gene IX by Benjamin Lewin, Jones and Bartlett Publishers, Sudbury, Massachusetts,2007
2. Molecular Biology of the Gene by J. D. Watson, T.A. Baker, S. P. Bell , A. Gann, M. Levin, R. Losick, 6th edition, Benjamin Cummings, San Francisco, USA,2007.
3. Molecular Biology of the Cell by B. Alberts, A. Johnson, J. Lewis, M. Raff, K. Roberts, P. Walter, 5th edition, Garland Science, New York and London,2007
4. Biochemistry (5th edition) by J.M. Berg, J.L. Tymoczko, L. Stryer, W.H. Freeman and Company, New York, USA, 2008.
5. Concepts of Genetics by W.S. Klug, and M.R. Cummings 2004. Publisher: Pearson Education
6. Genome by T.A. Brown.2nd edition Publisher: Oxford: Wiley-Liss; 2002.

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Course Name	Course Code	LTP	Credit	Semester
Introduction of Industrial Microbiology Lab.	MMC 121	0:0:4	2	1

A. Course Learning Outcomes (CLO)

CLO 1	**To provide hands on experience to the students about microbiology experiments**
CLO 2	**To understand cultivation of microorganisms**
CLO 3	**To understand the techniques used in microbiology laboratory**

B. Syllabus

Course objectives

The course aims to give hands-on training to students for enhancing their practical skills in the subject domain.

Course Content

A minimum of 8 laboratory exercises will be conducted based on theory papers MMC 101

Examination Scheme:

Components	Mid term	Case study	Presentation	MCQ	Attendance	EE
Weightage (%)	14	10	10	10	5	50

Suggested Readings

1. Prescott's Microbiology by J. Willey, L. Sherwood and C. J. Woolverton. 10th edition. McGraw Hill Education. 2017.
2. Brock Biology of Microorganisms by M. Madigan, K. Bender, D. Buckley, W. Sattley, D. Stahl. 15th Edition. Pearson Education. 2018.

3. Alcamo's Fundamentals of Microbiology by J. C. Pommerville. 10th Edition. Jones and Bartlett Learning. 2013.
4. General Microbiology by R. Stanier, J. Ingraham, M. Wheelis, R.Painter. 5th edition. Macmillan, Hampshire & London Publishers. 1992.
5. Microbiology by M. Pelczar, E. Chan & R. Reid. 4th Edition. McGraw Hill Education. 1998

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Course Name	Course Code	LTP	Credit	Semester
Microbial Physiology Lab	MMC 122	0:0:2	1	1

A. Course Learning Outcomes (CLO)

CLO 1	**To understand microbial physiology, nutrition and growth**
CLO 2	**To grow the microbial cells for mass production of metabolites**
CLO 3	**To understand the resistance in microbial cells**

B. Syllabus

Course objectives

The course aims to give hands-on training to students for enhancing their practical skills of the subject domain.

Course Content

A minimum of 8 laboratory exercises will be conducted based on theory papers MMC 102

Examination Scheme:

Components	Mid term	Case study	Presentation	MCQ	Attendance	EE
Weightage (%)	14	10	10	10	5	50

Suggested Readings

1. Lehninger Principles of Biochemistry by David L. Nelson and Michael M. Cox. Fifth Edition, W.H. Freeman and Company;2008
2. Microbial Physiology by Albert G. Moat and John W. Foster. Third Edition John Wiley and Sons;2002
3. Freeman WH (2001) Biochemistry, Stryer 5th edition
4. Biochemistry by Geoffrey L. Zubay. 4th Edition. Brown Co, USA. 1999
5. The Physiology and Biochemistry of Prokaryotes by D. White, J. Drummond, C. Fuqua. 4th Edition. Oxford University Press. 2011.

6. Microbial Biochemistry by G. N. Cohen. 2nd Edition. Springer. 2014.
7. Caldwell D.H. 1995 Microbial Physiology and Metabolism. Win C Brown publishers.

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Course Name	Course Code	LTP	Credit	Semester
Enzyme Technology and Biosensors Lab.	MMC 123	0:0:2	1	1

A. Course Learning Outcomes (CLO)

CLO 1	**To understand the enzyme production and activity estimation**
CLO 2	**To explore the application of enzymes in industry**
CLO 3	**To study the behavior of the enzyme in different systems**

B. Syllabus

Course objectives

The course aims to give hands-on training to students for enhancing their practical skills of the subject domain.

Course Content

A minimum of 8 laboratory exercises will be conducted based on theory papers MMC 103

Examination Scheme:

Components	Performance	VIVA	Lab record	Observations	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Allosteric Enzymes - Kinetic Behaviour. 1982. by B.I. Kurganov. JohnWiley and Sons. Inc., New York.
2. Biotechnology. Volume 7 A - Enzymes in Biotechnology. 1983 Edited byH. J. Rehm and G. Reed. Verlag Chemie.

3. Handbook of enzyme biotechnology: Edited by Alan Wiseman. Pp. 276. Published by Ellis Horwood Ltd., Chichester, U.K. and distributed by John Wiley and Sons Ltd., 1975.

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Course Name	Course Code	LTP	Credit	Semester
Microbial Genetics & Strain Improvement Lab.	MMC 124	0:0:4	2	1

A. Course Learning Outcomes (CLO)

CLO 1	**To understand the techniques used for DNA estimation**
CLO 2	**To perform the process of strain improvement**
CLO 3	**To differentiate between extracellular and genomic DNA**

B. Syllabus

8-10 experiments related to the theory course

Examination Scheme:

Components	Performance	VIVA	Lab record	Observations	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Gene IX by Benjamin Lewin, Jones and Bartlett Publishers, Sudbury, Massachusetts,2007
2. Molecular Biology of the Gene by J. D. Watson, T.A. Baker, S. P. Bell , A. Gann, M. Levin, R. Losick, 6th edition, Benjamin Cummings, San Francisco, USA,2007.
3. Molecular Biology of the Cell by B. Alberts, A. Johnson, J. Lewis, M. Raff, K. Roberts, P. Walter, 5th edition, Garland Science, New York and London,2007
4. Biochemistry (5th edition) by J.M. Berg, J.L. Tymoczko, L. Stryer, W.H. Freeman and Company, New York, USA, 2008.
5. Concepts of Genetics by W.S. Klug, and M.R. Cummings 2004. Publisher: Pearson Education
6. Genome by T.A. Brown.2nd edition Publisher: Oxford: Wiley-Liss; 2002.

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Course Name	Course Code	LTP	Credit	Semester
Biostatistics, IPR, Biosafety and Bioethics	MMC 111	3:0:0	3	1

A. Course Learning Outcomes (CLO)

CLO 1	Application of the statistical tools in biological research
CLO 2	Understanding of the ethical issues while planning the research
CLO 3	Understanding of the preservation of intellectual property

B. Syllabus

Module I:- Biostatistics

Statistics, it's meaning and objectives, Population samples, frequency tables, and their graphs, measures of central tendency (mean, mode, median), and their dispersion. Concepts of moments, Skewness, and kurtosis. Intuitive definition of random variables, probability mass function, and probability density function, expectation, and variance.Standard distribution; binomial, Poisson, and normal distribution with their important properties and significance.

Module II:- Biostatistics

Fitting of main distributions and testing of goodness –of – the –fit with special reference to $\chi 2$-test, t-test, Z-test. Fitting of trends; linear and quadratic with least square method. Lines of regression, coefficient of correlation, coefficient of variation, and their significance. Analysis of variance; one-way and two-way classification.

Module III:- IPR

Objectives of Intellectual Property Rights, tangible and intangible property; concept and classification of intellectual property: Copyrights and related rights, Trademarks and

Geographical indications, Rights of traditional Knowledge, and Protection of Plant Varieties. IPR- National and International perspective, WTO, TRIPS, and WIPO.

Patent- Basic criterion for patentability, Patentable subjects, patentable inventions, patent acquisition, infringement of patent, discovery vs invention, product patenting vs process patenting, special issue in biotechnology patent, Patenting laws in Indian and International perspective, Case studies: Basmati case, Neem controversy, Turmeric case.

Module IV: - Biosafety

Biosafety: definition, concepts and issues. Introduction to Biological Safety Cabinets; Containment for Biohazards; Biosafety Levels; Biosafety Levels of Specific Microorganisms; Recommended Biosafety Levels for Infectious Agents and Infected Animals.

Biosafety Guidelines: Biosafety guidelines and regulations (National and International)- operation of biosafety guidelines and regulations of Government of India; Definition of GMOs & LMOs; Roles of Institutional Biosafety Committee, RCGM, GEAC etc. for GMO applications in food and agriculture; Environmental release of GMOs; Risk Analysis; Risk Assessment; Risk management and communication; Overview of National Regulations and relevant International Agreements including Cartegana Protocol.

Module IV:- Bioethics

Bioethics: Definition ethics/ bioethics, Principles of bioethics- framework for ethical decision making; biotechnology and ethics- benefits and risks of genetic engineering-ethical aspects of genetic testing- ethical aspects relating to use of genetic information- genetic engineering and biowarfare; Animal ethics - Norms in India - Licensing of animal house - Ethical clearance norms for conducting studies on human subjects.

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Beauchamp, T. L., Walters, L., Kahn, J. P., Mastroianni, A. C. 2007. Contemporary Issues in Bioethics. 7th Edition. Wasdsworth Publishing Company, California.
2. Paul, R.C. 2000. Situation of Human Rights in India. Commonwealth Publishers, New Delhi.

3. Daniel, Wayne W.: Biostatistics — A Foundations for Analysis in the Health Sciences. Wiley & Sons, New York, 6th ed. 1995,
4. Biostatistics: A manual of Statistical Methodology for use in Health, Nutrition and Anthropology, K. Visweswara Rao. Publisher: Jaypee Brothers, Second edition (1 January 2007).
5. Fundamentals of Mathematical Statistics, Eleventh Edition (2014)S.C Gupta and V.K Kapoor. Publisher: S. Chand & Co
6. Bareact, Indian Patent Act 1970 Acts & Rules, Universal Law Publishing Co. Pvt. Ltd., 2007
7. Kankanala C., Genetic Patent Law & Strategy, 1st Edition, Manupatra Information Solution Pvt. Ltd., 2007
8. Singh K. Intellectual Property Rights on Biotechnology, BCIL, and Newdelhi-1993.
9. Shaleesha A. Stanley, Bioethics, Wisdom educational service-2010
10. S. Ignacimuthu. Bioethics.Alpha Science International, 2009.

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Industrial Safety and Management	MMC 112	3:0:0	3	1

A. Course Learning Outcomes (CLO)

CLO 1	Understanding of the industrial hazards and their control
CLO 2	Ability to design industrial plant, maintaining plant safety and industrial laws
CLO 3	Prevention of the occupational diseases

B. Syllabus

Module I: - Hazards

Classification: Chemical hazards. Radiation hazards and control of exposure to radiation. Types of fire and fire prevention methods. Mechanical hazards. Electrical hazards. Biological hazards.

Module II: - Psychology and Hygiene

Industrial psychology Industrial hygiene. Safety in plant site selection and plant layout. Industrial lighting and ventilation. Industrial noise.

Module III: - Occupational diseases and control

Occupational diseases and prevention methods. Safe housekeeping, Instrumentation for safe operation. Personal protective equipment. Safety in chemical operations and processes.

Module IV: - Management

Safety organization – safety committee – safety education and training. Management process. Philosophy and need for Industrial safety. Role of Government in Industrial safety. Waste management (Effluent treatment).

Module V: - Laws

Factory Act. ESI Act, Environmental Act. Workplace – compensation Act. Advantages of adopting safety laws.

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Safety and Accident Prevention in Chemical Operation 2nd Edn., H.H. Fawcett& W.S .Wood Wiley Interscience(1982)
2. Industrial Safety Management by L M Deshmukh Publisher Tata McGraw-Hill Education(2005)
3. Industrial Safety and Health Management by C. Ray Asfahl , David W. Rieske, 6th Edition Publisher: Prentice Hall(2009)

AMITY UNIVERSITY
RAJASTHAN

AMITY Institute of Microbial Technology (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Professional Communication Skills	BCS 111	1:0:0	1	1

A. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate strengths and personal insights to be revealed in a Formal Setup of Communication.
CLO 2	Create right selection of words and ideas while also choosing the appropriate networking channel for formal communication
CLO 3	Apply their acquired knowledge with the appropriate selection of channel of formal communication.
CLO 4	Develop and empower self with the power of Words.
CLO 5	Enhance their technical writing capabilities while also learning about do's and don'ts of technical drafting.

B. SYLLABUS

Topic
Self Actualization (Baseline, Self Image Building, SWOT, Goal Setting)

Writing Skills (CV Writing, Email Writing, cover Letter, Application Writing)
GD based on current affairs, contemporary issues, sensitive issues, case study based and social issues
Body Language

EXAMINATION SCHEME:

Components	Self introduction	Group Discussion	Email Writing	Attendance
Weightage (%)	25	35	35	5

SUGGESTED READINGS

- Raman Prakash, Business Communication, Oxford
- Working in English, Jones, Cambridge
- Dr. P.Prasad. *Communication Skills*.S.K.Kataria &Sons
- Koneru, Aruna. *Professional Communication.* The McGraw Hill: New Delhi, 2008. Print
- New International Business English, Jones/Alexander, Cambridge

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Behavioural Science - I (Self-Development and Interpersonal Skills)	BSS 111	1:0:0	1	1

A. Course Learning Outcomes (CLO)

CLO 1	Demonstrate awareness of Self and the process of self-exploration.
CLO 2	Demonstrate knowledge of strategies for developing a healthy self-esteem & positive attitude
CLO 3	Identify the difference between healthy and unhealthy expression of emotions
CLO 4	Develop emotional competences necessary for personal and professional life.
CLO 5	Develop an understanding about stress, anger, adjustment and techniques to manage them

B. Syllabus

Module I: Understanding Self
Formation of self concept
Dimension of Self
Components of self
Self Competency

Module II: Self-Esteem: Sense of Worth
Meaning and Nature of Self Esteem
Characteristics of High and Low Self Esteem
Importance & need of Self Esteem
Self Esteem at work
Steps to enhance Self Esteem

Module III: Emotional Intelligence: Brain Power
Introduction to EI
Difference between IQ, EQ and SQ
Relevance of EI at workplace

Self assessment, analysis and action plan

Module IV: Managing Emotions and Building Interpersonal Competence
Need and importance of Emotions
Healthy and Unhealthy expression of emotions
Anger: Conceptualization and Cycle
Developing emotional and interpersonal competence
Self assessment, analysis and action plan

Module V: Leading Through Positive Attitude
Understanding Attitudes
Formation of Attitudes
Types of Attitudes
Effects of Attitude on
Behaviour
Perception
Motivation
Stress
Adjustment
Time Management
Effective Performance
Building Positive Attitude

Module VI: End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components					Attendance	EE
Weightage (%)					5	50

Suggested Readings

1. Towers, Marc: Self Esteem, 1st Edition 1997, American Media
2. Pedler Mike, Burgoyne John, Boydell Tom, A Manager's Guide to Self-Development: Second edition, McGraw-Hill Book Company.
3. Covey, R. Stephen: Seven habits of Highly Effective People, 1992 Edition, Simon & Schuster Ltd.,
4. Khera Shiv: You Can Win, 1st Edition, 1999, Macmillan
5. Gegax Tom, Winning in the Game of Life: 1st Edition, Harmony Books
6. Chatterjee Debashish, Leading Consciously: 1998 1st Edition, Viva Books Pvt. Ltd.
7. Dr. Dinkmeyer Don, Dr. Losoncy Lewis, The Skills of Encouragement: St. Lucie Press.
8. Singh, Dalip, 2002, Emotional Intelligence at work; First Edition, Sage Publications.
9. Goleman, Daniel: Emotional Intelligence, 1995 Edition, Bantam Books
10. Goleman, Daniel: Working with E.I., 1998 Edition, Bantam Books.

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language French - I	FLT 111	2:0:0	2	1

A. Course Learning Outcomes (CLO)

CLO 1	Identify and express in French vocabulary and grammar norms
CLO 2	Interpret different types of texts as well as cultural ideas and themes.
CLO 3	Demonstrate comprehension of nuance between script and sound in French
CLO 4	Narrate clearly ideas, themes in simple standard French

B. Syllabus

Module A: pp. 01 to 37: Unités 1, 2, Unité 3 Object if 1, 2

Only grammar of Unité 3: object if 3, 4 and 5

Contenu lexical:

Unité 1: Découvrir la langue française: (oral et écrit)

1. se présenter, présenter quelqu'un, faire la connaissance des autres, formules de politesse, rencontres
2. dire/interroger si on comprend
3. Nommer les choses

Unité 2: Faire connaissance

1. donner/demander des informations sur une personne, premiers contacts, exprimer ses goûts et ses préférences
2. Parler de soi: parler du travail, de ses activités, de son pays, de sa ville.

Unité 3:Organiser son temps

1. dire la date et l'heure

Contenu grammatical:

1. organisation générale de la grammaire
2. article indéfini, défini, contracté

3. nom, adjectif, masculin, féminin, singulier et pluriel
4. négation avec « de », "moi aussi", "moi non plus"
5. interrogation : Inversion, est-ce que, qui, que, quoi, qu'est-ce que, où, quand, comment, quel(s), quelle(s)
   Interro-négatif : réponses : oui, si, non
6. pronom tonique/disjoint- pour insister après une préposition
7. futur proche

C – Project +Presentation
I – Interaction/Conversation Practice

result of training
Exit Level Rating by Self and Observer

Examination Scheme:

Components					Attendance	EE
Weightage (%)					5	50

Suggested Readings

1. le livre à suivre : Campus: Tome 1

AMITY UNIVERSITY
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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language German- I	FLG 111	2:0:0	2	1

A. Course Learning Outcomes (CLO)

CLO 1	
CLO 2	
CLO 3	
CLO 4	

B. Syllabus

Module I: Introduction
Self introduction: heissen, kommen, wohnwn, lernen, arbeiten, trinken, etc.
All personal pronouns in relation to the verbs taught so far.
Greetings: Guten Morgen!, Guten Tag!, Guten Abend!, Gute Nacht!, Danke sehr!, Danke!, Vielen Dank!, (es tut mir Leid!),
Hallo, wie geht's?: Danke gut!, sehr gut!, prima!, ausgezeichnet!,
Es geht!, nicht so gut!, so la la!, miserabel!

Module II: Interviewspiel
To assimilate the vocabulary learnt so far and to apply the words and phrases in short dialogues in an interview – game for self introduction.

Module III: Phonetics
Sound system of the language with special stress on Dipthongs

Module IV: Countries, nationalities and their languages
To make the students acquainted with the most widely used country names, their nationalitie and the language spoken in that country.

Module V: Articles
The definite and indefinite articles in masculine, feminine and neuter gender. All Vegetables, Fruits, Animals, Furniture, Eatables, modes of Transport

Module VI: Professions
To acquaint the students with professions in both the genders with the help of the verb "sein".

Module VII: Pronouns
Simple possessive pronouns, the use of my, your, etc.
The family members, family Tree with the help of the verb "to have"

Module VIII: Colours
All the color and color related vocabulary – colored, colorful, colorless, pale, light, dark, etc.

Module IX: Numbers and calculations – verb "kosten"
The counting, plural structures and simple calculation like addition, subtraction, multiplication and division to test the knowledge of numbers.
"Wie viel kostet das?"

Module X: Revision list of Question pronouns
W – Questions like who, what, where, when, which, how, how many, how much, etc.

C – Project +Presentation
I – Interaction/Conversation Practice

Examination Scheme:

Components					Attendance	EE
Weightage (%)					5	50

Suggested Readings

1. Wolfgang Hieber, Lernziel Deutsch
2. Hans-Heinrich Wangler, Sprachkurs Deutsch
3. Schulz Griesbach, Deutsche Sprachlehre für Ausländer
4. P.L Aneja, Deutsch Interessant- 1, 2 & 3
5. Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1, 2
6. Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language Spanish - I	FLS 111	2:0:0	2	1

A. Course Learning Outcomes (CLO)

CLO 1	
CLO 2	
CLO 3	
CLO 4	

B. Syllabus

Module I
A brief history of Spain, Latin America, the language, the culture…and the relevance of Spanish language in today's global context.
Introduction to alphabets

Module II
Introduction to '*Saludos*' (How to greet each other. How to present / introduce each other).
Goodbyes (despedidas)
The verb *llamarse* and practice of it.

Module III
Concept of Gender and Number
Months of the years, days of the week, seasons. Introduction to numbers 1-100, Colors, Revision of numbers and introduction to ordinal numbers.

Module IV
Introduction to *SER* and *ESTAR* (both of which mean To Be).Revision of '*Saludos*' and '*Llamarse*'. Some adjectives, nationalities, professions, physical/geographical location, the fact that spanish adjectives have to agree with gender and number of their nouns. Exercises highlighting usage of *Ser* and *Estar*.

Module V

Time, demonstrative pronoun (Este/esta, Aquel/aquella etc)

Module VI
Introduction to some key AR /ER/IR ending regular verbs.

C – Project +Presentation
I – Interaction/Conversation Practice

Exit Level Rating by Self and Observer

Examination Scheme:

Components					Attendance	EE
Weightage (%)					5	50

Suggested Readings

1. Español, En Directo I A
2. Español Sin Fronteras

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language Chinese - I	FLC 111	2:0:0	2	1

A. Course Learning Outcomes (CLO)

CLO 1	
CLO 2	
CLO 3	
CLO 4	

B. Syllabus

Course Contents:

Module I
Show pictures, dialogue and retell.
Getting to know each other.
Practicing chart with Initials and Finals. (CHART – The Chinese Phonetic Alphabet Called "Hanyu Pinyin" in Mandarin Chinese.)
Practicing of Tones as it is a tonal language.
Changes in 3rd tone and Neutral Tone.

Module II
Greetings
Let me Introduce
The modal particle "ne".
Use of Please 'qing" – sit, have tea …….. etc.
A brief self introduction – Ni hao ma? Zaijian!
Use of "bu" negative.

Module III
Attributives showing possession
How is your Health? Thank you
Where are you from?

A few Professions like – Engineer, Businessman, Doctor, Teacher, Worker.
Are you busy with your work?
May I know your name?

Module IV
Use of "How many" – People in your family?
Use of "zhe" and "na".
Use of interrogative particle "shenme", "shui", "ma" and "nar".
How to make interrogative sentences ending with "ma".
Structural particle "de".
Use of "Nin" when and where to use and with whom. Use of guixing.
Use of verb "zuo" and how to make sentences with it.

Module V
Family structure and Relations.
Use of "you" – "mei you".
Measure words
Days and Weekdays.
Numbers.
Maps, different languages and Countries.

C – Project +Presentation
I – Interaction/Conversation Practice

Examination Scheme:

Components					Attendance	EE
Weightage (%)					5	50

Suggested Readings

1. Elementary Chinese Reader Part I" Lesson 1-10

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Anandam - I	AND 001	NTCC	2	1

A. Course Learning Outcomes (CLO)

CLO 1	Awareness and empathy regarding community issues
CLO 2	Interaction with the community and impact on society
CLO 3	Interaction with mentor and development of Student teacher relationship
CLO 4	Interaction among students, enlarge social network
CLO 5	Cooperative and Communication skills and leadership qualities
CLO 6	Critical thinking, Confidence and Efficiency

B. Syllabus

Course Objectives:

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

- apply their knowledge and skills to solve specific community problem
- learn to plan, lead, and organize community events have a sense of belonging to their college campus and community and find something they are interested in doing during their free time
- make new friends, expand social network, and boost social skills and mental health.
- be useful to society as it will protect them against stress, frustration, and depression

Course Contents:

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants, phone number/mobile no, email, and address)

- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)

ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**

- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Immunology	MMC 201	4:0:0	4	2

A. Course Learning Outcomes (CLO)

CLO 1	Enlisting and explanation of the cells, organs and molecules involved in immunity
CLO 2	Ability to describe the basic mechanisms that provide innate immunity
CLO 3	Understanding of the cell-mediated and humoral adaptive immune responses against extra and intracellular pathogens
CLO 4	Exploration of the immune system for various types of diseases and immunotherapy

B. Syllabus

Module-I: - **History, Structure and Function**

History and scope of Immunology. Types of immunity-innate, acquired, passive and active. physiology of immune response- HI and CMI, specificity and memory. Antigen, antibody reactions. Antigen types, Hapten, immunoglobulin structure, distribution, and function. Molecular biology of Ig synthesis, Lymphoid tissues, origin and development, differentiation of lymphocytes. Lymphocyte subpopulation of human beings. Structure and function of class I and II molecules

Module-II: -**Immune Cell Receptors**

Detailed structure and development of B cell (Ig) and T cell (TcR) receptors; Structure of CD4, CD8, MHC-I, MHC-II molecules, cellular adhesion molecules; Pattern Recognition Receptors (PRRs); Markers of suppressor/ regulatory cells- $CD4^{+}CD25^{+}Foxp3^{+}$ T_{reg}, iNKT.

Module-III: -**Genetic Organization**

Organization of the genes for B and T cell receptors. Genetic organization of MHC-I and MHC-II complex (both HLA and H-2). Molecular mechanisms are responsible for generating a

diversity of antibodies and T cell receptors. Peptide loading and expression of MHC-I and MHC-II molecules; Hybridoma technology and monoclonal antibodies, antibody engineering.

Module-IV: -**Immune responses, Autoimmunity, and hypersensitivity**

Humoral and cell-mediated immune response; Innate immune response and pattern recognition; Recent advances in innate immune response especially NK-DC interactions; Cytokines, their types and their role in immune mechanisms: TNF, IFN, IL-1, IL-2, IL-4, IL-6, IL-10, IL-12, IL-17, TGFβ

Central and peripheral tolerance, and their mechanism; Mechanisms of autoimmunity; Autoimmune components of diabetes mellitus (DM), multiple sclerosis (MS) experimental autoimmune encephalitides (EAE); Infections leading to autoimmune diseases.

Comparative study of different hypersensitivities with examples.

Module-V: -**Immunological Disorders, Transplant & Tumor immunology**

Deficiencies /defects of T cells, B cells, complement, and phagocytic cells.

Transplantation immunity- organ transplantation and HLA tissue typing, Alloreactive response; Graft rejection and GVHD; HLA- matching; Transgenic animals for xenotransplantation, Use of CRISPR-Cas for generating transgenic animals for xenotransplantation

Tumor antigens, immune response to tumors, and immunotherapy of tumors.

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Kuby Immunology by Kindt TJ, Goldsby RA, Osborne BA, Kuby J: 6th edition. New York. WH Freeman;2006
2. Cellular and Molecular Immunology by Abbas, Abul K; Lichtman, Andrew H; Pillai, Shiv. Eighth edition, Philadelphia, PA : Elsevier/Saunders, [2015]
3. Roitt's Essential Immunology by Delves PJ, Martin SJ, Burton DR, Roitt IM; 11th edition. Blackwell Publishing/Oxford Univ.Press;2006

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Fermentation Technology and Metabolic Pathways	MMC 202	3:0:0	3	2

A. Course Learning Outcomes (CLO)

CLO 1	Introduction to metabolic pathways and industrial productions
CLO 2	Understanding of the Fermentation Economics and Bioprocess Development.
CLO 3	Creating and understanding the design of specialized Bioreactors.

B. Syllabus

Module-I: -Fermentation and Metabolic Engineering

Historical introduction to Fermentation, Definition of Metabolism, Catabolism, Anabolism. Microbial fermentations, Classification of fermentations- Alcoholic, Mixed acid, Lactic acid etc. Regulation of primary & secondary metabolite production

Metabolic Engineering: Concepts, Metabolic pathways, control of metabolic networks, regulation of enzyme activities, regulation of enzyme concentration, tools for metabolic engineering, the extension of substrate range, the extension of the product spectrum, Enhancement of productivity, improvement of cellular properties, xenobiotic degradation, Metabolic flux analysis with examples.

Module-II: - Metabolite Production & Down Stream Processing

Media formulation at large scale & substrates for industrial fermentation. Sterilization-kinetics of thermal death of microorganisms, batch, and continuous sterilization. Inoculum development and scale-up of fermentation

Downstream processing: Biomass separation by centrifugation, filtration, flocculation, and other recent developments.

Cell disintegration: Physical, chemical, and enzymatic methods.

Extraction: Solvent, two phase, liquid extraction, whole broth, aqueous multiphase extraction. Purification by different methods.

Concentration by precipitation, ultra-filtration, reverse osmosis. Drying and crystallization.

Module-III: -Bioreactor

Design of a basic fermenter, bioreactor configuration, design features, individual parts-baffles, impellers, foam separators, sparger, culture vessel, cooling and heating devices, probes for online monitoring, computer control of fermentation process, measurement, and control of the process. Reactors for specialized applications: Tube reactors, packed bed reactors, fluidized bed reactors, cyclone reactors, trickle flow reactors, their basic construction and types for distribution of gases. Bioreactor for animal cell.

Module-IV: - Mass transfer reactions & Fermentation Economics

Transport phenomena in fermentation: Gas-liquid exchange and mass transfer, oxygen transfer, critical oxygen concentration, determination of Kla, heat transfer, aeration/agitation, its importance. Sterilization of Bioreactors, nutrients, air supply, products and effluents, process variables and control, scale-up of bioreactors.

Viable fermentation processes, cost, and market potential of the product

Module-V: - Metabolite Production

PrimaryMetabolites: Production processes of Organic acids (e.g. citric acid, acetic acid); Amino acids (Glutamic, lysine, aspartic acid&Phenylalanine); and Alcohols (ethanol).

Secondary Metabolites: Penicillin and Streptomycin, Vitamin(B12) and Steroids

Enzymes: amylases, protease, lipase, cellulase. Enzymes for the food pharmaceutical industries. Production of recombinant proteins (Insulin)

Alcoholic beverages: Beer, Whisky, Wines, Rum, Brandy, Vodka etc.

Natural biopresevatives: Bacteriocin/ nisin

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. "Principles of Fermentation Technology" by Stanbury, Whitaker and Hall,(1997) Aditya Books(P)Ltd., New Delhi

2. "Fermentation Microbiology and Biotechnology" Edited by E.M.T. El-Mansi, C.F.A. Bryce, A.L. Demain and A.R. Allman (2007), Taylor and Francis Grp., London.
3. "Bioprocess Engineering: Basic Concepts" by Michael L. Shuler and F. Kargi (2003) Prentice-Hall.
4. Lehninger Principles of Biochemistry by David L. Nelson and Michael M. Cox. Fifth Edition, W.H. Freeman and Company;2008
5. Microbial Physiology by Albert G. Moat and John W. Foster. Third Edition John Wiley and Sons;2002
6. Freeman WH (2001) Biochemistry, Stryer 5th edition.
7. Biotechnology : A Text Book of Industrial Microbiology by W. Crueger and A. Crueger, Panima Publishing Corporation, New Delhi/ Bangalore,2000
8. Modern Industrial Microbiology and Biotechnology by N. Okafer, Scientific Publishers, Enfield, USA.,2007
9. Industrial Microbiology: An Introduction by Waites, Morgan, Rockey and Highton, Blackwell Science, 2001.

AMITY UNIVERSITY
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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Fermentation Technology and Metabolic Pathways	MMC 202	3:0:0	3	2

A. Course Learning Outcomes (CLO)

CLO 1	Introduction to metabolic pathways and industrial productions
CLO 2	Understanding of the Fermentation Economics and Bioprocess Development.
CLO 3	Creating and understanding the design of specialized Bioreactors.

B. Syllabus

Module-I: -Fermentation and Metabolic Engineering

Historical introduction to Fermentation, Definition of Metabolism, Catabolism, Anabolism. Microbial fermentations, Classification of fermentations- Alcoholic, Mixed acid, Lactic acid etc. Regulation of primary & secondary metabolite production

Metabolic Engineering: Concepts, Metabolic pathways, control of metabolic networks, regulation of enzyme activities, regulation of enzyme concentration, tools for metabolic engineering, the extension of substrate range, the extension of the product spectrum, Enhancement of productivity, improvement of cellular properties, xenobiotic degradation, Metabolic flux analysis with examples.

Module-II: - Metabolite Production & Down Stream Processing

Media formulation at large scale & substrates for industrial fermentation. Sterilization-kinetics of thermal death of microorganisms, batch, and continuous sterilization. Inoculum development and scale-up of fermentation

Downstream processing: Biomass separation by centrifugation, filtration, flocculation, and other recent developments.

Cell disintegration: Physical, chemical, and enzymatic methods.

Extraction: Solvent, two phase, liquid extraction, whole broth, aqueous multiphase extraction.

Purification by different methods.

Concentration by precipitation, ultra-filtration, reverse osmosis. Drying and crystallization.

Module-III: -Bioreactor

Design of a basic fermenter, bioreactor configuration, design features, individual parts-baffles, impellers, foam separators, sparger, culture vessel, cooling and heating devices, probes for online monitoring, computer control of fermentation process, measurement, and control of the process. Reactors for specialized applications: Tube reactors, packed bed reactors, fluidized bed reactors, cyclone reactors, trickle flow reactors, their basic construction and types for distribution of gases. Bioreactor for animal cell.

Module-IV: - Mass transfer reactions & Fermentation Economics

Transport phenomena in fermentation: Gas-liquid exchange and mass transfer, oxygen transfer, critical oxygen concentration, determination of Kla, heat transfer, aeration/agitation, its importance. Sterilization of Bioreactors, nutrients, air supply, products and effluents, process variables and control, scale-up of bioreactors.

Viable fermentation processes, cost, and market potential of the product

Module-V: - Metabolite Production

PrimaryMetabolites: Production processes of Organic acids (e.g. citric acid, acetic acid); Amino acids (Glutamic, lysine, aspartic acid&Phenylalanine); and Alcohols (ethanol).

Secondary Metabolites: Penicillin and Streptomycin, Vitamin(B12) and Steroids

Enzymes: amylases, protease, lipase, cellulase. Enzymes for the food pharmaceutical industries. Production of recombinant proteins (Insulin)

Alcoholic beverages: Beer, Whisky, Wines, Rum, Brandy, Vodka etc.

Natural biopresevatives: Bacteriocin/ nisin

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. “Principles of Fermentation Technology” by Stanbury, Whitaker and Hall,(1997) Aditya Books(P)Ltd., New Delhi
2. “Fermentation Microbiology and Biotechnology” Edited by E.M.T. El-Mansi, C.F.A. Bryce, A.L. Demain and A.R. Allman (2007), Taylor and Francis Grp., London.
3. “Bioprocess Engineering: Basic Concepts” by Michael L. Shuler and F. Kargi (2003) Prentice-Hall.
4. Lehninger Principles of Biochemistry by David L. Nelson and Michael M. Cox. Fifth Edition, W.H. Freeman and Company;2008
5. Microbial Physiology by Albert G. Moat and John W. Foster. Third Edition John Wiley and Sons;2002
6. Freeman WH (2001) Biochemistry, Stryer 5th edition.
7. Biotechnology : A Text Book of Industrial Microbiology by W. Crueger and A. Crueger, Panima Publishing Corporation, New Delhi/ Bangalore,2000
8. Modern Industrial Microbiology and Biotechnology by N. Okafer, Scientific Publishers, Enfield, USA.,2007
9. Industrial Microbiology: An Introduction by Waites, Morgan, Rockey and Highton, Blackwell Science, 2001.

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Food and Dairy Microbiology	MMC 203	3:0:0	3	2

A. Course Learning Outcomes (CLO)

CLO 1	Introduction of food and dairy biochemistry & biology.
CLO 2	Discuss food & Dairy Microorganisms, food preservation and food commodities.
CLO 3	Exposure to Food Quality Assurance.

B. Syllabus

Module I: Introduction of Food & Dairy Microbiology

Historical development, Food as a substrate for microbes- classification of foods, chemistry of microbial food spoilage. Microbes important to food microbiology- molds, yeasts, bacteria, viruses, and protozoa. Factors affecting the growth and survival of microorganisms in foods: Intrinsic, Extrinsic.

Microflora associated with milk and milk products and their importance, Importance of somatic cell counts in milk, Sources of microbial contamination of raw milk and their relative importance in influencing the quality of milk during production, collection, transportation, and storage.

Module II: Food Spoilage

Microbiology of spoilage of specific foods – Bread, Cakes, Fresh fruits, cereals vegetables, Juices, Bottled water, Milk & milk products (cream, butter, ice-cream, evaporated & sweetened condensed milk, and dried milk), Tea & coffee, Meat & meat products (Fresh and ground meat, sausages), Poultry, Eggs, Seafood, Fish and spoilage of canned foods. Spoilage and defects of fermented dairy products. Detection of food spoilage and characterization.

Microbiological spoilage aspects of thermally processed milks; Role of psychrotrophic, thermoduric, thermophilic bacteria and their metabolites in milk spoilage, biofilms. Bacteriological grading of raw and heat-treated milk

Module III: Food Preservation

Heat (D, Z, and F values), Low-temperature storage, Freezing, Dehydration & water availability, Lyophilization, Osmotic pressure, Filtration, Irradiation, Chemical & natural preservatives, modified atmospheres, canning. Bactofugation, thermisation, and pasteurization, bacteriocin.

Module IV: Food Borne Diseases

Sources of food contamination, Foodborne intoxication, and infections: Major differences and examples of infective and toxic types, Botulism, Staphylococcal food poisoning, *Clostridium perfringens* food poisoning, *Bacillus cereus* gastroenteritis, Salmonellosis, *Escherichia coli* diarrhea and colitis, *Vibrio cholerae*. Fungal poisonings: *Aspergillus, Penicillium, Claviceps, Fusarium*, mycotoxins, Protozoan poisonings: Amoebiasis (*Entamoeba histolytica*), Giardiasis (*Giardia lamblia*). Viral diseases: Enterovirus, Hepatitis A & E, Norovirus, Rotavirus. Pathogenic microbes in milk and milk products

Module V: Microbial Production of Foods and their Quality Control

Application of microbial enzymes and baker's yeast in the food industry, Sauerkraut, Pickles, Silage, Bread, cheese, vinegar, Yogurt, acidophilus milk, bifidus milk, single-cell protein-substrates for SCP, advantages of SCP, Industrially used SCP (Quorn, Pruteen), mushroom Production, fermented meats & fish, Indian fermented foods, Soy sauce fermentation, oriental fermented foods, tea and coffee fermentations, fermented cereal products. Genetically modified foods. Dairy products as functional / health foods: LAB as probiotics in development of health foods

Module VI: Advanced Food Microbiology and Quality Assurance

Biosensors in the food industry, utilization of byproducts of the food industry, Microbiological examination of foods – sampling, culturing/analysis including newer methods such as PCR, magnetic separation, plant sanitation& hygiene, Food Safety Act and

Trade Regulations, Good Manufacturing Practice (GMP) and Quality Systems, Government regulations- BIS, FPS, FDA, EPA, HACCP, ISO, FSSAI and assessment formats.

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Food Microbiology. 2nd Edition by Adams, M.R. and Moss, Maurice O. Published by Royal Society of Chemistry (2000)
2. Basic Food Microbiology by Banwart George J.2nd Edition, Published by Van Nostrand Reinhold(1989)
3. Biotechnology: Food Fermentation Microbiology, Biochemistry and Technology.Volume2 by Dr. V. K. Joshi, Ashok Pandey, Educational Publishers & Distributors, 1999.
4. Essentials of Food Microbiology by John Garbutt; Publisher: CRC Press; 2 editions (1997) Arnold International.
5. Microbiology of Fermented Foods. Volume I and II.,2nd Edition,by B.J. Wood, Brian J.B. Wood, Published 1997 by Elsiever Applied Science Publication.
6. Dairy Microbiology by Robinson. Volume I and II.Wiley-Blackwell; 3rd Edition (2002)
7. Food Microbiology by Bibek Ray.CRC Press; 4 edition (2007)

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Immunology Lab	MMC 221	0:0:4	2	2

A. Course Learning Outcomes (CLO)

CLO 1	**To understand the antigen antibody interactions**
CLO 2	**To study the immunological properties of cells**
CLO 3	**To determine the immunogenic profiles of cells**

B. Syllabus

Course objectives

The course aims to give hands-on training to students for enhancing their practical skills of the subject domain.

Course Content

A minimum of 10 laboratory exercises will be conducted based on theory papers MMC 201

Examination Scheme:

Components	Performance	VIVA	Lab record	Observations	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Kuby Immunology by Kindt TJ, Goldsby RA, Osborne BA, Kuby J: 6th edition. New York. WH Freeman;2006
2. Cellular and Molecular Immunology by Abbas, Abul K; Lichtman, Andrew H; Pillai, Shiv. Eighth edition, Philadelphia, PA : Elsevier/Saunders, [2015]

3. Roitt's Essential Immunology by Delves PJ, Martin SJ, Burton DR, Roitt IM; 11th edition. Blackwell Publishing/Oxford Univ.Press;2006

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Fermentation Technology and Metabolic Pathways Lab	MMC 222	0:0:4	2	2

A. Course Learning Outcomes (CLO)

CLO 1	**To study the different fermentation processes**
CLO 2	**To understand the production of various metabolites**
CLO 3	**To understand the process of the industrial processing's**

B. Syllabus

Course objectives

The course aims to give hands-on training to students for enhancing their practical skills of the subject domain.

Course Content

A minimum of 10 laboratory exercises will be conducted based on theory papers MMC202

Examination Scheme:

Components					Attendance	EE
Weightage (%)					5	50

Suggested Readings

1. "Principles of Fermentation Technology" by Stanbury, Whitaker and Hall,(1997) Aditya Books(P)Ltd., New Delhi
2. "Fermentation Microbiology and Biotechnology" Edited by E.M.T. El-Mansi, C.F.A. Bryce, A.L. Demain and A.R. Allman (2007), Taylor and Francis Grp., London.
3. "Bioprocess Engineering: Basic Concepts" by Michael L. Shuler and F. Kargi (2003) Prentice-Hall.

4. Lehninger Principles of Biochemistry by David L. Nelson and Michael M. Cox. Fifth Edition, W.H. Freeman and Company;2008
5. Microbial Physiology by Albert G. Moat and John W. Foster. Third Edition John Wiley and Sons;2002
6. Freeman WH (2001) Biochemistry, Stryer 5th edition.
7. Biotechnology : A Text Book of Industrial Microbiology by W. Crueger and A. Crueger, Panima Publishing Corporation, New Delhi/ Bangalore,2000
8. Modern Industrial Microbiology and Biotechnology by N. Okafer, Scientific Publishers, Enfield, USA.,2007
9. Industrial Microbiology: An Introduction by Waites, Morgan, Rockey and Highton, Blackwell Science, 2001.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Food and Dairy Microbiology Lab.	MMC 223	0:0:4	2	2

A. Course Learning Outcomes (CLO)

CLO 1	**To understand role of microorganism in food and dairy processing**
CLO 2	**To study the role of food composition on the microbial growth**
CLO 3	**To determine the impact of the environmental factors on the growth**

B. Syllabus

Course objectives

The course aims to give hands-on training to students for enhancing their practical skills of the subject domain.

Course Content

A minimum of 10 laboratory exercises will be conducted based on theory papers MMC 203

Examination Scheme:

Components					Attendance	EE
Weightage (%)					5	50

Suggested Readings

1. Food Microbiology. 2nd Edition by Adams, M.R. and Moss, Maurice O. Published by Royal Society of Chemistry (2000)
2. Basic Food Microbiology by Banwart George J.2nd Edition, Published by Van Nostrand Reinhold(1989)
3. Biotechnology: Food Fermentation Microbiology, Biochemistry and Technology.Volume2 by Dr. V. K. Joshi, Ashok Pandey, Educational Publishers & Distributors, 1999.

4. Essentials of Food Microbiology by John Garbutt; Publisher: CRC Press; 2 editions (1997) Arnold International.
5. Microbiology of Fermented Foods. Volume I and II.,2nd Edition,by B.J. Wood, Brian J.B. Wood, Published 1997 by Elsiever Applied Science Publication.
6. Dairy Microbiology by Robinson. Volume I and II.Wiley-Blackwell; 3rd Edition (2002)
7. Food Microbiology by Bibek Ray.CRC Press; 4 edition (2007)

AMITY UNIVERSITY
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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Pharmaceutical Microbiology and Herbal Technology	MMC 211	3:0:0	3	2

A. Course Learning Outcomes (CLO)

CLO 1	Understand the role of pharmaceutical technology and microbiology in the development and validation of different pharmaceutical dosage forms.
CLO 2	Understanding of Pharmaceutical Dosage Forms & New Drug Delivery Systems.
CLO 3	Understanding of the role of Microbiology in Pharmaceutical Product development.
CLO 4	Understanding of herbal pharmaceutical industrial process.

B. Syllabus

Module –I: Introduction to Physical Pharmaceutics – Metrology, Calculations, and Posology. Particulate Technology: Particle Size, Size reduction, Size Separation, Powder Flow, and Compaction.

Unit Operations: Mixing, Evaporation, Filtration, Centrifugation, Extraction, Distillation, Sterilization, and Drying

Regulatory Practices, Quality assurance, and Validation

Introduction about IP, BP & USP. Drug & Cosmetic Act & Rules, Government regulatory practices and policies, FDA perspective. Good Manufacturing Practices (GMP) and Good Laboratory Practices (GLP) in pharmaceutical industry. Regulatory aspects of quality control. Quality assurance and quality management in pharmaceuticals ISO, WHO and US certification.

Module-II: Pharmaceutical Dosage Forms & Drug Delivery Systems

Introduction to different dosage forms, their classification with examples (Official formulation), their relative application. Various route of drug administration.

Drug Discovery and Development

Introduction of drug discovery and development process, Stages of new drug discovery & developments, pre-Clinical research, Clinical research, Pharmacovigilance, Pharmacokinetic, Pharmacodynamic and Toxicological considerations in drug development.

Module-III: - Herbal Technology-I

Herbal based Industry: Scope, study of infrastructure, staff requirement, project profiles, plant and equipment, processing, research and development, regulatory requirement. Pilot plant scale up techniques

Principles of Ayurvedic systems of medicine. Introduction to different dosage forms, Preparation and evaluation methods of Ayurvedic medicines i.e. Asavas and Aristas, Arkas, Avalehas, Churnas, Ghritas and Tailas, Guggulu preparations, Ksara, Lauha kalpas, Lepas, Vatika and Bhasmas.

Standardization of polyherbal formulations: syrups, powders, ointments and other semisolid preparations, tablets and capsules.

Module-IV: - Herbal Technology-II

Extraction, isolation, purification estimation and uses of following phytoconstituents:

Alkaloids: Caffeine, Atropine, Berberine, Piperine

Glycosides: Sennosides, Digoxin

Flavonoids: Rutin, Hesperidin

Terpenoids: Taxol, Andrographolide

Saponins: Diosgenin, Glycyrrhizin

Pharmaceutical Aids: Study of Pharmaceutical aids like talc, diatomite, kaolin, bentonite, gelatin, and natural colors.

Neutraceuticals: Introduction, probiotics & Prebiotics, Study of some plant constituents and their products in the international market, study of lycopene, proanthocyanidin and grape products, ornithine, flaxseed and flax oil, melatonin, and ornithine.

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Text and Reference Books: -

1. Mukherjee Pulok, Quality Control of Herbal Drugs, Business Horizons Limited, New Delhi.

2. Advances in Natural Product Chemistry, extraction and isolation of biologically active compounds. S. Natori et al., Wiley, New York.
3. Kalia AN, Textbook of Industrial Pharmacognosy, CBS publishers and Distributors.
4. Pharmacognosy by C.K. Kokate, A.P. Purohit and S.B. Gokhale, Nirali Prakashan, 2007
5. The Aurvedic Pharmacopoeia of India, 1999. Government of India, Ministry of Health and Family Welfare, Department of Indian Systems of Medicine and Homeopathy, New Delhi.
6. Textbook of Physical Pharmaceutics by C.V.S. Subrahmanyam, Vallabh Prakashan.
7. Text book of Pharmaceutical Engineering by C.V.S. Subrahmanyam, Vallabh Prakashan.
8. Pharmaceutical Dosage forms and Drug Delivery Systems, H.C. Ansel , L.V. Allen, N.G. Popovich, Lippincott Williams and Wilkins Publishers.
9. Drug Discovery and Clinical Research, by S.K Gupta, Published by JAYPEE Brothers Medical Publishers (P) Ltd
10. New Drug Development: Design, Methodology, and Analysis, by J. Rick Turner, Published by John Wiley & Sons, 2007.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Nanobiotechnology	MMC 212	3:0:0	3	2

A. Course Learning Outcomes (CLO)

CLO 1	**To explore the applications of nanotechnology in biological sciences**
CLO 2	**To understand the structural properties of the nanomaterials**
CLO 3	**To study the properties of the nanomaterials**

B. Syllabus

Module I: - Nanomaterials
Bio-mineralized Inorganic Nanomaterial – Nanostructure and Dynamics of Biocompatible Surfactant monolayer's and bilayers -Bioconjugation, Biometrix based on bioinspired phospholipids polymers.

Module II: - Applications
Self-assembly of ionic – complementary peptides and their applications in Nanobiotechnology – from nanocluster assays to optical biochips, bioactive nanomaterials in bone grafting, and tissue engineering inorganic /polymers nanocomposites for dental restoration and bone replacement applications.

Module III: - Nanostructures
DNA-based artificial nanostructures; fabrication, properties, and application – Nucleic acid engineered nanomaterials and their applications. Protein patterning for applications in biomaterials and biodevices.

Module IV: - Polymers
Polymers nanofibers and their applications in bioengineering - Functional polymers for bone tissue engineering applications

Module V: - Applications in Pharmaceuticals

Vesicles and liposomes in sensor technology- self-assembling nanostructure injectable polymeric gels for drug delivery – Engineering surface erodible polyanhdrides with tailored microstructure for controlled drug and protein delivery.

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Challa S.S.R. Kumar (Ed.).2006. Biological and Pharmaceutical nonmaterial's Wiley-VCH Verlag Gmbh and Co., KgaA.
2. K.K. Jain 2006 Nanobiotechnology in Molecular Diagnostics: Current Techniques and Applications Horizon Biosciences.
3. Niemeyer, C.M. Mirking C.A., (Eds.) 2004. Nono biotechnology concepts.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Bio-entrepreneurship	MMC 213	3:0:0	3	2

A. Course Learning Outcomes (CLO)

CLO 1	**To develop entrepreneurship skills in the students**
CLO 2	**To assess the startup project ideas in life sciences**
CLO 3	**To study the market research, marketing strategies for enterprise fundings**

B. Syllabus

Module-I: - **Introduction**

Entrepreneurship: Concept – Evolution – Theories, Role in Economic Development, and entrepreneurial traits.

Module-II: - **Market Research**

Market Study – Questionnaire Design / Survey, potential Consumers & Competitors, Market Strategy Development.

Module-III: - **IPR & Regulatory Agencies**

Introduction to IPR, Trademarks, Copywrites, Trade Secrets. Protection of IPR. Technology Transfer & Commercialization, Licensing Deal, Relevant National & International Agencies.

Module-IV: - **Resource Management**

Government & Non-Government schemes, fund raising, Bank Loans & Asset Values, Strategic Partners & Angel Investors. Business Incubation Centers.

Module-V: - **Project Management & Start up Methodology**

Procedure and Legal Formalities for startup, Project drafting, Bio – business modeling, new venture creation, pitching, Recruitment of relevant expertise.

E – Learning Links:

http://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S000023MA/P001403/M016027/ET/1465203437Module-7Entre.pdf

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Text and Reference Books: -

1 Drucker, P. Innovation and Entrepreneurship. 2Rev Ed edition. ButterworthHeinemann, 2010.

2 Hopkins, Bruce. A Legal Guide to Starting and Managing a Nonprofit Organization. 3rd edition. Wiley, 2000.

3 Jensen, Bill. Simplicity: The New Competitive Advantage in a World of More, Better, Faster. Perseus, 2001.

4. P. Saravanavelu, "Entrepreneurship Development", Eskapee Publications.

5 N.P. Srinivasan & G.P.Gupta, "Entrepreneurship Development", Sul tanchand & Sons.

6 Barringer M.J. "Entrepreneurship", Prentice-Hall, 1999

7 Robert D. Hisrich, Michael P. Peters, "Entrepreneurship Development", Tata McGraw Hill

8. Vasanth Desai, "Dynamics of Entrepreneurial Development and Management", Himalayas Publishing House

AMITY UNIVERSITY
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AMITY Institute of Microbial Technology(AIMT)

Course Name	Course Code	LTP	Credit	Semester
Professional Communication Skills	BCS 211	1:0:0	1	1

B. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Investigate strengths and personal insights to be revealed in a Formal Setup of Communication.
CLO 2	Create right selection of words and ideas while also choosing the appropriate networking channel for formal communication
CLO 3	Recognize the mannerisms and methodology of Interview.

B. SYLLABUS

Topic
Enhancing Speaking Skills (JAM, Extempore, Public Speaking : any one)
Poster Making (Current Affairs)
Dream company-based presentation/ PPT Presentation
Interview Essentials (Mock PI) + CV-2
Internship preparation (SOP, Documentation)

EXAMINATION SCHEME:

Components	Public Speaking	Presentation	Personal Interview	Attendance
Weightage (%)	30	30	35	5

SUGGESTED READINGS

- Raman Prakash, Business Communication, Oxford
- Working in English, Jones, Cambridge
- Dr. P.Prasad. *Communication Skills*.S.K.Kataria &Sons
- Koneru, Aruna. *Professional Communication.* The McGraw Hill: New Delhi, 2008. Print
- New International Business English, Jones/Alexander, Cambridge

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Behavioural Science - II (Behavioural Communication & Relationship Management)	BSS 211	1:0:0	1	2

A. Course Learning Outcomes (CLO)

CLO 1	
CLO 2	
CLO 3	
CLO 4	
CLO 5	

B. Syllabus

Module I: Behavioural Communication
Scope of Behavioural Communication
Process – Personal, Impersonal and Interpersonal Communication
Guidelines for developing Human Communication skills
Relevance of Behavioural Communication in relationship management

Module II: Managing Individual Differences in Relationships
Principles
Types of issues
Approaches
Understanding and importance of self disclosure
Guidelines for effective communication during conflicts

Module III: Communication Climate: Foundation of Interpersonal Relationships

Elements of satisfying relationships
Conforming and Disconfirming Communication
Culturally Relevant Communication
Guideline for Creating and Sustaining Healthy Climate

Module IV: Interpersonal Communication
Imperatives for Interpersonal Communication
Models – Linear, Interaction and Transaction
Patterns – Complementary, Symmetrical and Parallel
Types – Self and Other Oriented
Steps to improve Interpersonal Communication

Module V: Interpersonal Relationship Development
Relationship circle – Peer/ Colleague, Superior and Subordinate
Initiating and establishing IPR
Escalating, maintaining and terminating IPR
Direct and indirect strategies of terminating relationship
Model of ending relationship

Module VI:End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer
Examination Scheme:

Components					Attendance	
Weightage (%)					5	

Suggested Readings

1. Vangelist L. Anita, Mark N. Knapp, Inter Personal Communication and Human Relationships: Third Edition, Allyn and Bacon
2. Julia T. Wood. Interpersonal Communication everyday encounter
3. Simons, Christine, Naylor, Belinda: Effective Communication for Managers, 1997 1st Edition Cassell
4. Harvard Business School, Effective Communication: United States of America
5. Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language French - II	FLT 211	2:0:0	2	2

A. Course Learning Outcomes (CLO)

CLO 1	
CLO 2	
CLO 3	
CLO 4	

B. Syllabus

Module A: pp.38 – 47: Unité 3: Objectif 3, 4, 5. 6

Module B: pp. 47 to 75 Unité 4, 5

Contenu lexical: **Unité 3: Organiser son temps**

1. donner/demander des informations sur un emploi du temps, un horaire SNCF – Imaginer un dialogue
2. rédiger un message/ une lettre pour …
   i) prendre un rendez-vous/ accepter et confirmer/ annuler
   ii) inviter/accepter/refuser
3. Faire un programme d'activités

imaginer une conversation téléphonique/un dialogue

Propositions- interroger, répondre

Unité 4:Découvrir son environnement

1. situer un lieu
2. s'orienter, s'informer sur un itinéraire.
3. Chercher, décrire un logement
4. connaître les rythmes de la vie

Unité 5: s'informer

1. demander/donner des informations sur un emploi du temps passé.
2. donner une explication, exprimer le doute ou la certitude.
3. découvrir les relations entre les mots

4. savoir s'informer

Contenu grammatical:

1. Adjectifs démonstratifs
2. Adjectifs possessifs/exprimer la possession à l'aide de : i. « de » ii. A+nom/pronom disjoint
3. Conjugaison pronominale – négative, interrogative - construction à l'infinitif
4. Impératif/exprimer l'obligation/l'interdiction à l'aide de « il faut…. »/ «il ne faut pas… »
5. passé composé
6. Questions directes/indirectes

C – Project +Presentation
I – Interaction/Conversation Practice

Examination Scheme:

Components	CT1	CT2	C	I	V	Attendance
Weightage (%)	20	20	20	20	15	5

Suggested Readings

2. le livre à suivre : Campus: Tome 1

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language German- II	FLG 211	2:0:0	2	2

A. Course Learning Outcomes (CLO)

CLO 1	
CLO 2	
CLO 3	
CLO 4	

B. Syllabus

Module I: Everything about Time and Time periods
Time and times of the day.
Weekdays, months, seasons.
Adverbs of time and time related prepositions

Module II: Irregular verbs
Introduction to irregular verbs like to be, and others, to learn the conjugations of the same, (fahren, essen, lessen, schlafen, sprechen und ähnliche).

Module III: Separable verbs
To comprehend the change in meaning that the verbs undergo when used as such
Treatment of such verbs with separable prefixes

Module IV: Reading and comprehension
Reading and deciphering railway schedules/school time table
Usage of separable verbs in the above context

Module V: Accusative case
Accusative case with the relevant articles
Introduction to 2 different kinds of sentences – Nominative and Accusative

Module VI: Accusative personal pronouns

Nominative and accusative in comparison
Emphasizing on the universal applicability of the pronouns to both persons and objects

Module VII: Accusative prepositions
Accusative propositions with their use
Both theoretical and figurative use

Module VIII: Dialogues
Dialogue reading: 'In the market place'
'At the Hotel'

C – Project +Presentation
I – Interaction/Conversation Practice

Examination Scheme:

Components	CT1	CT2	C	I	V	Attendance
Weightage (%)	20	20	20	20	15	5

Suggested Readings

7. Wolfgang Hieber, Lernziel Deutsch
8. Hans-Heinrich Wangler, Sprachkurs Deutsch
9. Schulz Griesbach, Deutsche Sprachlehre für Ausländer
10. P.L Aneja, Deutsch Interessant- 1, 2 & 3
11. Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1, 2
12. Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language Spanish - II	FLS 211	2:0:0	2	2

A. Course Learning Outcomes (CLO)

CLO 1	
CLO 2	
CLO 3	
CLO 4	

B. Syllabus

Module I
Revision of earlier modules.

Module II
Some more AR/ER/IR verbs. Introduction to root changing and irregular AR/ER/IR ending verbs

Module III
More verbal phrases (eg, Dios Mio, Que lastima etc), adverbs *(bueno/malo, muy, mucho, bastante, poco).*
Simple texts based on grammar and vocabulary done in earlier modules.

Module IV
Possessive pronouns

Module V
Writing/speaking essays like my friend, my house, my school/institution, myself….descriptions of people, objects etc, computer/internet related vocabulary

Examination Scheme:

Components	CT1	CT2	C	I	V	Attendance

Weightage (%)	20	20	20	20	15	5

Suggested Readings

1. Español, En Directo I A
2. Español Sin Fronteras

AMITY UNIVERSITY
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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language Chinese - II	FLC 211	2:0:0	2	2

A. Course Learning Outcomes (CLO)

CLO 1	
CLO 2	
CLO 3	
CLO 4	

B. Syllabus

Course Contents:

Module I

Drills
Practice reading aloud
Observe Picture and answer the question.
Tone practice.
Practice using the language both by speaking and by taking notes.
Introduction of basic sentence patterns.
Measure words.
Glad to meet you.

Module II

Where do you live?
Learning different colors.
Tones of "bu"
Buying things and how muchit costs?
Dialogue on change of Money.
More sentence patterns on Days and Weekdays.
How to tell time. Saying the units of time in Chinese. Learning to say useful phrases like – 8:00, 11:25, 10:30 P.M. everyday, afternoon, evening, night, morning 3:58, one hour, to begin, to end ….. etc.
Morning, Afternoon, Evening, Night.

Module III
Use of words of location like-li, wais hang, xia
Furniture – table, chair, bed, bookshelf,.. etc.
Description of room, house or hostel room.. eg what is placed where and how many things are there in it?
Review Lessons – Preview Lessons.
Expression 'yao", "xiang" and "yaoshi" (if).
Days of week, months in a year etc.
I am learning Chinese. Is Chinese difficult?

Module IV
Counting from 1-1000
Use of "chang-chang".
Making an Inquiry – What time is it now? Where is the Post Office?
Days of the week. Months in a year.
Use of Preposition – "zai", "gen".
Use of interrogative pronoun – "duoshao" and "ji".
"Whose"??? Sweater etc is it?
Different Games and going out for exercise in the morning.

Module V
The verb "qu"
Going to the library issuing a book from the library
Going to the cinema hall, buying tickets
Going to the post office, buying stamps
Going to the market to buy things.. etc
Going to the buy clothes …. Etc.
Hobby. I also like swimming.
Comprehension and answer questions based on it.

C – Project +Presentation
I – Interaction/Conversation Practice

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	Attendance
Weightage (%)	20	20	20	20	15	5

Suggested Readings

2. Elementary Chinese Reader Part I" Lesson 11-20

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Anandam - II	AND 002	NTCC	2	2

A. Course Learning Outcomes (CLO)

CLO 1	Awareness and empathy regarding community issues
CLO 2	Interaction with the community and impact on society
CLO 3	Interaction with mentor and development of Student teacher relationship
CLO 4	Interaction among students, enlarge social network
CLO 5	Cooperative and Communication skills and leadership qualities
CLO 6	Critical thinking, Confidence and Efficiency

B. Syllabus

Course Objectives:

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

- apply their knowledge and skills to solve specific community problem
- learn to plan, lead, and organize community events have a sense of belonging to their college campus and community and find something they are interested in doing during their free time
- make new friends, expand social network, and boost social skills and mental health.
- be useful to society as it will protect them against stress, frustration, and depression

Course Contents:

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants, phone number/mobile no, email, and address)

- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)

ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
RDT & Genomics	MMC 301	3:1:0	4	3

A. Course Learning Outcomes (CLO)

CLO 1	Explain the tools and techniques of genetic engineering, DNA manipulation enzymes, genome and transcriptome analysis and manipulation tools.
CLO 2	Introduction of gene expression regulation, production and characterization of recombinant proteins.
CLO 3	Knowledge of advances in biotechnology- healthcare, agriculture and environment cleanup via recombinant DNA technology.

B. Syllabus

Module I: - Basics of Recombinant DNA Technology

Restriction enzymes- types, properties, DNA modifying enzymes - klenow enzymes, T4 DNA polymerase, DNA ligase, SI nuclease, bacterial alkaline phosphates, polynuclotide kinase., ligation- cohesive and blunt end, linkers, adaptors, homopolymer tailing, Labelling of DNA- nick translation, random priming, non-radioactive probes, Hybridization- Southern, Northern and Colony hybridization

Module II: - PCR and its applications

The basic concept of PCR, Primer design, Gradient PCR, touchdown PCR, Hot Start PCR, Real-time PCR- syber green assay, Taqman assay, Reverse transcriptase PCR, quantitative Reverse transcriptase PCR, Long PCR, inverse PCR, nested PCR, multiplex PCR, 3′ & 5′ RACE, overlap PCR, *in situ PCR*, droplet PCR (3rd generation PCR), Ligation PCR, overlap PCR,site-specific mutagenesis

Module III: - Cloning & Expression- Vectors & Methodologies

Cloning using different kinds of vectors- plasmids, phages, cosmids, Artificial chromosome

vectors, TOPO and TA vector, Ti and Ri vectors, Expression vectors, use of His-tag, GST-tag, MBP-tag in protein expression, codon optimization, selection and screening of cloning vectors, reporter genes, Foreign DNA insertion to host- transformation, transfection, liposomes, electroporation, micro-injection, hosts for overexpression, c-DNA and genomic DNA libraries

Module IV: - Genomics, Transcriptomics & Proteomics

Sequencing methods- enzymatic sequencing, chemical sequencing, pyrosequencing whole-genome shotgun sequencing, next-generation sequencing, In-vitro transcription & translation, Promoter characterization, Genetic and physical maps, restriction mapping, molecular markers of genome analysis- RFLP, RAPD, AFLP, analysis of protein-DNA interactions, Chromosome walking, Gene Silencing, Details and applications of antisense technology and ribozyme in genetic engineering

Module V: - Genomics, Transcriptomics & Proteomics

Gene expression analysis- DNA microarrays, EST analysis, Serial analysis of gene expression, PAGE, 2D electrophoresis, isolation and sequence analysis of individual proteins, protein microarray, Enzymatic and bioluminescent reporters. Reporters used in protein localization and trafficking studies

Module VI: - Bioinformatics

Computational methods- biological databases, homology search (BLAST, FASTA search, pairwise & multiple alignments) for proteins and nucleic acids, identification of ORFs (ORF finder), Protein structure and function analysis, DNA analysis for repeats, phylogenetic analysis- concepts and tree construction

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Clarke, D. P., Pazdernik, N. J. 2013. Molecular Biology.2nd edition; Elsevier Academic Press.

2. Sambrook, J., Russell, D. 2001. Molecular Cloning: A laboratory manual. Volume 1, 2 & 3. 3rd edition. Cold Spring Harbor Laboratory Press.
3. Watson, J. D. 2007. Recombinant DNA. W.H. Freeman and Company.
4. Brown, T. A. 2002. Genome. 2nd Edition. BIOS Scientific Publishers Ltd.
5. Brown, T. A. 2010. Gene Cloning and DNA Analysis. 6th Edition. John Wiley & Sons Ltd..
6. Primrose, S. B., Twyman, R. M., Old, R. W. 2001. Principles of gene manipulation. 6th Edition. Blackwell Science Ltd.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Environmental & Agricultural Microbiology	MMC 302	3:0:0	3	3

A. Course Learning Outcomes (CLO)

CLO 1	Introduce components of environment (Air, Water & Soil) and their interaction with indigenous microorganisms.
CLO 2	Introduction of beneficial Microorganisms and their role in Mineral cycles and Agriculture.
CLO 3	Explain Host Plant Interaction, also discuss sustainable waste management.

B. Syllabus

Module-I: - Soil-Aquatic-Air Microbiology

Types of Soil, Soil Profile- Physico-Chemical properties, Suitability of soil for agriculture, Soil Enzymes, Inter-relationship of soil and microbes, microbial interactions in soil and mineralization, Rhizosphere and Rhizoplane microflora. Soil pollution

Aquatic microbiology: drinking water microbiology and quality control, biofilms and water-borne diseases, water pollution

Aerobiology: Outdoor-indoor microflora, aerosol-aeroallergens, air pollution & air quality assessment

Module-II: - Beneficial Microbes, Ecosystem & Microbial Diversity

Importance of soil microorganisms, Plant growth-promoting Rhizobacteria (PGPR), Nitrogen Fixing Microbes and mechanisms, Phosphate mobilizing microbes, and Mycorrhizal fungi. Overview and applications of Biofertilizers& Biopesticides: Bacteria, fungi, and viruses. Ligno-cellulolytic microorganisms- bio-pulping, bio-bleaching, textiles, biofuels, animal feed production. Bio-mining- Bio-leaching of copper, gold, and uranium. Bioremediation of environmental pollutants: Petroleum hydrocarbons and pesticides

Biotic and abiotic components and their interaction, Bio-energetics, Food webs, Ecological successions, and important mineral cycles (C, N, P, S, Fe).

Microbial diversity: Culture-dependent approaches and their limitations, Culture-independent methods, Metagenomic approaches. Analysis of diversity by DNA hybridization, ARDRA, FAME profiles, BIOLOG microtitre plates, G+C analysis, slot–blot hybridization, and FISH.

Module- III Pathogenesis in plants & Defense Response

Plant diseases – Epidemiology and plant disease forecasting, Principles of plant pathology: entry and establishment of pathogens, host-parasite interaction, the role of toxins and enzymes. Disease resistance in plants– protection and defense, mechanisms of resistance (performed and induced defense, local signals, programmed cell death, induced structural barriers, phytoalexins, Systemic Acquired Resistance (SAR), and Local Acquired Resistance (LAR). Pathogenesis Related Proteins (PR proteins)- chitinases and glucanases. Transgenic Resistance: Gene-to-gene resistance (horizontal and vertical), plant resistance genes. Transformation for disease resistance, Resistance to viruses, fungi, bacteria and insects, Mycoviruses.

Module- IV: - Plant Diseases & Genetic Engineering

Bacterial (bacterial blight of paddy, angular leaf spot of cotton, common scab of potato, citrus canker), fungal (early &late blight of potato, downy mildew of grapes, Loose smut of wheat, smut of bajra, covered smut of barley, blast disease of rice, red rot of sugarcane, Tikka of Groundnut), viral (tobacco mosaic, leaf curl of tomato, yellow vein mosaic of bhindi), viroid diseases of crop plants and their symptoms.

Post-harvest diseases – grains, mode of infection and factors influencing post-harvest diseases, strategies for postharvest disease control (fungicides, irradiation, fumigation and VHT - Vapour Heat treatment etc.).

Genetic Engineering: methods of plant cell transformation, vectors, transgenic plants, molecular farming, Genetic engineering for insect, pest resistance and herbicide resistance, Impact of GMO's and issues related to environmental safety.

Module-V: - Waste Management

Waste types, solid & liquid wastes characterization, solid & liquid waste treatments – physical, chemical, biological (aerobic – anaerobic – primary –secondary – tertiary). Solid

waste treatment – saccharification – gasification – composting, Utilization of solid wastes – food (SCP, mushroom, yeast): fuel (ethanol, methane, hydrogen), fertilizer (composting), liquid waste treatment – trickling, activated sludge, oxidation pond – oxidation ditch. Bioremediation of hydrocarbons, pesticides, air pollutants and natural products.

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Agricultural Microbiology Biotechnological approaches in soil microorganisms for sustainable crop production by Dadarwal 1997
2. Agricultural Microbiology by N.S. SubbaRao
3. Microbial Ecology by Atlas R.M., Bartha R., Benjamin Cummings Publishing Co, Redwood City, CA.,1993
4. Environmental Microbiology by A.H. Varnam and M.G. Evans, Manson Publishing Ltd., 2000.
5. Lignocellulose Biotechnology: Future Prospects by R.C. Kuhad and A. Singh,I.K. International,2007
6. Advances in Applied Bioremediation by A. Singh, R.C. Kuhad and O.P. Ward, Springer,2009
7. Burns R.G., and Slater J.H. (1982) Experimental Microbial Ecology-Blackwell Scientific Publications, Oxford, London.

AMITY UNIVERSITY
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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Clinical Microbiology	MMC 303	3:1:0	4	3

A. Course Learning Outcomes (CLO)

CLO 1	Understanding of infection biology and host-pathogen interactions
CLO 2	Ability to do direct and indirect diagnosis of the diseases
CLO 3	Knowledge of the disease prevention measures

B. Syllabus

Module-I: - **Introduction to Medical Microbiology**

Koch postulates, sources of infection for man- exogenous infections, - patient, carrier (healthy, convalescent, contact, paradoxical and chronic), infected animals, soil, and endogenous infections. Mode of spread of infections- Respiratory, skin, wound & burn, venereal, alimentary tract, arthropod borne, blood infection, laboratory infection, nosocomial infections, infections in immune-compromised patients etc., systemic infections, Normal microflora of human body and its significance, Gnotobiotic animals and their use, biofilms. Global warming: effect on the increase in the incidence of vector-borne and water-borne infectious diseases, Vaccines- types

Module II: - Diagnostic Microbiology & Antimicrobial Studies

Staining approaches, cultural methods, biochemical characterization, nucleic acid detection, automated instruments for detection/diagnosis of infectious, agents (BACTAC and Vitek-2, GeneExpert). Immunological approaches: precipitation, agglutination, ELISA, immunodiffusion. Automated instruments for detection / diagnosis of infectious agents (BACTAC and Vitek-2, GeneExpert). Concept of point-of-care diagnosis (PoCD): lateral-flow assays, bedside nucleic acid detection Antibiotics, susceptibility testing, mechanism of drug resistance, and its spread

Module-III: - **Host-pathogen interactions & Epidemiology**

Host susceptibility, predisposing factor, Host-pathogen interaction- Receptors for pathogens, Infection establishment, spreading, tissue damage and anti-phagocytic factors; mechanism of bacterial adhesion, colonization, and invasion of mucous membranes of respiratory, enteric and urogenital tracts, virulence, virulence factors, pathogenicity islands, toxins, intracellular life, organotropisms. Type three secretion system (TTSS, T3SS), Biofilm formation and its role in pathogenesis, quorum sensing mechanism and its role in microbial Pathogenicity

Molecular microbial epidemiology: Objectives of microbial epidemiology. Biochemical and Immunological tools - biotyping, serotyping, phage typing, multilocus enzyme electrophoresis (MLEE); Molecular typing: RAPD, IS-based typing, PFGE, AFLP, MLST, VNTR and whole-genome sequence; geographical information system (GIS) for microbial epidemiology.

Module-IV: - **Bacterial and Viral Infections**

Bacterial Pathogens: Mode & Mechanism of Infection, diagnosis, treatment & Prevention- *Staphylococcus, Streptococcus, Pneumococcus, Neisseria, Campylobacter, Clostridium, Shigella, Vibrio, Yersinia, Listeria, Haemophilus, Bordetella, Brucella, Mycobacteria, Spirochaetes, Rickettsiae, Chlamdiae*

Viral Pathogens: Mode & Mechanism of Infection, diagnosis, treatment & Prevention- Orthopox viruses, Influenza virus, rhinovirus, dengue, Chikungunya, adenovirus, rabies, Hepatitis viruses, Norovirus, Rotavirus, Herpes virus, HIV, oncogenic viruses

Module-V: - **Fungal, Protozoan & Helminthes Infections**

Fungal infection- Pathogenesis, diagnosis, treatment and prevention- Aspergillosis, Blastomycosis, Candidiasis, Coccidioides immitis, Cryptococcosis, Histoplasmosis, Tinea pedis.

Protozoan's and Helminthes infections- Amebiasis, Ascariasis Fascioliasis, Fasciolopsiasis, Kala azar (Black fever), Malaria, Taeniasis & cysticercosis.

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Boyd, R.F. 1987. General Microbiology. 2nd Edition. Times Mirror/Mosby College publishing, St. Louis).
2. Ananthanarayan, R., Panicker, C. K. J. 2005. Text Book of Microbiology. 7th Edition. Orient Longman Private Limited.
3. Collee, J. G. 1997. Practical Medical Microbiology. 14th Edition. Churchill Livingstone.
4. Baron E. J., Peterson, L. R., Finegold, S.M. 1994. Bailey and Scott's Diagnostic Microbiology.
5. Mackie & McCartney Practical Medical Microbiology (1996). Collee, J.G., Fraser,
6. A.G., Marmion, B.P. and Simmons, A (eds.), Churchill Livingstone,Edinburgh.
7. Baron, E.J., Peterson, L.R., and Finegold, S.M.(1990). Bailey and Scott's Diagnostic Microbiology.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
RDT & Genomics Lab	MMC 321	0:0:4	2	3

A. Course Learning Outcomes (CLO)

CLO 1	To understand the techniques used in the RDT technologies
CLO 2	To differentiate the cloned cells from non-cloned cells
CLO 3	To study the gene cloning methods

B. Syllabus

Course objectives

The course aims to give hands-on training to students for enhancing their practical skills of the subject domain.

Course Content

A minimum of 10 laboratory exercises will be conducted based on theory papers MMC 301

Examination Scheme:

Components	Performance	VIVA	Lab record	Observations	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Clarke, D. P., Pazdernik, N. J. 2013. Molecular Biology.2nd edition; Elsevier Academic Press.
2. Sambrook, J., Russell, D. 2001. Molecular Cloning: A laboratory manual. Volume 1, 2 & 3. 3rd edition. Cold Spring Harbor Laboratory Press.
3. Watson, J. D. 2007. Recombinant DNA. W.H. Freeman and Company.
4. Brown, T. A. 2002. Genome. 2nd Edition. BIOS Scientific Publishers Ltd.

5. Brown, T. A. 2010. Gene Cloning and DNA Analysis. 6th Edition. John Wiley & Sons Ltd..
6. Primrose, S. B., Twyman, R. M., Old, R. W. 2001. Principles of gene manipulation. 6th Edition. Blackwell Science Ltd.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Environmental & Agricultural Microbiology Lab	MMC 322	0:0:4	2	3

A. Course Learning Outcomes (CLO)

CLO 1	To understand the role of the microbes in agriculture and environment
CLO 2	To understand the synergies of microorganisms in different ecological niche
CLO 3	To study the role of microflora in contaminants managements

B. Syllabus

Course objectives

The course aims to give hands-on training to students for enhancing their practical skills in the subject domain.

Course Content

A minimum of 10 laboratory exercises will be conducted based on theory papers MMC 302

Examination Scheme:

Components	Performance	VIVA	Lab record	Observations	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Agricultural Microbiology Biotechnological approaches in soil microorganisms for sustainable crop production by Dadarwal 1997
2. Agricultural Microbiology by N.S. SubbaRao

3. Microbial Ecology by Atlas R.M., Bartha R., Benjamin Cummings Publishing Co, Redwood City, CA.,1993
4. Environmental Microbiology by A.H. Varnam and M.G. Evans, Manson Publishing Ltd., 2000.
5. Lignocellulose Biotechnology: Future Prospects by R.C. Kuhad and A. Singh,I.K. International,2007
6. Advances in Applied Bioremediation by A. Singh, R.C. Kuhad and O.P. Ward, Springer,2009
7. Burns R.G., and Slater J.H. (1982) Experimental Microbial Ecology-Blackwell Scientific Publications, Oxford, London.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Clinical Microbiology Lab	MMC 323	0:0:4	2	3

A. Course Learning Outcomes (CLO)

CLO 1	To study the pathogenesis of given human pathogens
CLO 2	To understands the preventive and control measures
CLO 3	To study the diagnostics and epidemiological aspects

B. Syllabus

Course objectives

The course aims to give hands-on training to students for enhancing their practical skills of the subject domain.

Course Content

A minimum of 10 laboratory exercises will be conducted based on theory papers MMC303

Examination Scheme:

Components	Performance	VIVA	Lab record	Observations	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Boyd, R.F. 1987. General Microbiology. 2nd Edition. Times Mirror/Mosby College publishing, St. Louis).
2. Ananthanarayan, R., Panicker, C. K. J. 2005. Textbook of Microbiology. 7th Edition. Orient Longman Private Limited.
3. Collee, J. G. 1997. Practical Medical Microbiology. 14th Edition. Churchill Livingstone.

4. Baron E. J., Peterson, L. R., Finegold, S.M. 1994. Bailey and Scott's Diagnostic Microbiology.
5. Mackie & McCartney Practical Medical Microbiology (1996). Collee, J.G., Fraser,
6. A.G., Marmion, B.P. and Simmons, A (eds.), Churchill Livingstone,Edinburgh.
7. Baron, E.J., Peterson, L.R., and Finegold, S.M. (1990). Bailey and Scott's Diagnostic Microbiology.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Instrumentation & Techniques in Microbiology	MMC 311	3:0:0	3	3

A. Course Learning Outcomes (CLO)

CLO 1	Explain concept of techniques-based outcome relating to growth limitation and sterilization, culturing micro-organisms and microorganisms identification.
CLO 2	Explain the applications of instruments and techniques in biomolecular studies

B. Syllabus

Module I: - Basic Laboratory Instruments & Centrifugation

Principle & Theory of pH meter, Laminar air flow, Bio-safety cabinets, and chemical hoods. Principle of centrifugation, Preparatory & analytical centrifuge, differential centrifugation, density gradient centrifugation, and analytical ultra-centrifugation.

Module II: - Chromatography

Chromatography- Principle, Theory & Applications, Paper Chromatography, TLC, GLC, FPLC and HPLC, Ion Exchange, Affinity Chromatography and GPC

Module III: - Spectroscopy

Theory and Principle of Spectroscopy, Applications of UV, Visible, IR, NMR, ESR, Fluorescence, Atomic Absorption, Mass Spectroscopy, MALDI-TOF.

Module IV: -Microscopic Techniques

Theory, Principle and Applications- Bright Field Microscopy, Dark Field Microscopy, Inverted Microscope, Phase Contrast Microscope, Fluorescent Microscope, Confocal Microscope, Electron Microscope- SEM, TEM & STEM, Atomic Force Microscope, Micrometry, Microphotography, FISH

Module V: - Electrophoresis

Basic Principle of Electrophoresis, Applications of Agarose Gel Electrophoresis, Native and Denaturating PAGE, Iso-electric Focusing, Capillary Electrophoresis, 2DE, Immuno-Electrophoresis.Blotting Techniques -Southern, Northern, and Western blotting, gel doc system.

Module VI: - Cell Biology Tools

Primary & Secondary Cell Lines, Monolayer & Suspension cultures, Fluorescence-Activated Cell Sorting (FACS), Different methods of cell lysis/ breakage and isolation and purification of various cell organelles - Cell Surface Structures, Cell Envelopes, Plasma Membranes, Peptidoglycan, Outer membrane, Ribosomes, Protoplasts, Vesicles, Spheroplast, DNA, RNA

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Williams, B. L., Wilson, K. 1982. A Biologists Guide to Principles and Techniques of Practical Biochemistry. Edward Arnold, London.
2. Wilson, K., Walkar, J. 2008. Principles and Techniques of Biochemistry and Molecular Biology. 6th Edition. Cambridge Uni. Press, N. Delhi.
3. Upadhyay, A., Upadhyay, K. Nath, N. 2010. Biophysical Chemistry (Principles and Techniques) by Himalya Publishing House Pvt. Ltd., Mumbai.
4. Ghatak, K. L. 2011. Techniques and Methods. PHI Learning Pvt. Ltd., N. Delhi.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Marine Microbiology	MMC 312	3:0:0	3	3

A. Course Learning Outcomes (CLO)

CLO 1	To understand the microbial diversity of the marine environments
CLO 2	To determine the applications of the marine microflora

B. Syllabus

Module I: - Marine Environment

World's oceans & Seas, Physico – Chemical properties of marine water, marine microbial habitat: water column, sediments, coastal ecosystems, mangroves salt marshes. Bio-films & Microbial mats. Microbial life at the surface of living & non-living systems and microbial interactions. Quorum sensing in marine microbes and significance. Metabolic diversity and importance of microbial communities, Photo trophy & primary productivity.

Module II: - Methods in Marine Microbiology

Sampling methods of the different habitats of oceans and screening by CLSM & FCM. Importance of Culturable & non Culturable microorganisms. Molecular tools to study marine diversity. Limitations of analysis of nucleic acid directly from the marine environment.

Module III: - Role of Microbes in ocean processes

Bioenergetics, Carbon & Nitrogen cycling in ocean, Photosynthesis and Primary productivity. Eutrophication of coastal areas. Microbial loop in the ocean food web. Microbial processes and climate change. Bio–fouling & biodeterioration, indicator organisms and pollution control.

Symbiosis of microalgae with animals: Chemoautotrophic prokaryotes with animals. Symbionts of sponges, mixotrophy in protists. Metabolic consortia and mutualism between prokaryotes.

Module IV: - Marine Microbes

Bacterial and viral disease of freshwater, seawater, aquaculture: fish, bivalve mollusks, crustaceans, corals. Diagnosis methods. Control of diseases.

Biodegradation and Bioremediation of marine pollutants (oil, Organic comp. etc.).

Module V: - Recent trends in Marine Microbiology

Recently identified microorganisms of the

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Munn, C. 2011. Marine Microbiology: Ecology and Applications. GS Publications. PP- 648

2. Sekwon Kim. 2013. Marine Microbiology: Bioactive compounds and Biotechnological applications. Wiley VCH.

3. Paul, J. 2001. Marine Microbiology. Academic Press. PP-666.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Cellular Microbiology	MMC 313	3:0:0	3	3

A. Course Learning Outcomes (CLO)

CLO 1	To understand the mechanisms behind the cell functioning's
CLO 2	To study the cell signaling and pathways

B. Syllabus

Module I: - Introduction

Introduction and emergence of cellular microbiology, cellular biology underlying prokaryotic and eukaryotic interactions: ultrastructure, genome expression

Module II: - Prokaryotic and Eukaryotic Systems

Prokaryotic system: Pathogenicity Islands, Bacterial Protein secretion systems (sec dependent pathway, Type I, II, III protein secretion pathway), Bacterial cell cycle.

Eukaryotic system: Ultra structure-plasma membrane, cytoplasm, nucleus, mitochondria and chloroplasts, ribosomes, endoplasmic reticulum, Golgi apparatus, lysosome, peroxisomes, vacuoles, cytoskeleton, flagella, cilia, pseudopodia; Vesicular transport pathways- Exocytosis and Endocytosis; cell cycle and Apoptosis.

Module III: - Prokaryotic – eukaryotic interactions in infection

Bacterial adhesion to host cells: Basic principles of microbial adhesion, Molecular mechanisms of adhesion, Bacterial structures involved in adhesion, the effect of adhesion on host cells. Bacterial invasion to host cells (a) Invasion of epithelial cells - actin rearrangements (eg *Salmonella*), microtubules (eg *Klebsiella pneumonia*), paracytosis, (b) Invasion of endothelial cells (*eg E.coli, Streptococcus pneumonia*), (c) Invasion of macrophages (eg. *Bordetella pertusis*, *Mycobacterium*). The consequence of invasion – Effect on host cell, Effect on bacteria Survival

after invasion - (a) Intracellular lifestyle- Survival in phagolysosomes, survival of remodeled vacuole, Survival in the cytoplasm of the host cell. (b) Extracellular lifestyle

Module IV: - Prokaryotic and eukaryotic signaling mechanisms

Prokaryotic cell to cell signaling: quorum sensing and bacterial pheromones.

Overview of extracellular signaling; types of hormones; major classes of receptors, secondary messesgers, common intracellular signaling proteins-GTPase switch proteins, protein kinases, adapter proteins; G-protein coupled receptors and their effectors; Receptor tyrosine kinases and Ras, MAP kinase pathways, signaling pathways leading to activation of transcription factors and modulation of gene expression

Module V: - Applied Aspects

Comparative and functional genomics, Phylogenetic analysis, Virulence genes, tools for identifying virulence gene by mutation, differential expression, and by use of comparative genomics. Genome evolution in microbes Genomic processes in bacterial pathogen evolution, the role of horizontal gene transfer in prokaryotic genome evolution. Future approach for discovery of novel therapeutics.

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Fredrirch Marks et al (2009), Cellular signaling processing, Garland Science Taylor & Francis Group.
2. Henderson et al., (2000), Cellular microbiology, John Wiley & sons Ltd.
3. Jacquelyn G.Black, (2008), Microbiology Principles and explorations, John Wiley & sons Ltd
4. Lehninger(2010), Principles of Biochemistry, Worth Publishers,Inc.
5. Lodish, Berk, Baltimore 4th Edition (2000) Molecular biology, W.H Freeman and Company.
6. Nester et al, 2004, Microbiology a human perspective, Mac Graw Hill Higher education.
7. Prescott, Harley & Klein's, (2008), Microbiology, Mac Graw Hill Higher education.
8. Stalley, Jerome, Microbial life 2nd edition (2007), Sinauer Associates inc, Massachusetts

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Term Paper	MMC 330	NTCC	3	3

A. Course Learning Outcomes (CLO)

CLO 1	To search and prepare a scientific information's
CLO 2	To develop the scientific writing abilities
CLO 3	To understand the tools and scientific ethics in term paper

B. Syllabus

Course objectives

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.
The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consist of the following steps:

1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

a) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.
b) Begin by making a list of subject-headings under which you might expect the subject to be listed.
c) The sources could be books and magazine articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

a) Get facts, not just opinions. Compare the facts with author's conclusion.
b) In research studies, notice the methods and procedures, results & conclusions.
c) Check cross references.

4. Outlining the paper

a) Review notes to find main sub-divisions of the subject.
b) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose
b) main body of the paper
c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main idea.

6. Editing &preparing the final Paper

a) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.
b) Read the paper to ensure that the language is not awkward, and that it "flows" properly.
c) Check for proper spelling, phrasing and sentence construction.
d) Check for proper form on footnotes, quotes, and punctuation.
e) Check to see that quotations serve one of the following purposes:
   (i) Show evidence of what an author has said.
   (ii) Avoid misrepresentation through restatement.
   (iii) Save unnecessary writing when ideas have been well expressed by the original author.
f) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

1) Title page
2) Table of contents
3) Introduction
4) Review
5) Discussion&Conclusion
6) References
7) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion
The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion
The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

1. summary of question posed
2. summary of findings
3. summary of main limitations of the study at hand
4. details of possibilities for related future research

References
From the very beginning of a research project, you should be careful to note all details of articles gathered.
The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.
The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions
Monographs
Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited volumes
Gass, S./ Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited articles
Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal articles
McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic book
Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic journal articles
Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide

Web, http://www.gfl-journal.com/.

Other websites
Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished papers
Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished theses/ dissertations
Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.
Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix
The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation (Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)	**40%**
Final Evaluation (Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)	**60%**

AMITY UNIVERSITY
RAJASTHAN

AMITY Institute of Microbial Technology (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Professional Communication Skills	BCS 311	1:0:0	1	1

C. COURSE LEARNING OUTCOMES (CLO)

CLO 1	Develop an idea of professional work place
CLO 2	**Learn about the importance of interviews, etiquette.**
CLO 3	Learn the basic steps and techniques for preparing and for having a successful interview
CLO 4	Demonstrate Workplace Speaking Skills.

B. SYLLABUS

Topic
Group Discussion-2
PI-2 (Mock Sessions)
CV-3 + Profile Mapping
Video Resume

Social Media Profiling

EXAMINATION SCHEME:

Components	Group Discussion	Video Resume	Personal Interview	Attendance
Weightage (%)	30	30	35	5

SUGGESTED READINGS

- Raman Prakash, Business Communication, Oxford
- Working in English, Jones, Cambridge
- Dr. P.Prasad. *Communication Skills*.S.K.Kataria &Sons
- Koneru, Aruna. *Professional Communication.* The McGraw Hill: New Delhi, 2008. Print
- New International Business English, Jones/Alexander, Cambridge

AMITY UNIVERSITY
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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Behavioural Science - III (Leading Through Teams)	BSS 311	1:0:0	1	3

A. Course Learning Outcomes (CLO)

CLO 1	
CLO 2	
CLO 3	
CLO 4	
CLO 5	

B. Syllabus

Module I: Teams: An Overview
Team Design Features: team vs. group
Effective Team Mission and Vision
Life Cycle of a Project Team
Rationale of a Team, Goal Analysis and Team Roles

Module II: Team & Sociometry
Patterns of Interaction in a Team
Sociometry: Method of studying attractions and repulsions in groups
Construction of sociogram for studying interpersonal relations in a Team

Module III: Team Building
Types and Development of Team Building
Stages of team growth
Team performance curve
Profiling your Team: Internal & External Dynamics
Team Strategies for organizational vision
Team communication

Module IV: Team Leadership & Conflict Management
Leadership styles in organizations
Self Authorized team leadership
Causes of team conflict
Conflict management strategies
Stress and Coping in teams

Module V: Global Teams and Universal Values
Management by values
Pragmatic spirituality in life and organization
Building global teams through universal human values
Learning based on project work on Scriptures like Ramayana, Mahabharata, Gita etc.

Module VI:End-of-Semester Appraisal
Viva based on personal journal
Assessment of Behavioural change as a result of training
Exit Level Rating by Self and Observer
of training
Exit Level Rating by Self and Observer
Examination Scheme:

Components					Attendance	
Weightage (%)					5	

Suggested Readings

1. Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
2. LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
3. Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
4. J William Pfeiffer (ed.) Theories and Models in Applied Behavioural Science, Vol 2, Group (1996); Pfeiffer & Company
5. Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers
6. Organizational Behaviour, Davis, K.

AMITY UNIVERSITY
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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language French - II	FLT 311	2:0:0	2	2

A. Course Learning Outcomes (CLO)

CLO 1	
CLO 2	
CLO 3	
CLO 4	

B. Syllabus

Module A: pp.38 – 47: Unité 3: Objectif 3, 4, 5. 6

Module B: pp. 47 to 75 Unité 4, 5

Contenu lexical: **Unité 3: Organiser son temps**

4. donner/demander des informations sur un emploi du temps, un horaire SNCF – Imaginer un dialogue
5. rédiger un message/ une lettre pour …
   i) prendre un rendez-vous/ accepter et confirmer/ annuler
   ii) inviter/accepter/refuser
6. Faire un programme d'activités

imaginer une conversation téléphonique/un dialogue

Propositions- interroger, répondre

Unité 4:Découvrir son environnement

5. situer un lieu
6. s'orienter, s'informer sur un itinéraire.
7. Chercher, décrire un logement
8. connaître les rythmes de la vie

Unité 5: s'informer

5. demander/donner des informations sur un emploi du temps passé.

6. donner une explication, exprimer le doute ou la certitude.
7. découvrir les relations entre les mots
8. savoir s'informer

Contenu grammatical:

1. Adjectifs démonstratifs
2. Adjectifs possessifs/exprimer la possession à l'aide de : i. « de » ii. A+nom/pronom disjoint
3. Conjugaison pronominale – négative, interrogative - construction à l'infinitif
4. Impératif/exprimer l'obligation/l'interdiction à l'aide de « il faut…. »/ «il ne faut pas… »
5. passé composé
6. Questions directes/indirectes

C – Project +Presentation
I – Interaction/Conversation Practice

Examination Scheme:

Components	CT1	CT2	C	I	V	Attendance
Weightage (%)	20	20	20	20	15	5

Suggested Readings

3. le livre à suivre : Campus: Tome 1

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language German- III	FLG 311	2:0:0	2	3

A. Course Learning Outcomes (CLO)

CLO 1	
CLO 2	
CLO 3	
CLO 4	

B. Syllabus

Module I: Modal verbs
Modal verbs with conjugations and usage
Imparting the finer nuances of the language

Module II: Information about Germany (ongoing)
Information about Germany in the form of presentations or "Referat" – neighbors, states and capitals, important cities and towns and characteristic features of the same, and also a few other topics related to Germany.

Module III: Dative case
Dative case, comparison with accusative case
Dative case with the relevant articles
Introduction to 3 different kinds of sentences – nominative, accusative and dative

Module IV: Dative personal pronouns
Nominative, accusative and dative pronouns in comparison

Module V: Dative prepositions
Dative preposition with their usage both theoretical and figurative use

Module VI: Dialogues
In the Restaurant,

At the Tourist Information Office,
A telephone conversation

Module VII: Directions
Names of the directions
Asking and telling the directions with the help of a roadmap

Module VIII: Conjunctions
To assimilate the knowledge of the conjunctions learnt indirectly so far

C – Project +Presentation
I – Interaction/Conversation Practice

Examination Scheme:

Components	CT1	CT2	C	I	V	Attendance
Weightage (%)	20	20	20	20	15	5

Suggested Readings

13. Wolfgang Hieber, Lernziel Deutsch
14. Hans-Heinrich Wangler, Sprachkurs Deutsch
15. Schulz Griesbach, Deutsche Sprachlehre für Ausländer
16. P.L Aneja, Deutsch Interessant- 1, 2 & 3
17. Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1, 2
18. Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language Spanish - III	FLS 311	2:0:0	2	3

A. Course Learning Outcomes (CLO)

CLO 1	
CLO 2	
CLO 3	
CLO 4	

B. Syllabus

Module I
Revision of earlier semester modules
Set expressions (idiomatic expressions) with the verb *Tener, Poner, Ir….*
Weather

Module II
Introduction to *Gustar*…and all its forms. Revision of *Gustar* and usage of it

Module III
Translation of Spanish-English; English-Spanish. Practice sentences.
How to ask for directions (using estar)
Introduction to IR + A + INFINITIVE FORM OF A VERB

Module IV
Simple conversation with help of texts and vocabulary
En el restaurante
En el instituto
En el aeropuerto

Module V

Reflexives

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	Attendance
Weightage (%)	20	20	20	20	15	5

Suggested Readings

1. Español, En Directo I A
2. Español Sin Fronteras -Nivel Elemental

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language Chinese - III	FLC 311	2:0:0	2	3

A. Course Learning Outcomes (CLO)

CLO 1	
CLO 2	
CLO 3	
CLO 4	

B. Syllabus

Course Contents:

Module I

Drills
Dialogue practice
Observe picture and answer the question.
Introduction of written characters.
Practice reading aloud
Practice using the language both by speaking and by taking notes.
Character writing and stroke order

Module II

Measure words
Position words e.g. inside, outside, middle, in front, behind, top, bottom, side, left, right, straight.
Directional words – beibian, xibian, nanbian, dongbian, zhongjian.
Our school and its different building locations.
What game do you like?
Difference between "hii" and "neng", "keyi".

Module III

Changing affirmative sentences to negative ones and vice versa
Human body parts.

Not feeling well words e.g. ; fever, cold, stomach ache, head ache.
Use of the modal particle "le"
Making a telephone call
Use of "jiu" and "cal" (Grammar portion)
Automobiles e.g. Bus, train, boat, car, bike etc.
Traveling, by train, by airplane, by bus, on the bike, by boat.. etc.

Module IV
The ordinal number "di"
"Mei" the demonstrative pronoun e.g. mei tian, mei nian etc.
use of to enter to exit
Structural particle "de" (Compliment of degree).
Going to the Park.
Description about class schedule during a week in school.
Grammar use of "li" and "cong".
Comprehension reading followed by questions.

Module V
Persuasion-Please don't smoke.
Please speak slowly
Praise – This pictorial is very beautiful
Opposites e.g. Clean-Dirty, Little-More, Old-New, Young-Old, Easy-Difficult, Boy-Girl, Black-White, Big-Small, Slow-Fast … etc.
Talking about studies and classmates
Use of "it doesn't matter"
Enquiring about a student, description about study method.
Grammar: Negation of a sentence with a verbal predicate.

C – Project +Presentation
I – Interaction/Conversation Practice

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	Attendance
Weightage (%)	20	20	20	20	15	5

Suggested Readings

3. Elementary Chinese Reader Part I" Lesson 21-30

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Anandam - III	AND 003	NTCC	2	3

A. Course Learning Outcomes (CLO)

CLO 1	Awareness and empathy regarding community issues
CLO 2	Interaction with the community and impact on society
CLO 3	Interaction with mentor and development of Student teacher relationship
CLO 4	Interaction among students, enlarge social network
CLO 5	Cooperative and Communication skills and leadership qualities
CLO 6	Critical thinking, Confidence and Efficiency

B. Syllabus

Course Objectives:

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

- apply their knowledge and skills to solve specific community problem
- learn to plan, lead, and organize community events have a sense of belonging to their college campus and community and find something they are interested in doing during their free time
- make new friends, expand social network, and boost social skills and mental health.
- be useful to society as it will protect them against stress, frustration, and depression

Course Contents:

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants, phone number/mobile no, email, and address)

- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)

ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

AMITY UNIVERSITY
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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Research Project & Dissertation/In House project	MMC 330	NTCC	3	3

A. Course Learning Outcomes (CLO)

CLO 1	To search and prepare a scientific information's
CLO 2	To develop the scientific skills during industrial project
CLO 3	To understand the tools and scientific ethics in term paper

B. Syllabus

The project & dissertation report in prescribed format.

AMITY UNIVERSITY
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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY

(AIMT)

B.Sc. (Hons.) MICROBIOLOGY

Programme Code: BSM

Duration – 3 Years Full Time

SYLLABUS

(Programme Structure)

Choice Based Credit System (CBCS)

2021

Program Learning Outcomes - PLO

- Define and explain various microbiology disciplines of the core theories to be applicable in industries and research.
- Describe and demonstrate the microbial cell functioning for their replication, survival and interaction with environment and host.
- Explain the theoretical and practical basis of the tools and techniques common to microbiology.
- Evaluate and respond to given challenges using microbiological skills.

Credits Summary

B.Sc. (Hons.) Microbiology (03 Years/ 06 Semesters)							
Semester	**Core Course (CC)**	**Domain Electives (DE)**	**Value Added Course (VAC)**	**Minor Track (MT)**	**AND**	**NTCC**	**Total**
I	16	-	4	-	2	**-**	**22**
II	19	-	4	3	2	-	**28**
III	15	3	4	3	2	3	**30**
IV	14	3	4	3	2	-	**26**
V	13	3	4	3	2	3	**28**
VI	25	-	-	-	-	1	**26**
Total	**102**	**9**	**20**	**12**	**10**	**7**	**160**

Total Credits (22+28+30+26+28+26) = 160

CC=Core Course, DE = Domain Elective, MT =Minor Track

VAC =Value Added Course, AND = Anandam (NTCC)

NTCC = Non -Teaching Credit Courses (NTCC)

Courses Summary

Sem	CC	DE	MT	VAC	AND	NTCC	Total
1	6	0	0	3	1	0	10
2	7	0	1	3	1	0	12
3	5	1	1	3	1	1	12
4	5	1	1	3	1	0	11
5	5	1	1	3	1	1	12
6	4	0	0	0	0	1	5
Total	**32**	**3**	**4**	**15**	**5**	**3**	**62**

AMITY UNIVERSITY
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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Program Name: B.Sc. (Hons.) MICROBIOLOGY

FIRST SEMESTER

Course Code	Course Title	Category	Lectures(L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
BSM 101	Introduction of Microbiology	CC	3	-	-	3
BSM 102	Life Sciences- I	CC	3	-	-	3
BSM 103	Chemistry- I	CC	3	-	-	3
BSM 104	Biochemistry & Biophysics	CC	3	-	-	3
BSM 122	Life Sciences- I Lab.	CC	-	-	4	2
BSM 123	Chemistry- I Lab.	CC	-	-	4	2
BCS 101	English – I	VAC	1	-	-	1
BSS 103	(Behavioural Sciences-I) Understanding Self for Effectiveness	VAC	1	-	-	1
FLT 101 FLG 101 FLS 101 FLC 101	Foreign Language – I French German Spanish Chinese	VAC	2	-	-	2
AND 001	Anandam– I	NTCC	-	-	-	2
					TOTAL	**22**

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Program Name: B.Sc. (Hons.) MICROBIOLOGY

SECOND SEMESTER

Course Code	Course Title	Category	Lectures(L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
BSM 201	Bacteriology & Virology	CC	3	1	-	4
BSM 202	Mycology & Phycology	CC	3	-	-	3
BSM 203	Life Sciences- II	CC	3	-	-	3
BSM 204	Chemistry- II	CC	3	-	-	3
BSM 221	Bacteriology & Virology Lab	CC	-	-	4	2
BSM 222	Mycology & Phycology Lab.	CC	-	-	4	2
BSM 224	Chemistry- II Lab.	CC			4	2
Minor Track-I		**MT**	3	-	-	3
BCS 201	English – II	VA	1	-	-	1
BSS 203	Behavioural Science-II (Problem Solving and Creative Thinking)	VA	1	-	-	1
FLT 201 FLG 201 FLS 201 FLC 201	Foreign Language – II French German Spanish Chinese	VA	2	-	-	2
AND 002	Anandam--II	NTCC	-	-	-	2
					TOTAL	**28**

Note: -Term Paper/ Case Study topic distribution before summer vacations and will be evaluated in Third Semester.

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Program Name: B.Sc. (Hons.) MICROBIOLOGY

THIRD SEMESTER

Course Code	Course Title	Category	Lectures(L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
BSM 301	Microbial Physiology & Metabolism	CC	3	-	-	3
BSM 302	Molecular Biology & RDT	CC	3	1	-	4
EVS 003	Environmental Sciences	CC	3	1	-	4
BSM 321	Biochemistry & Microbial Physiology Lab.	CC	-	-	4	2
BSM 322	Molecular Biology & RDT Lab.	CC	-	-	4	2
Domain Elective-I : Choose any one from the following courses						
BSM 311	Bionanotechnology & Biosensors	DE	3	-	-	3
BSM 312	Soil Microbiology					
BSM 313	Food Biotechnology					
BSM 314	Cell Biology					
Minor Track- II		MT				3
BSM 330	Term Paper Evaluation	NTCC	-	-	-	3
BCS 301	Communication Skills – I	VA	-	-	-	1
BSS 303	Behavioural Science-III (Interpersonal Communication & Relationship Management)	VA	-	-	-	1
FLT 301 FLG 301 FLS 301 FLC 301	Foreign Language – III French German Spanish Chinese	VA	-	-	-	2
AND003	Anandam-III	NTCC	2	-	-	2
					TOTAL	**30**

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Program Name: B.Sc. (Hons.) MICROBIOLOGY

FOURTH SEMESTER

Course Code	Course Title	Category	Lectures(L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
BSM 401	Immunology	CC	3	1	-	4
BSM 402	Fermentation Technology & Industrial Microbiology	CC	3	-	-	3
BSM 403	Medical Microbiology	CC	3	-	-	3
BSM 421	Immunology & Medical Microbiology Lab.	CC	-	-	4	2
BSM 422	Fermentation Technology & Industrial Microbiology Lab.	CC	-	-	4	2
Domain Elective-II: Choose any one from the following courses						
BSM 411	Bioinformatics	DE	3	-	-	3
BSM 412	Pharmaceutical Technology & Microbiology					
BSM 413	Biomaterial Science					
BSM 414	Inheritance Biology					
Minor Track- III		MT				3
BCS 401	Communication Skills – II	VA	-	-	-	1
BSS 403	Behavioural Science-IV (Group Dynamics and Team Building)	VA	-	-	-	1
FLT 401 FLG 401 FLS 401 FLC 401	Foreign Language – IV French German Spanish Chinese	VA	-	-	-	2
AND 004	Anandam-IV	NTCC	-	-	-	2
					TOTAL	**26**

Note: - Students will be required to undergo summer training of 45 days in industry/ research institution/ academic institution. Work progress will be evaluated in V semester.

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Program Name: B.Sc. (Hons.) MICROBIOLOGY

FIFTH SEMESTER

Course Code	Course Title	Category	Lectures(L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
BSM 501	Microbial Ecology & Diversity	CC	3	-	-	3
BSM 502	Microbial Genetics & Genomics	CC	3	-	-	3
BSM 503	Plant Pathology	CC	3	-	-	3
BSM 521	Microbial Ecology & Plant Pathology Lab.	CC	-	-	4	2
BSM 522	Microbial Genetics & Genomics Lab.	CC	-	-	4	2
Domain Elective-III: Choose any one from the following courses						
BSM 511	Industrial Safety & Management	DE	3	-	-	3
BSM 512	IPR & Bioethics					
BSM 513	GMP & Microbial Quality Control					
BSM 514	Clinical Research & Pharmacovigilance					
Minor Track- IV		MT				3
BSM 550	Summer Training Evaluation	CC	-	-	-	3
BCS 501	Communication Skills – III	VA	-	-	-	1
BSS 503	Behavioural Science-V (Individual, Society and Nation)	VA	-	-	-	1
FLT 501 FLG 501 FLS 501 FLC 501	Foreign Language – V French German Spanish Chinese	VA	-	-	-	2
AND 005	Anandam-V	NTCC	-	-	-	2
					TOTAL	**28**

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Program Name: B.Sc. (Hons.) MICROBIOLOGY

SIXTH SEMESTER

Course Code	Course Title	Category	Lectures(L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
BSM 601	Bioanalytical Techniques & Statistics	CC	3	-	-	3
BSM 602	Food & Dairy Microbiology	CC	3	-	-	3
BSM 603	Marine Microbiology	CC	3	-	-	3
BSM 650	Educational/ Industrial Tour	NTCC	-	-	-	1
BSM 660	In House Project	CC	-	-	-	16
					TOTAL	**26**

'* One Industrial /Educational Tour can be organized in any Semester of Program and report evaluated will be in Semester VI

Total Credits (22+28+30+26+28+26) = 160

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Program Name: B.Sc. (Hons.) MICROBIOLOGY

FIRST SEMESTER

Course Code	Course Title	Category	Lectures(L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
BSM 101	Introduction of Microbiology	CC	3	-	-	3
BSM 102	Life Sciences- I	CC	3	-	-	3
BSM 103	Chemistry- I	CC	3	-	-	3
BSM 104	Biochemistry & Biophysics	CC	3	-	-	3
BSM 122	Life Sciences- I Lab.	CC	-	-	4	2
BSM 123	Chemistry- I Lab.	CC	-	-	4	2
BCS 101	English – I	VA	1	-	-	1
BSS 103	(Behavioural Sciences-I) Understanding Self for Effectiveness	VA	1	-	-	1
FLT 101 FLG 101 FLS 101 FLC 101	Foreign Language – I French German Spanish Chinese	VA	2	-	-	2
AND 001	Anandam– I	NTCC	-	-	-	2
					TOTAL	**22**

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Introduction of Microbiology	BSM 101	3:0:0	3	1

A. Course Learning Outcomes (CLO)

CLO 1	Introduction and historical information about Microorganisms.
CLO 2	Develop theoretical skills to handle microbes and their maintenance.

B. Syllabus

Module I: - Historical development of Microbiology

Development of microbiology as a discipline, Spontaneous generation vs.biogenesis, development of various microbiological techniques, concept of fermentation, establishment of fields of medical microbiology, immunology andenvironmental microbiology with special reference to the work of followingscientists : Anton von Leeuwenhoek, Joseph Lister, Paul Ehrlich, Edward Jenner,Louis Pasteur, Robert Koch, Martinus W. Beijerinck, Sergei N. Winogradsky,Alexander Fleming, Selman A. Waksman, Elie Metchnikoff, Norman Pace, Carl Woese and Ananda M. Chakraborty

Module II: - Microbial World

Systems of classification: Binomial Nomenclature, Whittaker's five kingdom and Carl Woese's threekingdom classification systems and their utility.

Difference between prokaryotic and eukaryotic microorganisms

General characteristics of different groups: Acellular microorganisms (Viruses,Viroids, Prions) and Cellular microorganisms (Bacteria- Gram positive, Gram negative, archebactreria, Algae, Fungi andProtozoa) with emphasis cell structure, distribution, occurrence, mode ofreproduction, cultural characteristics, biochemical characteristics and economic importance.

Module III:- Staining, Sterilization & Disinfection

Staining: Principle of staining, Types of staining– Simple, Differential (Gram, Spore, AFB), Negative staining, Capsule staining, Giemsa Staining, LPCB, KOH Mount

Sterilization and Disinfection- Principles- Methods of Sterilization – Physical methods – Dry heat- Moist heat, Filtration (Membrane & HEPA) - Radiation sterilization and mechanism– Chemical Sterilization -Chemical agents &Mode of action – Phenol coefficient test- Sterility testing

Module IV: - Cultivation of Microbes

Nutritional diversity of microbes, Culture & -Media preparation - Solid and Liquid- Types of Media – Semi-Synthetic, Synthetic, Enriched, Enrichment, Selective and Differential media, Natural components as media and Special Purpose Media (one eg for each type). Anaerobic culture technique – Wright's tube, Roll tube, Mclntost fildes jar method. Pure culture techniques – Tube dilution, Pour, Spread, Streak plate

Module V: - Preservation and Maintenance of Microbes

Preservation of pure culture: Periodic subculture methods, cold storage, freezing, deep-freezing, lyophilization methods, storage using liquid nitrogen, comparative advantages and disadvantages of different methods

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Alexopoulos CJ, Mims CW, and Blackwell M. (1996). *Introductory Mycology*. 4th edition. John and Sons, Inc.
2. Atlas RM. (1997). *Principles of Microbiology*. 2nd edition. WM.T.Brown Publishers.
3. Cappucino J and Sherman N. (2010). *Microbiology: A Laboratory Manual*. 9th edition. Pearson Education limited.
4. Madigan MT, Martinko JM and Parker J. (2009). *Brock Biology of Microorganisms*. 12th edition. Pearson/Benjamin Cummings.
5. Pelczar MJ, Chan ECS and Krieg NR. (1993). *Microbiology*. 5th edition. McGraw Hill Book Company.
6. Stanier RY, Ingraham JL, Wheelis ML, and Painter PR. (2005). *General Microbiology*. 5th edition. McMillan.
7. Tortora GJ, Funke BR, and Case CL. (2008). *Microbiology: An Introduction*. 9th edition. Pearson Education.
8. Vashishta BR and Sinha AK. (2008). *Fungi*. S. Chand and Company Ltd.
9. Vashishta BR. (2005). *Algae*. 3rd edition. S. Chand and Company Limited, New Delhi.

10. Willey JM, Sherwood LM, and Woolverton CJ. (2008). *Prescott, Harley and Klein's Microbiology*. 7th edition. McGraw Hill Higher Education.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Life Sciences-I	BSM 102	3:0:0	3	1

A. Course Learning Outcomes (CLO)

CLO 1	Introduction and characteristics of Bryophytes, Pteridophytes, Gymnosperms and Angiosperms.
CLO 2	Explain plant anatomy, physiology & embryology.
CLO 3	Define various ecological interactions.

B. Syllabus

Module I: -Evolution and Diversity of Bryophytes & Pteridophytes

Theories of evolution

Bryophytes: general characteristics, classification, reproduction, affinities, vegetative and reproductive structures- sphagnus & anthoceros

Pteridophytes: General features, classification, stellar evolution, anatomy & development, vegetative & reproductive system- Ryhnia, lycopodium, marsilea

Module II: -Diversity of gymnosperms & angiosperms

Gymnosperms: General charaters, classification, morphology, anatomy, vegetative & reproductive parts- cycas, pinus, ephidra

Angiosperms: Principles of classification, nomenclature- Bentham & Hooker, taxonomic study of Ranunculaceae, Brassicaceae, Fabaceae, Poaceae. External morphology of vegetative and floral parts, Structure & development of male & female gametophytes.

Module III: -Plant Anatomy & Physiology

Tissue & Cell walls, root-leaf-stem, vascular-cambium, secondary growth & periderm, adaptations, secretory & excretory system

Plant water relationship- uptake & conduction, nutrient uptake & deficiency- toxicity, photosynthesis & chemosynthesis, aerobic & anaerobic respiration

Module IV: -Embryology& Ecology

Ultrastructure of anther & ovule, pollination & fertilization, self incompatability, endosperm, poly embryony & apomixes

Distribution & characteristics of population, food chain, food web, pyramids, succession, ecological speciation, biomass study, bioenergetics.

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Bhatnager, S.P. and Moitra, A. 1996 Gymnospersm. New Age International (P) Ltd. Publishers, New Delhi.
2. Buchanan, B., Gruissem, W. and Jones, R. 2000 Biochemistry and Molecular Biology of Plants. American Society of Plant Biologists.
3. Raven, P.H., Johnson, G.B., Losos, J.B. and Singer, S.R. 2005 Biology. Tata MC Graw Hill.
4. Richardson, D.H.S. 1981 The Biology of Mosses. John Wiley and Sons, New York.
5. Sambamurty 2008 A Textbook of Bryophytes, Pteridophytes, Gymnosperms and Paleobotany. IK International Publishers.
6. Shaw, A.J. and Goffinet, B. (2000) Bryophyte Biology. Cambridge University Press.
7. Vander-Poorteri 2009 Introduction to Bryophytes. COP. 8. Parihar, N.S. 1991. Bryophytes. Central Book Depot, Allahabad.
8. Parihar, N.S. 1996. The Biology and Morphology of Pteridophytes. Central Book Depot, Allahabad.
9. Bhatnagar S.P. and Mohitra A 1996 Gymnosperms. New Age Publishers, New Delhi Mauseth, J.D. 1988 Plant Anatomy. The Benjammin/Cummings Publisher, USA.

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Course Name	Course Code	LTP	Credit	Semester
Chemistry-I	BSM 103	3:0:0	3	1

A. Course Learning Outcomes (CLO)

CLO 1	Understand quantum chemistry and their models for structure of atoms.
CLO 2	Periodic properties of various elements.
CLO 3	Various types of bond and calculation of their lattice energy, bonding energy, ionic character in bond.
CLO 4	Thermodynamics of chemical reactions and calculation of work, heat and enthalpy.
CLO 5	Calculation of entropy change and free energy change of various processes.
CLO 6	Ionization and calculation of solubility product.

B. Syllabus

Module I

Recapitulation of: Bohr's theory and its limitations, dual behaviour of matter and radiation, de-Broglie's relation, Heisenberg Uncertainty principle. Schrodinger equation, applications of Schrodinger equation for hydrogen atom. Need ofpolar coordinates, transformation of Cartesian coordinates into polar coordinates. Radial andangular parts of the hydogenic wave functions (atomic orbitals) and their variations for 1s, 2s, 2p, 3s, 3p and3d orbitals. (Only graphical representation).

Vector atom model and Discovery of spin quantum number, and magnetic spin quantum number (ms). Rules for fillingelectrons in various orbitals in atoms. Stability of half-filled and completelyfilled orbitals,

Radial and angular nodes and their significance. Radial distribution functions and the concept of the mostprobable distances with special reference to 1s and 2s atomic orbitals. Quantum numbers & their significance of quantum numbers,orbital angular momentum and quantum numbers mr and ms. Shapes of s, p and d atomic orbitals, nodal planes.

Module II

Modern periodic table, periodicity in properties of elements: atomic, ionic & covalent radii, electron affinity, ionization energy, and electronegeativity. Chemistry of lanthanides & actinides

Module III

Chemical Bonding and Molecular Structure

Ionic Bonding: General characteristics of an ionic bond. Energy considerations in ionic bonding, latticeenergy,solvation energy and their importance in the context of stability and solubility of ionic compounds.

Statement of Born-Lande equation for calculation of lattice energy, Born-Haber cycle and its applications. Fajan's rules, covalent character in ionic compounds,dipole moment and percentage ionic character.

Covalent bonding: VB Approach Shapes of some inorganic molecules and ions on the basis of VSEPR theory, concept of hybridization of resonance and its importance.

Module IV

Chemical Thermodynamics

State of a system, state variables, intensive and extensive variables, concept of heatand work, thermodynamic equilibrium, thermodynamic properties, various types of systems and processes.First Law of thermodynamics. Calculation of work (w), heat (q), changes in internal energy (PU) andenthalpy (PH) for expansion or compression of ideal gases under isothermal and adiabatic conditions for bothreversible and irreversible processes. Calculation of w, q, PU and PH for processes involving changes inphysical states.

Thermochemistry: Concept of standard state andstandard enthalpies of formations, integral and differential enthalpies of solution and dilution Calculation ofbond energy, bond dissociation energy and resonance energy from thermochemical data. Variation of enthalpyof a reaction with temperature – Kirchhoff's equation.Second Law of thermodynamics, Carnot cycle, concept of entropy, Gibbs free energy, Calculations of entropy change and free energy change for reversible and irreversibleprocesses under isothermal and adiabatic conditions. Criteria of spontaneity. Gibbs - Helmholtz equation.Maxwell's relations. Statement of Third Law of thermodynamics and calculation of absolute entropies ofsubstances.

Module V

Ionic Equilibria

Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionizationconstant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect, Salthydrolysis_calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffersolutions. Solubility, solubility product and its applications.

Qualitative treatment of acid base titration curves (calculation of pH at various stages of HCl – NaOH titration only). Theory of acid – base indicators.

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Barrow GM. (2007). Physical Chemistry. Tata McGraw_Hill.
2. Castellan GW. (2004). Physical Chemistry. 4th edition. Narosa.
3. Cotton FA and Wilkinson G. (Year). Basic Inorganic Chemistry. John Wiley.
4. Douglas, McDaniel and Alexader. (Year). Concepts and Models in Inorganic Chemistry. John Wiley.
5. Huheey JE, Keiter E and Keiter R. (Year). Inorganic Chemistry: Principles of Structure and Reactivity. Pearson Publication.
6. Khosla B.D. Senior Practical Physical Chemistry. R. Chand & Co.
7. Kotz JC, Treichel PM and Townsend JR. (2009). General Chemistry. Cengage Learning India Pvt. Ltd., New Delhi.
8. Mahan BH. (1998). University Chemistry. 3rd edition. Narosa
9. Vogel A.I. Vogel's Qualitative Inorganic Analysis. 7th edition. Prentice Hall
10. Vogel A.I. Vogel's Quantitative Chemical Analysis. 6th edition. Prentice Hall.

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Course Name	Course Code	LTP	Credit	Semester
Biochemistry & Biophysics	BSM 104	3:0:0	3	1

A. Course Learning Outcomes (CLO)

CLO 1	Explain structure and function of bio-molecules.
CLO 2	Explain biophysics principals and its application for the study of bio-molecules

B. Syllabus

Module I

Module I: - Introduction to Biochemistry

Chemical foundation of biology, Acid, Base, Buffer solution, pH, Handerson Hasselbalch equation, Water as a biological solvent, Importance of covalent and non-covalent interaction in biology

Module II: - Amino Acids, Proteins & Enzymes

Types & properties of amino acids, physical & chemical, peptide bonds, Ramachandran Plot, folding of peptide chains into regular repeating structure (helix, pleated sheets, β turns) in polypeptides, Levels of structure in protein architecture, forces stabilizing structure and shape of proteins, Introduction to enzymes, models and applications.

Module III: - Nucleic Acids

Structure & properties of purine and pyrimidine bases. Nucleosides and nucleotides, Double helical model of DNA & responsible molecular forces. Methods for isolation and purification of nucleic acids.

Module IV: - Carbohydrates & Lipids

Classification of carbohydrates, Properties and structure of few biologically essential polysaccharides, Structure & functions of lipids, fatty acids, triacylglycerols, sphingmylins, Liposomes, biological membranes and micelles.

Module V: - Thermodynamics & chemical kinetics

Laws of thermodynamics, concept of enthalpy, concept of entropy, Gibb's free energy, high energy phosphate bonds, chemical kinetics – rate, order, molecularity of reactions, Energy of activation

Module V: - Spectroscopic Techniques, electrophoretic & Microbiological techniques

Beer's Lambert Law, U.V. visible spectrophotometry, IR spectroscopy, Principles and applications of electrophoretic techniques in purification and characterization of biomolecules - SDS - PAGE & agarose gel electrophoresis, centrifugation, laminar air flow/biosafety cabinets.

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Principles of Biochemistry; Lehninger, Nelson & Cox.
2. Biochemistry; Luberts Stryer. W.H. Freeman and Company, New York.
3. Fundamentals of Biochemistry; J.L. Jain, Chand and Co., New Delhi.
4. An Introduction to Practical Biochemistry, 3rd edition, Tata McGraw Hill. 1988, David T. Plummer.
5. Biochemical Methods, 2nd edition, New Age International Publishers edn. 1996, S.S. Sadasivan and A Mamekam.
6. A Biologists Guide to Principles and Techniques of Practical Biochemistry, Wilson and Goulding, ELBS Publishers, Britain.
7. Biophysical Chemistry - Principles and Techniques. Upadhyay, Upadhyay and Nath, 3rd Edition, 2002. Himalaya Publishing House.
8. Physical Chemistry with Application to Biological systems: Raymond Chang, 2nd Edition, 1989, MacMillan Publishing Co. 2 No. New York.

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Course Name	Course Code	LTP	Credit	Semester
Life Sciences-I Lab	BSM 122	0:0:4	2	1

A. Course Learning Outcomes (CLO)

CLO 1	To understand the role of plants physiology in life sciences
CLO 2	To study the plant cell morphology using microscopy
CLO 3	To study plant cell structures

B. Syllabus

Course objectives

Aim of the course is to give hands on training to students for enhancing their practical skills of the subject domain.

Course Content

Minimum of 5-8 laboratory exercises will be conducted based on theory papers BSM 102

Examination Scheme:

Components	Performance	Lab record	Viva	Observations	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Bhatnager, S.P. and Moitra, A. 1996 Gymnospersm. New Age International (P) Ltd. Publishers, New Delhi.
2. Buchanan, B., Gruissem, W. and Jones, R. 2000 Biochemistry and Molecular Biology of Plants. American Society of Plant Biologists.
3. Raven, P.H., Johnson, G.B., Losos, J.B. and Singer, S.R. 2005 Biology. Tata MC Graw Hill.
4. Richardson, D.H.S. 1981 The Biology of Mosses. John Wiley and Sons, New York.

5. Sambamurty 2008 A Textbook of Bryophytes, Pteridophytes, Gymnosperms and Paleobotany. IK International Publishers.
6. Shaw, A.J. and Goffinet, B. (2000) Bryophyte Biology. Cambridge University Press.
7. Vander-Poorteri 2009 Introduction to Bryophytes. COP. 8. Parihar, N.S. 1991. Bryophytes. Central Book Depot, Allahabad.
8. Parihar, N.S. 1996. The Biology and Morphology of Pteridophytes. Central Book Depot, Allahabad.
9. Bhatnagar S.P. and Mohitra A 1996 Gymnosperms. New Age Publishers, New Delhi
10. Mauseth, J.D. 1988 Plant Anatomy. The Benjammin/Cummings Publisher, USA.

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Course Name	Course Code	LTP	Credit	Semester
Chemistry-I Lab.	BSM 123	0:0:4	2	1

A. Course Learning Outcomes (CLO)

CLO 1	**To understand the chemical reactions and mechanisms**
CLO 2	**To study the experimental setup for analysis**
CLO 3	**To understand the underlying calculations involved in chemical analysis**

B. Syllabus

Course objectives

Aim of the course is to give hands on training to students for enhancing their practical skills of the subject domain.

Course Content

Minimum of 5-8 laboratory exercises will be conducted based on theory papers BSM 103

Examination Scheme:

Components	Performance	Lab record	Viva	Observations	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Barrow GM. (2007). Physical Chemistry. Tata McGraw_Hill.
2. Castellan GW. (2004). Physical Chemistry. 4th edition. Narosa.
3. Cotton FA and Wilkinson G. (Year). Basic Inorganic Chemistry. John Wiley.
4. Douglas, McDaniel and Alexader. (Year). Concepts and Models in Inorganic Chemistry. John Wiley.
5. Huheey JE, Keiter E and Keiter R. (Year). Inorganic Chemistry: Principles of Structure and Reactivity. Pearson Publication.

6. Khosla B.D. Senior Practical Physical Chemistry. R. Chand & Co.
7. Kotz JC, Treichel PM and Townsend JR. (2009). General Chemistry. Cengage Learning India Pvt. Ltd., New Delhi.
8. Mahan BH. (1998). University Chemistry. 3rd edition. Narosa
9. Vogel A.I. Vogel's Qualitative Inorganic Analysis. 7th edition. Prentice Hall
10. Vogel A.I. Vogel's Quantitative Chemical Analysis. 6th edition. Prentice Hall.

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Course Name	Course Code	LTP	Credit	Semester
English - I	BCS 101	1:0:0	1	1

A. Course Learning Outcomes (CLO)

CLO 1	Identify essentials components of basic English language
CLO 2	Analyse varied tools to improve vocabulary and learn them
CLO 3	Interpret varied nuances of communication skills
CLO 4	Acquire mastery over grammatical aspects so as to use error free language
CLO 5	Explore and use English as medium of communication in real life situation

B. Syllabus

Module I: Vocabulary

Use of Dictionary

Use of Words: Diminutives, Homonyms & Homophones

Module II: Essentials of Grammar - I

Articles

Parts of Speech

Tenses

Module III: Essentials of Grammar - II

Sentence Structure

Subject -Verb agreement

Punctuation

Module IV: Communication

The process and importance

Principles & benefits of Effective Communication

Module V: Spoken English Communication

Speech Drills

Pronunciation and accent

Stress and Intonation

Module VI: Communication Skills-I

Developing listening skills

Developing speaking skills

Module VII: Communication Skills-II

Developing Reading Skills

Developing writing Skills

Module VIII: Written English communication

Progression of Thought/ideas

Structure of Paragraph

Structure of Essays

Module IX: Short Stories

Of Studies, by Francis Bacon

Dream Children, by Charles Lamb

The Necklace, by Guy de Maupassant

A Shadow, by R.K.Narayan

Glory at Twilight, Bhabani Bhattacharya

Module X: Poems

All the Worlds a Stage	Shakespeare
To Autumn	Keats
O! Captain, My Captain.	Walt Whitman
Where the Mind is Without Fear	Rabindranath Tagore

Examination Scheme:

Components					Attendance	EE
Weightage (%)					5	50

Text & References:

1. Madhulika Jha, Echoes, Orient Long Man
2. Ramon & Prakash, Business Communication, Oxford.
3. Sydney Greenbaum Oxford English Grammar, Oxford.
4. Successful Communications, Malra Treece (Allyn and Bacon)
5. Effective Technical Communication, M. Ashraf Rizvi.

- 30 hrs Programme to be continued for Full year

AMITY UNIVERSITY
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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
(Behavioural Sciences-I) Understanding Self for Effectiveness	BSS 103	1: 0:0	1	1

A. Course Learning Outcomes (CLO)

CLO 1	Understanding self & process of self exploration
CLO 2	Learning strategies for development of a healthy self esteem
CLO 3	Importance of attitudes and its effective on personality
CLO 4	Building Emotional Competence

B. Syllabus

Module I: Self: Core Competency

Understanding of Self

Components of Self – Self identity

Self concept

Self confidence

Self image

Module II: Techniques of Self Awareness

Exploration through Johari Window

Mapping the key characteristics of self

Framing a charter for self

Stages – self awareness, self acceptance and self realization

Module III: Self Esteem & Effectiveness

Meaning and Importance

Components of self esteem

High and low self esteem

Measuring your self esteem

Module IV: Building Positive Attitude

Meaning and nature of attitude

Components and Types of attitude

Importance and relevance of attitude

Module V: Building Emotional Competence

Emotional Intelligence – Meaning, components, Importance and Relevance

Positive and Negative emotions

Healthy and Unhealthy expression of emotions

Module VI:End-of-Semester Appraisal

Viva based on personal journal

Assessment of Behavioural change as a result of training

Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	Attendance	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

1. Davis, K. Organizational Behaviour,
2. Hoover, Judhith D. (2002). Effective Small Group and Team Communication, Harcourt College Publishers.
3. Charles: Team Management, Dick, Mc Cann & Margerison, Edition, viva books (1992)
4. Bates, A. P., & Julian, J. Sociology - Understanding Social Behaviour
5. Dressler, David and Cans, Donald: The Study of Human Interaction
6. Lapiere, Richard. T – Social Change

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language -I French	FLT 101	2:0:0	1	1

A. Course Learning Outcomes (CLO)

CLO 1	Identify and express in French vocabulary and grammar norms
CLO 2	Interpret different types of texts as well as cultural ideas and themes
CLO 3	Demonstrate comprehension of nuance between script and sound in French
CLO 4	Narrate clearly ideas, themes in simple standard French

B. Syllabus

Module A: pp. 01 to 37: Unités 1, 2, Unité 3 Objectif 1,2

Only grammar of Unité 3: objectif 3, 4 and 5

Contenu lexical:Unité 1: Découvrir la langue française : (oral et écrit)

1. se présenter, présenter quelqu'un, faire la connaissance des autres, formules de politesse, rencontres
2. dire/interroger si on comprend
3. Nommer les choses

Unité 2: Faire connaissance

1. donner/demander des informations sur une personne, premiers contacts, exprimer ses goûts et ses préférences
2. Parler de soi: parler du travail, de ses activités, de son pays, de sa ville.

Unité 3:Organiser son temps

1. dire la date et l'heure

Contenu grammatical:

1. organisation générale de la grammaire
2. article indéfini, défini, contracté
3. nom, adjectif, masculin, féminin, singulier et pluriel
4. négation avec « de », "moi aussi", "moi non plus"
5. interrogation : Inversion, est-ce que, qui, que, quoi, qu'est-ce que, où, quand, comment, quel(s), quelle(s)

Interro-négatif : réponses : oui, si, non

6. pronom tonique/disjoint- pour insister après une préposition
7. future proche

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- le livre à suivre : Campus: Tome 1

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language -I German	FLG 101	2:0:0	2	1

A. Course Learning Outcomes (CLO)

CLO 1	
CLO 2	
CLO 3	
CLO 4	

B. Syllabus

Course Contents:

Module I: Introduction

Self introduction: heissen, kommen, wohnwn, lernen, arbeiten, trinken, etc.

All personal pronouns in relation to the verbs taught so far.

Greetings: Guten Morgen!, Guten Tag!, Guten Abend!, Gute Nacht!, Danke sehr!, Danke!, Vielen Dank!, (es tut mir Leid!),

Hallo, wie geht's?: Danke gut!, sehr gut!, prima!, ausgezeichnet!,

Es geht!, nicht so gut!, so la la!, miserabel!

Module II: Interviewspiel

To assimilate the vocabulary learnt so far and to apply the words and phrases in short dialogues in an interview – game for self introduction.

Module III: Phonetics

Sound system of the language with special stress on Dipthongs

Module IV: Countries, nationalities and their languages

To make the students acquainted with the most widely used country names, their nationalitie and the language spoken in that country.

Module V: Articles

The definite and indefinite articles in masculine, feminine and neuter gender. All Vegetables, Fruits, Animals, Furniture, Eatables, modes of Transport

Module VI: Professions

To acquaint the students with professions in both the genders with the help of the verb "sein".

Module VII: Pronouns

Simple possessive pronouns, the use of my, your, etc.

The family members, family Tree with the help of the verb "to have"

Module VIII: Colours

All the color and color related vocabulary – colored, colorful, colorless, pale, light, dark, etc.

Module IX: Numbers and calculations – verb "kosten"

The counting, plural structures and simple calculation like addition, subtraction, multiplication and division to test the knowledge of numbers.

"Wie viel kostet das?"

Module X: Revision list of Question pronouns

W – Questions like who, what, where, when, which, how, how many, how much, etc.

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language -I Spanish	FLS 101	2:0:0	2	1

A. Course Learning Outcomes (CLO)

CLO 1	
CLO 2	
CLO 3	
CLO 4	

B. Syllabus

Module I

A brief history of Spain, Latin America, the language, the culture…and the relevance of Spanish language in today's global context.

Introduction to alphabets

Module II

Introduction to '*Saludos*' (How to greet each other. How to present / introduce each other).

Goodbyes (despedidas)

The verb *llamarse* and practice of it.

Module III

Concept of Gender and Number

Months of the years, days of the week, seasons. Introduction to numbers 1-100, Colors, Revision of numbers and introduction to ordinal numbers.

Module IV

Introduction to *SER* and *ESTAR* (both of which mean To Be).Revision of '*Saludos*' and '*Llamarse*'. Some adjectives, nationalities, professions, physical/geographical location, the fact that spanish adjectives have to agree with gender and number of their nouns. Exercises highlighting usage of *Ser* and *Estar*.

Module V

Time, demonstrative pronoun (Este/esta, Aquel/aquella etc)

Module VI

Introduction to some key AR /ER/IR ending regular verbs.

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language -I Chinese	FLC 101	2:0:0	1	1

A. Course Learning Outcomes (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. Syllabus

Module I

Show pictures, dialogue and retell.

Getting to know each other.

Practicing chart with Initials and Finals. (CHART – The Chinese Phonetic Alphabet Called "Hanyu Pinyin" in Mandarin Chinese.)

Practicing of Tones as it is a tonal language.

Changes in 3rd tone and Neutral Tone.

Module II

Greetings

Let me Introduce

The modal particle "ne".

Use of Please 'qing" – sit, have tea …….. etc.

A brief self introduction – Ni hao ma? Zaijian!

Use of "bu" negative.

Module III

Attributives showing possession

How is your Health? Thank you

Where are you from?

A few Professions like – Engineer, Businessman, Doctor, Teacher, Worker.

Are you busy with your work?

May I know your name?

Module IV

Use of "How many" – People in your family?

Use of "zhe" and "na".

Use of interrogative particle "shenme", "shui", "ma" and "nar".

How to make interrogative sentences ending with "ma".

Structural particle "de".

Use of "Nin" when and where to use and with whom. Use of guixing.

Use of verb "zuo" and how to make sentences with it.

Module V

Family structure and Relations.

Use of "you" – "mei you".

Measure words

Days and Weekdays.

Numbers.

Maps, different languages and Countries.

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text books & References

1. Professionals' Handbook For Learning Chinese Vol 1

2. ECR book-I (suggested reading)

3. Practical Chinese Grammar for foreigners (suggested reading)

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Anandam - I	AND 001	NTCC	2	1

A. Course Learning Outcomes (CLO)

CLO 1	Awareness and empathy regarding community issues
CLO 2	Interaction with the community and impact on society
CLO 3	Interaction with mentor and development of Student teacher relationship
CLO 4	Interaction among students, enlarge social network
CLO 5	Cooperative and Communication skills and leadership qualities
CLO 6	Critical thinking, Confidence and Efficiency

B. Syllabus

Course Objectives:

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

- apply their knowledge and skills to solve specific community problem
- learn to plan, lead, and organize community events have a sense of belonging to their college campus and community and find something they are interested in doing during their free time
- make new friends, expand social network, and boost social skills and mental health.
- be useful to society as it will protect them against stress, frustration, and depression

Course Contents:

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants, phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.

- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)

ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.

3. Conclusion is clearly stated. The underlying logic is explicit.

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Program Name: B.Sc. (Hons.) MICROBIOLOGY

SECOND SEMESTER

Course Code	Course Title	Category	Lectures(L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
BSM 201	Bacteriology & Virology	CC	3	1	-	4
BSM 202	Mycology & Phycology	CC	3	-	-	3
BSM 203	Life Sciences- II	CC	3	-	-	3
BSM 204	Chemistry- II	CC	3	-	-	3
BSM 221	Bacteriology & Virology Lab	CC	-	-	4	2
BSM 222	Mycology & Phycology Lab.	CC	-	-	4	2
BSM 224	Chemistry- II Lab.	CC			4	2
Minor Track-I		**MT**	3	-	-	3
BCS 201	English – II	VA	1	-	-	1
BSS 203	Behavioural Science-II (Problem Solving and Creative Thinking)	VA	1	-	-	1
FLT 201 FLG 201 FLS 201 FLC 201	Foreign Language – II French German Spanish Chinese	VA	2	-	-	2
AND 002	Anandam--II	NTCC	-	-	-	2
					TOTAL	**28**

Note: -Term Paper/ Case Study topic distribution before summer vacations and will be evaluated in Third Semester.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Bacteriology & Virology	BSM 201	3:1:0	4	2

A. Course Learning Outcomes (CLO)

CLO 1	Understanding of the bacterial cellular organization, cell organelles, bacterial classification, taxonomic tools, diversity and their importance
CLO 2	Students will have knowledge of virus structure, types, genomes, classification, multiplication and role in cancer

B. Syllabus

Module I: - Cell Structure

Cell organization: Cell size, shape and arrangement, glycocalyx, capsule, flagella, endoflagella, fimbriae and pili. Cell-wall: Composition and detailed structure of gram positive and gram-negative cell walls, Archaebacterial cell wall, lipopolysaccharide (LPS), sphaeroplasts, protoplasts, and L-forms. Effect of antibiotics and enzymes on the cell wall.

Cell Membrane: Structure, function and chemical composition of bacterial and archaeal cell membranes.

Cytoplasm: Ribosomes, mesosomes, inclusion bodies, nucleoid, chromosome and plasmids

Endospore: Structure, formation, stages of sporulation.

Module II: - Bacterial Systematics

Aim and principles of classification, systematics and taxonomy, concept of species, taxa, strain; conventional, molecular and recent approaches to polyphasic bacterial taxonomy, evolutionary chronometers, rRNA oligonucleotide sequencing, signature sequences, and protein sequences. Differences between eubacteria and archaebacteria.

Module III: - Important archaeal and eubacterial groups

According to Bergey's Manual of Systematic Bacteriology (Second Edition)

Archaebacteria: General characteristics, phylogenetic overview, genera belonging to Nanoarchaeota (Nanoarchaeum), Crenarchaeota (Sulfolobus, Thermoproteus) and Euryarchaeota [Methanogens (Methanobacterium, Methanocaldococcus), thermophiles (Thermococcus, Pyrococcus, Thermoplasma), and Halophiles (Halobacterium, Halococcus)]

Eubacteria: Morphology, metabolism, ecological significance and economic importance of following groups:
Gram Negative: Non proteobacteria, Alpha proteobacteria, Beta proteobacteria, Gamma proteobacteria, Delta proteobacteria, Epsilon proteobacteria
Gram Positive: Low G+ C (Firmicutes), High G+C (Actinobacteria)
Cyanobacteria: An Introduction

Module IV: - Introduction of Virology
Discovery of viruses, nature and definition of viruses, general properties of viruses. Capsid symmetry, enveloped and non-enveloped viruses. Structure: Concept of viroids, virusoids, satellite viruses and prions. Theories of viral origin. Isolation, purification and cultivation of viruses.

Module V: - Viral Taxonomy & Features of Viral Genomes
Classification and nomenclature of different groups of viruses infecting microbes, plants and animals
Salient features of viral genomes: Unusual bases (TMV, T4 phage), overlapping genes (ΦX174, Hepatitis B virus), alternate splicing (Picornavirus), terminal redundancy (T4 phage), terminal cohesive ends (lambda phage), ambisense genomes (arenavirus), partial double stranded genomes (Hepatitis B), long terminal repeats (retrovirus), segmented (influenza virus) and non segmented genomes (picornavirus), capping and tailing (TMV)

Module VI: - Bacteriophages & Oncogenic Viruses
Diversity, classification, one step multiplication curve, lytic and lysogenic phages (lambda and P1 phage), concept of early and late proteins, regulation of transcription in lambda phage and applications of bacteriophages.
Types of oncogenic DNA and RNA viruses. Concepts of oncogenes, proto-oncogenes and tumor suppressor genes.
Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Atlas RM. (1997). Principles of Microbiology. 2nd edition. WM.T.Brown Publishers.
2. Black JG. (2008). Microbiology: Principles and Explorations. 7th edition. Prentice Hall
3. Madigan MT, and Martinko JM. (2006). Brock Biology of Micro-organisms. 8th edition. Parker J. Prentice Hall International, Inc.
4. Pelczar Jr MJ, Chan ECS, and Krieg NR. (2004). Microbiology. 5th edition Tata McGraw Hill.
5. Srivastava S and Srivastava PS. (2003). Understanding Bacteria. Kluwer Academic Publishers, Dordrecht
6. Stanier RY, Ingraham JL, Wheelis ML and Painter PR. (2005). General Microbiology. 5th edition McMillan.
7. Tortora GJ, Funke BR, and Case CL. (2008). Microbiology: An Introduction. 9th edition Pearson Education.
8. Willey JM, Sherwood LM, and Woolverton CJ. (2008). Prescott, Harley and Klein's Microbiology. 7th edition. McGraw Hill Higher Education.
9. Dimmock, NJ, Easton, AL, Leppard, KN (2007). Introduction to Modern Virology. 6th edition (First Indian reprint 2007), Blackwell Publishing Ltd.
10. Carter J and Saunders V (2007). Virology: Principles and Applications. John Wiley and Sons.
11. Flint SJ, Enquist, LW, Krug, RM, Racaniello, VR, Skalka, AM (2004). Principles of Virology, Molecular biology, Pathogenesis and Control. 2nd edition. ASM press Washington DC.
12. Levy JA, Conrat HF, Owens RA. (2000). Virology. 3rd edition. Prentice Hall publication, New Jersey.
13. Wagner EK, Hewlett MJ. (2004). Basic Virology. 2nd edition. Blackwell Publishing.
14. Mathews. (2004). Plant Virology. Hull R. Academic Press, New York.
15. Nayudu MV. (2008). Plant Viruses. Tata McGraw Hill, India.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Mycology & Phycology	BSM 202	3:0:0	3	2

A. Course Learning Outcomes (CLO)

CLO 1	**Introduction and characteristics of Fungi, Algae, Lichens & Mycorrhizae**
CLO 2	Explain Cell Structures, Classification, life cycle & economic importance of Algae, Fungi, and Lichens.
CLO 3	Also explain its economic importance.

B. Syllabus

Module I: - Introduction to

Distribution and classification of algae, algal nutrition, thallus organization, Applications of algae in Agriculture, Industry, Environment and Food

Module II: - Lifecycles of algae

-Chlorophyceae*: Volvox, Coleochaete*

-Charophyceae: *Chara*

-Diatoms: General features with reference to pinnate and centric diatoms

-Xanthophyceae: *Vaucheria*

-Phaeophyceae: *Ectocarpus*

-Rhodophyceae: *Polysiphonia*

-Cyanobacteria: *Nostoc*

Module III: - Classification of fungi

Distribution, fungal cell structure, general characteristics, Classification of fungi, physiology and reproduction, importance in Agriculture, Environment, Industry, Medicine, Food, Biodeterioration (of wood, paper, textile, leather), Mycotoxins

Module IV: - Lifecycles of fungi

-Cellular slime molds - *Dictyostelium*

-True slime molds (Myxomycetes) - *Physarum*

-Oomycetes - *Saprolegnia, Phytophthora*

-Chytridiomycetes - *Neocallimastix*

-Zygomycetes – *Mucor*

-Ascomycetes - *Saccharomyces, Penicillium, Neurospora*

-Basidiomycetes - *Agaricus*

-Deuteromycetes - *Candida, Alternaria*

Module V: - Lichens & Mycorrhizae

Structure, different, types, physiology, importance

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Barasanti L and Guaaltieri P. (2006). Algae: Anatomy Biochemistry and Biotechnology. Taylor and Francis Group, New York.
2. Graham LE, Graham JM and Wilcox LW. (2009). Algae. 2nd edition. Benjamin Cumming, New York.
3. Kumar HD. (1990). Introductory Phycology. 2nd edition. Affiliated East Western Press.
4. Kumar HD. (1995). The Text Book on Algae. 4th edition. Affiliated East Western Press.
5. Lee RE. (1999). Phycology. 4th edition. Cambridge Press.
6. Sharma OP. (2005). Textbook of Algae. Tata McGraw Hill Publishing Co. Ltd.
7. Vashishta BR. (2005). Algae. 3rd edition. S. Chand and Company Ltd., New Delhi.
8. Alexopoulos CJ, Mims CW and Blackwell M. (1996). Introductory Mycology. 4th edition. John Wiley and Sons, Inc.
9. Dube HC. (1981). An Introduction to Fungi. Vikas Publishing House Pvt. Ltd.
10. Sumbali G. (2005). The Fungi. 1st edition. Narosa Publishing India House.
11. Vashishta BR and Sinha AK. (2008). Fungi. S. Chand and Company Ltd.
12. Webster J. (1980). Introduction to Fungi. 2nd edition. Cambridge University Press.

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Course Name	Course Code	LTP	Credit	Semester
Life Sciences-II	BSM 203	3:0:0	3	2

A. Course Learning Outcomes (CLO)

CLO 1	Classification and characteristics of different classes of chordate and non-chordata.
CLO 2	Fundamental knowledge of animal histology and physiology, Concept of animal evolution
CLO 3	Scientific process and practical applications of applied zoology

B. Syllabus

Module I: - Non Chordata

General characteristics, outline classification of protozoa, porifera, metazoan, chidinia, platyhelminthes, aschelminchets, annelid, arthopoda, mollusca & echinodermata

Module II: - Chordata

General account of chordates, pisces, amphibian, reptiles, aves & mammals

Module III: - Histology & Physiology

Concept & classification of various tissues & glands, bones- muscle-nervous system

Vasculatory, digestive, respiratory, reproductive, excretory & endocrine system

Module IV: - Animal Evolution

Theories of evolution, concept of species, gametogenesis & fertilization, evolution of man & mutation

Module V: - Applied Zoology

Production technology of apiculture, sericulture, fisheries, aquaculture, poultry, lac-culture.

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Kardong, K.V. (2005) Vertebrates Comparative Anatomy, Function and evolution. IV Edition. McGrawHill Higher Education.
2. Kent, G.C. and Carr R.K. (2000). Comparative Anatomy of the Vertebrates. IX Edition. The McGraw-Hill Companies.
3. Young, J.Z. (2004). The life of vertebrates. III Edition. Oxford university press.
4. Hall B.K. and Hallgrimsson B. (2008). Strickberger's Evolution. IV Edition. Jones and Bartlett Publishers, Inc.
5. Weichert, C.K. (1970). Anatomy of Chordate. McGraw Hill.
6. Tortora, G.J. & Grabowski, S. (2006). Principles of Anatomy & Physiology. XI Edition. John wiley & sons, Inc.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Chemistry-II	BSM 204	3:0:0	3	2

A. Course Learning Outcomes (CLO)

CLO 1	Understand general organic chemistry and its application on chemical reactions.
CLO 2	Synthesise the intermediates in control manner.
CLO 3	Synthesise the molecules in stereospecific and stereoselective manner
CLO 4	Prepare the Grignard reagent and apply it chemical reactions.
CLO 5	Synthesise the petrol in laboratory and their fractionation and cracking.
CLO 6	Determine the age of earth by carbon dating and apply the radioactive elements in general life.

B. Syllabus

Module I

Fundamentals of Organic Chemistry

Concept of hybridization of carbon. Cleavage of a covalent bond: homolysis and heterolysis. Electronic effects and their applications (inductive, electromeric, hyperconjugation and resonance). Structure and stability of reactive intermediates (carbocations, carbanions and free radicals). Relative strength of carboxylic acids (aliphatic, aromatic and halo-substituted aliphatic), alcohols, phenols and nitro-phenols. Relative basic strength of amines (aliphatic and aromatic) Intermolecular and intramolecular forces, hydrogen bonding. Effect of intermolecular and intramolecular forces on properties such as solubility, vapour pressure, melting and boiling points of organic compounds.

Module II

Stereochemistry

Conformational analysis of ethane, butane and cyclohexane. Interconversion of Wedge Formula, Newman, Sawhorse and Fischer representations. Concept of chirality (upto two carbon atoms). Geometrical and Optical isomerism; Enantiomerism, Diastereomerism and Meso compounds). IUPAC conventions for optical isomers: Threo and erythro; D and L; cis - trans nomenclature; CIP Rules: R/ S (for upto 2 chiral carbon atoms) and E / Z Nomenclature.

Module III

Grignard reagent; preparation and uses, Alcohols; ethanol, propanol, glycerol; Monocarboxylic acids and their simple derivatives, descriptive studies of dicarboxylic acids, viz. malic, oxalic, tartaric, maleic, General methods of preparation of aliphatic aldehydes and ketones, Keto-enol tautomerism; aceto-acetic ester and malonic ester.

Module IV

Petroleum: Fractionation, cracking and synthetic petrol. General methods of preparation and properties of alkanes, alkenes, alkynes, Halo alkanes (CH_2CI_2 , $CHCI_3$, CCI_4, CHI_3), Electrophilic substitutions in aromatic systems. General study of Cycloalkanes

Module V

Radioactive disintegration series, group displacement law, law of radioactive decay, half-life and average life of radio elements, radio active equilibrium, measurement of radioactivity. Stability of atomic nucleus, n/p ratio, Radioisotopes and their applications: Determination of age of earth, radio carbon dating, Medicinal and agriculture use of isotopes, hazards of radio activity.

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Bahl, B. S. (2006). Text Book of Organic Chemistry 18th Ed. S. Chand & Co. Ltd.
2. Puri, B. R., Sharma, L. R., & Madan, S. P. (2013). Principles of Physical Chemistry. 46th Ed. Vishal Publishing Co.
3. Bahl, A. (2010). Advanced organic chemistry. 3rd Ed. S Chand & Company Limited.
4. I.L. Finar & S, Pearsons (1973). Organic Chemistry Vol.I & II 6th Ed. Pearson India.
5. N, Haider. (2011), Fundamentals of Organic Chemistry 5th Ed. S. Chand & Co. Ltd.
6. T. W. Graham Solomons. Organic Chemistry, John Wiley and Sons.

AMITY UNIVERSITY
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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Bacteriology & Virology Lab	BSM 221	0:0:4	2	2

A. Course Learning Outcomes (CLO)

CLO 1	**To understand viral cell cultivation**
CLO 2	**To learn the different methods of bacteria culture**
CLO 3	**To study cell behavior in different environment**

B. Syllabus

Course Objective: -

Aim of the course is to give hands on training to students for enhancing their practical skills of the subject domain.

Course Content

Minimum of 5-8 laboratory exercises will be conducted based on theory papers BSM 201

Examination Scheme:

Components	Performance	Lab record	Viva	Observations	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

16. Atlas RM. (1997). Principles of Microbiology. 2nd edition. WM.T.Brown Publishers.
17. Black JG. (2008). Microbiology: Principles and Explorations. 7th edition. Prentice Hall
18. Madigan MT, and Martinko JM. (2006). Brock Biology of Micro-organisms. 8th edition. Parker J. Prentice Hall International, Inc.
19. Pelczar Jr MJ, Chan ECS, and Krieg NR. (2004). Microbiology. 5th edition Tata McGraw Hill.
20. Srivastava S and Srivastava PS. (2003). Understanding Bacteria. Kluwer Academic Publishers, Dordrecht
21. Stanier RY, Ingraham JL, Wheelis ML and Painter PR. (2005). General Microbiology. 5th edition McMillan.

22. Tortora GJ, Funke BR, and Case CL. (2008). Microbiology: An Introduction. 9th edition Pearson Education.
23. Willey JM, Sherwood LM, and Woolverton CJ. (2008). Prescott, Harley and Klein's Microbiology. 7th edition. McGraw Hill Higher Education.
24. Dimmock, NJ, Easton, AL, Leppard, KN (2007). Introduction to Modern Virology. 6th edition (First Indian reprint 2007), Blackwell Publishing Ltd.
25. Carter J and Saunders V (2007). Virology: Principles and Applications. John Wiley and Sons.
26. Flint SJ, Enquist, LW, Krug, RM, Racaniello, VR, Skalka, AM (2004). Principles of Virology, Molecular biology, Pathogenesis and Control. 2nd edition. ASM press Washington DC.
27. Levy JA, Conrat HF, Owens RA. (2000). Virology. 3rd edition. Prentice Hall publication, New Jersey.
28. Wagner EK, Hewlett MJ. (2004). Basic Virology. 2nd edition. Blackwell Publishing.
29. Mathews. (2004). Plant Virology. Hull R. Academic Press, New York.
30. Nayudu MV. (2008). Plant Viruses. Tata McGraw Hill, India.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Mycology & Phycology Lab	BSM 222	0:0:4	2	2

A. Course Learning Outcomes (CLO)

CLO 1	**To study the structure and cellular organization of the fungi**
CLO 2	**To study the structure and cellular organization of the Algae**
CLO 3	**To understand the nutrient requirements of the fungal and algal cells**

B. Syllabus

Course Objective: -

Aim of the course is to give hands on training to students for enhancing their practical skills of the subject domain.

Course Content

Minimum of 5-8 laboratory exercises will be conducted based on theory papers BSM 202

Structure, different, types, physiology, importance

Examination Scheme:

Components	Performance	Lab record	Viva	Observations	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

13. Barasanti L and Guaaltieri P. (2006). Algae: Anatomy Biochemistry and Biotechnology. Taylor and Francis Group, New York.
14. Graham LE, Graham JM and Wilcox LW. (2009). Algae. 2nd edition. Benjamin Cumming, New York.
15. Kumar HD. (1990). Introductory Phycology. 2nd edition. Affiliated East Western Press.
16. Kumar HD. (1995). The Text Book on Algae. 4th edition. Affiliated East Western Press.

17. Lee RE. (1999). Phycology. 4th edition. Cambridge Press.
18. Sharma OP. (2005). Textbook of Algae. Tata McGraw Hill Publishing Co. Ltd.
19. Vashishta BR. (2005). Algae. 3rd edition. S. Chand and Company Ltd., New Delhi.
20. Alexopoulos CJ, Mims CW and Blackwell M. (1996). Introductory Mycology. 4th edition. John Wiley and Sons, Inc.
21. Dube HC. (1981). An Introduction to Fungi. Vikas Publishing House Pvt. Ltd.
22. Sumbali G. (2005). The Fungi. 1st edition. Narosa Publishing India House.
23. Vashishta BR and Sinha AK. (2008). Fungi. S. Chand and Company Ltd.
24. Webster J. (1980). Introduction to Fungi. 2nd edition. Cambridge University Press.

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Course Name	Course Code	LTP	Credit	Semester
Chemistry-II Lab.	BSM 224	0:0:4	2	2

A. Course Learning Outcomes (CLO)

CLO 1	**To understand basic chemical reactions**
CLO 2	**To analyses the salts along with their confirmatory tests**
CLO 3	**To study the chemical behavior of the salts**

B. Syllabus

Course Objective: -

Aim of the course is to give hands on training to students for enhancing their practical skills of the subject domain.

Course Content

Minimum of 5-8 laboratory exercises will be conducted based on theory papers BSM 204

Examination Scheme:

Components	Performance	Lab record	Viva	Observations	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

7. Bahl, B. S. (2006). Text Book of Organic Chemistry 18th Ed. S. Chand & Co. Ltd.
8. Puri, B. R., Sharma, L. R., & Madan, S. P. (2013). Principles of Physical Chemistry. 46th Ed. Vishal Publishing Co.
9. Bahl, A. (2010). Advanced organic chemistry. 3rd Ed. S Chand & Company Limited.
10. I.L. Finar & S, Pearsons (1973). Organic Chemistry Vol.I & II 6th Ed. Pearson India.
11. N, Haider. (2011), Fundamentals of Organic Chemistry 5th Ed. S. Chand & Co. Ltd.
12. T. W. Graham Solomons. Organic Chemistry, John Wiley and Sons.

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Course Name	Course Code	LTP	Credit	Semester
English - II	BCS 201	1:0:0	1	1

A. Course Learning Outcomes (CLO)

CLO 1	Identify essentials components of language
CLO 2	Make inferences and predictions about spoken discourse
CLO 3	Develop Creative & Literary Sensitivity in global situation
CLO 4	Give an oral presentation in class using effective delivery strategies
CLO 5	Explore and use English as medium of communication in real life situation

B. Syllabus

Module I: Vocabulary

Use of Dictionary

Use of Words: Diminutives, Homonyms & Homophones

Module II: Essentials of Grammar - I

Articles

Parts of Speech

Tenses

Module III: Essentials of Grammar - II

Sentence Structure

Subject -Verb agreement

Punctuation

Module IV: Communication

The process and importance

Principles & benefits of Effective Communication

Module V: Spoken English Communication

Speech Drills

Pronunciation and accent

Stress and Intonation

Module VI: Communication Skills-I

Developing listening skills

Developing speaking skills

Module VII: Communication Skills-II

Developing Reading Skills

Developing writing Skills

Module VIII: Written English communication

Progression of Thought/ideas

Structure of Paragraph

Structure of Essays

Module IX: Short Stories

Of Studies, by Francis Bacon

Dream Children, by Charles Lamb

The Necklace, by Guy de Maupassant

A Shadow, by R.K.Narayan

Glory at Twilight, Bhabani Bhattacharya

Module X: Poems

All the Worlds a Stage	Shakespeare
To Autumn	Keats
O! Captain, My Captain.	Walt Whitman
Where the Mind is Without Fear	Rabindranath Tagore
Psalm of Life	H.W. Longfellow

Examination Scheme:

Components					Attendance	EE
Weightage (%)					5	50

Text & References:

1. Madhulika Jha, Echoes, Orient Long Man
2. Ramon & Prakash, Business Communication, Oxford.
3. Sydney Greenbaum Oxford English Grammar, Oxford.
4. Successful Communications, Malra Treece (Allyn and Bacon)
5. Effective Technical Communication, M. Ashraf Rizvi.

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Course Name	Course Code	LTP	Credit	Semester
Behavioural Science- II (Problem solving and creative thinking)	BSS 203	1:0:0	1	2

A. Course Learning Outcomes (CLO)

CLO 1	Understand the process of problem solving and creative thinking
CLO 2	Facilitation and enhancement of skills required for decision-making

B. Syllabus

Module I: Thinking as a tool for Problem Solving

What is thinking: The Mind/Brain/Behaviour

Critical Thinking and Learning:

Making Predictions and Reasoning

Memory and Critical Thinking

Emotions and Critical Thinking

Thinking skills

Module II: Hindrances to Problem Solving Process

Perception

Expression

Emotion

Intellect

Work environment

Module III: Problem Solving

Recognizing and Defining a problem

Analyzing the problem (potential causes)

Developing possible alternatives

Evaluating Solutions

Resolution of problem

Implementation

Barriers to problem solving:

- Perception
- Expression
- Emotion
- Intellect
- Work environment

Module IV: Plan of Action

Construction of POA

Monitoring

Reviewing and analyzing the outcome

Module V: Creative Thinking

Definition and meaning of creativity

The nature of creative thinking

- Convergent and Divergent thinking
- Idea generation and evaluation (Brain Storming)
- Image generation and evaluation
- Debating

The six-phase model of Creative Thinking: ICEDIP model

Module VI: End-of-Semester Appraisal

Viva based on personal journal

Assessment of Behavioural change as a result of training

Exit Level Rating by Self and Observer

Examination Scheme:

Components	SAP	Attendance	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

Text & References:

1. Michael S. (1999). How to be a Better Problem Solver, Kogan Page, New Delhi.

2. Geoff P. (1999). How to be a Better at creativity; by: Kogan Page, New Delhi, (1999)
3. Richard Y. C., & Keith P., (1998). Wheeler Publishing, New Delhi.
4. Phil Lowe Koge (1996). Page: Creativity and Problem Solving, New Delhi,
5. Pfeiffer, J. W., (1996). Theories and Models in Applied Behavioural Science, Management Pfeiffer & Company.
6. Bensley, A. D. (1998). Critical Thinking in Psychology – A Unified Skills Approach, Brooks/Cole Publishing Company.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language French- II	FLT 201	2:0:0	1	1

A. Course Learning Outcomes (CLO)

CLO 1	Identify and express in French vocabulary and grammar norms
CLO 2	Interpret different types of texts as well as cultural ideas and themes
CLO 3	Demonstrate comprehension of nuance between script and sound in French
CLO 4	Narrate clearly ideas, themes in simple standard French

B. Syllabus

Module A: pp.38 – 47: Unité 3: Objectif 3, 4, 5. 6

Module B: pp. 47 to 75 Unité 4, 5

Contenu lexical: Unité 3: Organiser son temps

1. donner/demander des informations sur un emploi du temps, un horaire SNCF – Imaginer un dialogue
2. rédiger un message/ une lettre pour …
    i) prendre un rendez-vous/ accepter et confirmer/ annuler
    ii) inviter/accepter/refuser
3. Faire un programme d'activités

imaginer une conversation téléphonique/un dialogue

Propositions- interroger, répondre

Unité 4: **Découvrir son environnement**

1. situer un lieu
2. s'orienter, s'informer sur un itinéraire.
3. Chercher, décrire un logement
4. connaître les rythmes de la vie

Unité 5 : s'informer

1. demander/donner des informations sur un emploi du temps passé.
2. donner une explication, exprimer le doute ou la certitude.
3. découvrir les relations entre les mots
4. savoir s'informer

Contenu grammatical:

1. Adjectifs démonstratifs
2. Adjectifs possessifs/exprimer la possession à l'aide de :
   i. « de » ii. A+nom/pronom disjoint
3. Conjugaison pronominale – négative, interrogative - construction à l'infinitif
4. Impératif/exprimer l'obligation/l'interdiction à l'aide de « il faut…. »/ «il ne faut pas… »
5. passé composé
6. Questions directes/indirectes

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- le livre à suivre : Campus: Tome 1

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language -II German	FLG 201	2:0:0	1	2

A. Course Learning Outcomes (CLO)

CLO 1	Identify and express in German vocabulary and grammar norms
CLO 2	Interpret different types of texts as well as cultural ideas and themes
CLO 3	Demonstrate comprehension of nuance between script and sound in German
CLO 4	Narrate clearly ideas, themes in simple standard German

B. Syllabus

Module I: Everything about Time and Time periods

Time and times of the day.

Weekdays, months, seasons.

Adverbs of time and time related prepositions

Module II: Irregular verbs

Introduction to irregular verbs like to be, and others, to learn the conjugations of the same, (fahren, essen, lessen, schlafen, sprechen und ähnliche).

Module III: Separable verbs

To comprehend the change in meaning that the verbs undergo when used as such

Treatment of such verbs with separable prefixes

Module IV: Reading and comprehension

Reading and deciphering railway schedules/school time table

Usage of separable verbs in the above context

Module V: Accusative case

Accusative case with the relevant articles

Introduction to 2 different kinds of sentences – Nominative and Accusative

Module VI: Accusative personal pronouns

Nominative and accusative in comparison

Emphasizing on the universal applicability of the pronouns to both persons and objects

Module VII: Accusative prepositions

Accusative propositions with their use

Both theoretical and figurative use

Module VIII: Dialogues

Dialogue reading: 'In the market place'

'At the Hotel'

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language -II Spanish	FLS 201	2:0:0	2	2

A. Course Learning Outcomes (CLO)

CLO 1	Identify and express in Spanish vocabulary and grammar norms
CLO 2	Interpret different types of texts as well as cultural ideas and themes
CLO 3	Demonstrate comprehension of nuance between script and sound in Spanish
CLO 4	Narrate clearly ideas, themes in simple standard Spanish

B. Syllabus

Module I

Revision of earlier modules.

Module II

Some more AR/ER/IR verbs. Introduction to root changing and irregular AR/ER/IR ending verbs

Module III

More verbal phrases (eg, Dios Mio, Que lastima etc), adverbs *(bueno/malo, muy, mucho, bastante, poco).*

Simple texts based on grammar and vocabulary done in earlier modules.

Module IV

Posessive pronouns

Module V

Writing/speaking essays like my friend, my house, my school/institution, myself….descriptions of people, objects etc, computer/internet related vocabulary

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language -II Chinese	FLC 201	2:0:0	1	1

A. Course Learning Outcomes (CLO)

CLO 1	Read, write and speak approx50Chinese words and understand basic grammar points.
CLO 2	Interpret words, phrases and sentences of day today conversation related to hobbies and abilities, gratitude, apology and welcome
CLO 3	Write Chinesecharacters, simple sentence and a paragraph on simple topic like 'Self Introduction' and dialogue writing on "Conversation between two friends exchanging Personnel Information
CLO 4	Communicate with Chinese speaking people using words, phrases and sentences related to hobbies and abilities. Express gratitude, apology and welcome

B. Syllabus

Module I

Drills

Practice reading aloud

Observe Picture and answer the question.

Tone practice.

Practice using the language both by speaking and by taking notes.

Introduction of basic sentence patterns.

Measure words.

Glad to meet you.

Module II

Where do you live?

Learning different colors.

Tones of “bu”

Buying things and how muchit costs?

Dialogue on change of Money.

More sentence patterns on Days and Weekdays.

How to tell time. Saying the units of time in Chinese. Learning to say useful phrases like – 8:00, 11:25, 10:30 P.M. everyday, afternoon, evening, night, morning 3:58, one hour, to begin, to end ….. etc.

Morning, Afternoon, Evening, Night.

Module III

Use of words of location like-li, wais hang, xia

Furniture – table, chair, bed, bookshelf,.. etc.

Description of room, house or hostel room.. eg what is placed where and how many things are there in it?

Review Lessons – Preview Lessons.

Expression ‘yao”, “xiang” and “yaoshi” (if).

Days of week, months in a year etc.

I am learning Chinese. Is Chinese difficult?

Module IV

Counting from 1-1000

Use of “chang-chang”.

Making an Inquiry – What time is it now? Where is the Post Office?

Days of the week. Months in a year.

Use of Preposition – “zai”, “gen”.

Use of interrogative pronoun – “duoshao” and “ji”.

“Whose”??? Sweater etc is it?

Different Games and going out for exercise in the morning.

Module V

The verb “qu”

– Going to the library issuing a book from the library

– Going to the cinema hall, buying tickets

– Going to the post office, buying stamps

– Going to the market to buy things.. etc

– Going to the buy clothes …. Etc.

Hobby. I also like swimming.

Comprehension and answer questions based on it.

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text Book :
Professionals' Handbook for Learning Chinese Vol-1, GBD books. In this session Professionals' Handbook for Learning Chinese Vol-I, lesson 6 to 9 i.e. topics Hobbies, abilities, express gratitude, apology and welcome will be covered.
Reference books:
Learn Chinese with me Vol- 1, GBD books; Elementary Chinese Reader Vol-1
Mobile app –HSK-I
Internet sources- Video clippings related to topics.
Practical Chinese Grammar for the foreigners.
Video Clippings: How to Bargain? Chinese for Beginners
Rosetta software level I Unit 1 core lesson 3 &4.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Anandam - II	AND 002	NTCC	2	2

A. Course Learning Outcomes (CLO)

CLO 1	Awareness and empathy regarding community issues
CLO 2	Interaction with the community and impact on society
CLO 3	Interaction with mentor and development of Student teacher relationship
CLO 4	Interaction among students, enlarge social network
CLO 5	Cooperative and Communication skills and leadership qualities
CLO 6	Critical thinking, Confidence and Efficiency

B. Syllabus

Course Objectives:

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

- apply their knowledge and skills to solve specific community problem
- learn to plan, lead, and organize community events have a sense of belonging to their college campus and community and find something they are interested in doing during their free time
- make new friends, expand social network, and boost social skills and mental health.
- be useful to society as it will protect them against stress, frustration, and depression

Course Contents:

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants, phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any

- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)

ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.

2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

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Program Name: B.Sc. (Hons.) MICROBIOLOGY

THIRD SEMESTER

Course Code	Course Title	Category	Lectures(L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
BSM 301	Microbial Physiology & Metabolism	CC	3	-	-	3
BSM 302	Molecular Biology & RDT	CC	3	1	-	4
EVS 003	Environmental Sciences	CC	3	1	-	4
BSM 321	Biochemistry & Microbial Physiology Lab.	CC	-	-	4	2
BSM 322	Molecular Biology & RDT Lab.	CC	-	-	4	2
Domain Elective-I : Choose any one from the following courses						
BSM 311	Bionanotechnology & Biosensors	DE	3	-	-	3
BSM 312	Soil Microbiology					
BSM 313	Food Biotechnology					
BSM 314	Cell Biology					
Minor Track- II		MT				3
BSM 330	Term Paper Evaluation	NTCC	-	-	-	3
BCS 301	Communication Skills – I	VA	-	-	-	1
BSS 303	Behavioural Science-III (Interpersonal Communication & Relationship Management)	VA	-	-	-	1
FLT 301 FLG 301 FLS 301 FLC 301	Foreign Language – III French German Spanish Chinese	VA	-	-	-	2
AND003	Anandam-III	NTCC	2	-	-	2
					TOTAL	**30**

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Course Name	Course Code	LTP	Credit	Semester
Microbial Physiology & Metabolism	BSM 301	3:0:0	3	3

A. Course Learning Outcomes (CLO)

CLO 1	Explain nutritional requirements of microorganism and their growth
CLO 2	Explain metabolic processes in details

B. Syllabus

Module I: - Nutritional Diversity of Microbes

Nutrition: Nutritional diversity &requirements of Microorganisms – Autotrophs, Heterotrophs, Photoautorophs, Chemoautotrophs, Copiotrophs, Oligotrophs. Nutritional Transport Mechanisms,Diffusion: Passive and facilitated, Primary active and secondary active transport,Group translocation (phosphotransferase system), symport, antiport and uniport,electrogenic and electro neutral transport, transport of Iron. Phagocytosis – Pinocytosis.

Module II: - Microbial Growth

Different phases of growth – Growth curve – Generation time – Batch Growth, Continuous Growth, Feb Batch Growth, Synchronous culture, Diauxic growth,Factors influencing Microbial growth – Temperature, pH, Pressure , Salt concentration. Measurement of cell numbers, cell mass and metabolic activity, Ageing, death &Stress response in microorganism

Module III: - Metabolism& Energetics

EMP – HMP – ED pathways – TCA cycle- Electron transport chain – Oxidative and Substrate level phosphorylation, Uncouplers,inhibitors and ionophores. Chemical coupling, conformational coupling andchemiosmotic hypotheses. Methanogens

Module IV: - Anaerobic respiration

Anaerobic respiration – sulphur , nitrogenous compounds and CO2 as final electron Acceptor - Fermentation – alcoholic, propionic and mixed acid fermentation. Lactic acid fermentation.

Module V: Photosynthesis

Microbial pigments for photosynthesis, Photosynthesis – Oxygenic and Anoxygenic , Carbon dioxide fixation, Bioluminescence.

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Prescott, L.M J.P. Harley and C.A. Klein 1995. Microbiology 2nd edition Wm, C. Brown publishers.

2. David White. The Physiology and Biochemistry of Prokaryotes. Oxford University Press. 4th Edition. 2011.

3. Tortora, Funke and Case. Microbiology - An Introduction. Books a la carte Edition. 11th Edition

4. Doelle. H.W.1975.Bacterial Metabolism. 2nd edition. Academic Press.

5. Moat. A.G. J.W.Foster. 1988. Microbial physiology. 2nd edition. Springer – Verlag.

6. Caldwell. D.R.1995, Microbial physiology and Metabolism. WmC Brown Publishers, England.

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Molecular Biology & RDT	BSM 302	3:1:0	4	3

A. Course Learning Outcomes (CLO)

CLO 1	Explain the properties of genetic materials and storage and processing of genetic information.
CLO 2	Apply mechanisms of DNA replication, damage and its repair
CLO 3	Explain mechanisms involved in gene expression.
CLO 4	Explain the tools and techniques of genetic engineering including DNA manipulation enzymes, various cloning and expression vectors

B. Syllabus

Module I: - Genetic Information

Genetic material, DNA as the carrier of genetic information, Key experiments establishing-The Central Dogma, DNA Structure: Miescher to Watson and Crick- historic perspective, DNA structure, Salient features of double helix, Types of DNA, denaturation and renaturation, cot curves, RNA type and structure, RNA as genetic material in viruses

Module III: - DNA Mutation & Repair

Replication Errors, DNA Damage and their repair. Suppression of mutations, Ames test

Module II: - The Replication of DNA (Prokaryotes and Eukaryotes)

Experiments on semiconservative replication, bidirectional replication, mechanism of replication, requirement of RNA priming, enzymes & proteins involved in replication., Various models of DNA replication including rolling circle, D-loop (mitochondrial), θ (theta) mode of replication,replication of linear ds-DNA, replicating the 5'end of linear chromosome.

Module III: - Transcription

RNA Polymerase and the transcription unit, Transcription in Prokaryotes & Eukaryotes

RNA Modifications, Split genes- concept of introns and exons, removal of Introns, alternative splicing, exon shuffling, RNA editing, and mRNA transport.

Module IV: - Translation

Genetic code, ribosome structure & translation, mechanism of translation on prokaryotes & eukaryotes, Fidelity of translation, Inhibitors of protein synthesis, introduction of protein trafficking

Module V: - Genetic Engineering- I

Milestones in genetic engineering, hosts for genetic engineering- *E. coli* strains; Yeast (*Saccharomyces cerevisiae, Pichia pastoris*); Fungi(*Penicillium*, *Aspergillus*); Mammalian cell lines - names and genotypes, Enzymes- Restriction modification systems: Types I, II and III. Mode of action, applications, DNA modifying enzymes and their applications: Terminal deoxynucleotidyltransferase, kinases and phosphatases, DNA ligases and DNA polymerases, reversetranscriptases, bacteriophage RNA polymerases, exonuclease III, BAL31, mungbean nuclease, S1 nuclease

Vectors- Properties, Plasmid vectors-pBR and pUC series,Bacteriophage lambda and M13 based vectors. Cosmids. Shuttle vectors. BACs,YACs, MACs Mammalian Expression Vectors- SV40, Vaccinia, Retroviral promoter based vectors

Module V: - Genetic Engineering- II

Steps of making recombinant DNA constructs for cloning & expression, *E. coli*expression vectors-lac, tac and T7 promoter based vectors. Yeast expression vectors- pET yeast vectors, YIp, YEp and YCp vectors. Baculovirus based vectors. Tibased vectors (Binary and Cointegrated vectors) and cloning using linkers andadaptors, Transformation of DNA by chemical method and electroporation, Methods of gene delivery in plants and animals- Microinjection, biolistic method (gene gun), liposome and viral-mediated delivery,Agrobacterium-mediated delivery

Few examples of RDT products in market

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1 Karp, G. (2010). Cell and Molecular Biology: Concepts and Experiments. VI Edition.John Wiley & Sons. Inc.

2. De Robertis, E.D.P. and De Robertis, E.M.F. (2006). Cell and Molecular Biology.VIII Edition. Lippincott Williams and Wilkins, Philadelphia.

3. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. (2009). The World ofthe Cell. VII Edition. Pearson Benjamin Cummings Publishing, San Francisco.

4. Watson, J. D., Baker T.A., Bell, S. P., Gann, A., Levine, M., and Losick, R., (2008)Molecular Biology of the Gene (VI Edition.). Cold Spring Harbour Lab. Press,
Pearson Pub.

5. Alcamo IE. (2001). *DNA Technology: The Awesome Skill*. 2nd edition. ElsevierAcademic Press, USA.

6. Brown TA. (2006). *Gene Cloning and DNA Analysis*. 5th edition. BlackwellPublishing, Oxford, U.K.

7. Clark DP and Pazdernik NJ. (2009). *Biotechnology-Applying the GeneticRevolution*. Elsevier Academic Press, USA.

8. Glick BR and Pasternak JJ. (2003). *Molecular Biotechnology*. 3rd edition. ASMPress Washington D.C.

9. Primrose SB and Twyman RM. (2006). *Principles of Gene Manipulation andGenomics*, 7th edition. Blackwell Publishing, Oxford, U.K.

10. Sambrook J, Fritsch EF and Maniatis T. (2001). *Molecular Cloning-A LaboratoryManual*. 3rd edition. Cold Spring Harbor Laboratory Press.

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Environmental Sciences	EVS 003	3:1:0	4	3

A. Course Learning Outcomes (CLO)

CLO 1	**Understand the importance**
CLO 2	Evaluate local, regional
CLO 3	Measure environmental variables
CLO 4	Interpret the results
CLO 5	Implement "Sustainable

B. Syllabus

Module I: The multidisciplinary nature of environmental studies

Definition, scope and importance

Need for public awareness

Module II: Natural Resources

Renewable and non-renewable resources:

Natural resources and associated problems

Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.

Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Module III: Ecosystems

Concept of an ecosystem

Structure and function of an ecosystem

Producers, consumers and decomposers

Energy flow in the ecosystem

Ecological succession

Food chains, food webs and ecological pyramids

Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, ocean estuaries)

Module IV: Biodiversity and its conservation

Introduction – Definition: genetic, species and ecosystem diversity

Biogeographical classification of India

Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values

Biodiversity at global, national and local levels

India as a mega-diversity nation

Hot-spots of biodiversity

Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts

Endangered and endemic species of India

Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

Module V: Environmental Pollution

Definition

□□□Causes, effects and control measures of:

a. Air pollution
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear pollution

Solid waste management: Causes, effects and control measures of urban and industrial wastes.

Role of an individual in prevention of pollution.

Pollution case studies.

Disaster management: floods, earthquake, cyclone and landslides.

Module VI: Social Issues and the Environment

From unsustainable to sustainable development

Urban problems and related to energy

Water conservation, rain water harvesting, watershed management

Resettlement and rehabilitation of people; its problems and concerns.Case studies.

Environmental ethics: Issues and possible solutions

Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.

Wasteland reclamation

Consumerism and waste products

Environmental Protection Act

Air (Prevention and Control of Pollution) Act

Water (Prevention and control of Pollution) Act

Wildlife Protection Act

Forest Conservation Act

Issues involved in enforcement of environmental legislation

Public awareness

Module VII: Human Population and the Environment

Population growth, variation among nations

Population explosion – Family Welfare Programmes

Environment and human health

Human Rights

Value Education

HIV / AIDS

Women and Child Welfare

Role of Information Technology in Environment and Human Health

Case Studies

Module VIII: Field Work

Visit to a local area to document environmental assets-river / forest/ grassland/ hill/ mountain.

Visit to a local polluted site – Urban / Rural / Industrial / Agricultural

Study of common plants, insects, birds

Study of simple ecosystems-pond, river, hill slopes, etc (Field work equal to 5 lecture hours)

delivery

Few examples of RDT products in market

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

- 1 Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.

- BharuchaErach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380 013, India, Email:mapin@icenet.net (R)
- Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
- Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p
- De A.K., Environmental Chemistry, Wiley Eastern Ltd.
- Down to Earth, Centre for Science and Environment (R)
- Gleick, H.P. 1993. Water in Crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
- Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
- Heywood, V.H &Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
- Jadhav, H &Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
- Mckinney, M.L. & School, R.M. 1996. Environmental Science Systems & Solutions, Web enhanced edition. 639p.
- Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB)
- Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
- Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
- Rao M N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
- Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
- Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science
- Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (R)
- Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB)
- Wanger K.D., 1998 Environnemental Management. W.B. Saunders Co. Philadelphia, USA 499p

AMITY UNIVERSITY
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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Biochemistry & Microbial Physiology Lab.	BSM 321	0:0:4	2	3

A. Course Learning Outcomes (CLO)

CLO 1	**To understand the biochemical behavior of the microbial cells**
CLO 2	**To study the metabolic pathways and key enzymes**
CLO 3	**To learn the biochemical production of the various metabolites**

B. Syllabus

Aim of the course is to give hands on training to students for enhancing their practical skills of the subject domain.

Course Content

Minimum of 5-8 laboratory exercises will be conducted based on theory papers BSM 301

Examination Scheme:

Components	Performance	Lab record	Viva	Observations	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Prescott, L.M J.P. Harley and C.A. Klein 1995. Microbiology 2nd edition Wm, C. Brown publishers.

2. David White. The Physiology and Biochemistry of Prokaryotes. Oxford University Press. 4th Edition. 2011.

3. Tortora, Funke and Case. Microbiology - An Introduction. Books a la carte Edition. 11th Edition

4. Doelle. H.W.1975.Bacterial Metabolism. 2nd edition. Academic Press.

5. Moat. A.G. J.W.Foster. 1988. Microbial physiology. 2nd edition. Springer – Verlag.

6. Caldwell. D.R.1995, Microbial physiology and Metabolism. WmC Brown Publishers, England.

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Course Name	Course Code	LTP	Credit	Semester
Molecular Biology & RDT Lab.	BSM 322	0:0:4	2	3

A. Course Learning Outcomes (CLO)

CLO 1	**To study the methods for the DNA extraction**
CLO 2	**To understand the plasmid and other genetic materials**
CLO 3	**To study the DNA purification methods**

B. Syllabus

Course Objective: -

Aim of the course is to give hands on training to students for enhancing their practical skills of the subject domain.

Course Content

Minimum of 5-8 laboratory **Examination Scheme:**

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1 Karp, G. (2010). Cell and Molecular Biology: Concepts and Experiments. VI Edition.John Wiley & Sons. Inc.

2. De Robertis, E.D.P. and De Robertis, E.M.F. (2006). Cell and Molecular Biology.VIII Edition. Lippincott Williams and Wilkins, Philadelphia.

3. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. (2009). The World ofthe Cell. VII Edition. Pearson Benjamin Cummings Publishing, San Francisco.

4. Watson, J. D., Baker T.A., Bell, S. P., Gann, A., Levine, M., and Losick, R., (2008)Molecular Biology of the Gene (VI Edition.). Cold Spring Harbour Lab. Press,

Pearson Pub.

5. Alcamo IE. (2001). *DNA Technology: The Awesome Skill*. 2nd edition. ElsevierAcademic Press, USA.

6. Brown TA. (2006). *Gene Cloning and DNA Analysis*. 5th edition. BlackwellPublishing, Oxford, U.K.

7. Clark DP and Pazdernik NJ. (2009). *Biotechnology-Applying the GeneticRevolution*. Elsevier Academic Press, USA.

8. Glick BR and Pasternak JJ. (2003). *Molecular Biotechnology*. 3rd edition. ASMPress Washington D.C.

9. Primrose SB and Twyman RM. (2006). *Principles of Gene Manipulation andGenomics*, 7th edition. Blackwell Publishing, Oxford, U.K.

10. Sambrook J, Fritsch EF and Maniatis T. (2001). *Molecular Cloning-A LaboratoryManual*. 3rd edition. Cold Spring Harbor Laboratory Press.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Bio-nanotechnology& Biosensors	BSM 311	3:0:0	3	3

A. Course Learning Outcomes (CLO)

CLO 1	**To understand the properties of the nanoparticles**
CLO 2	**To study the physical properties of the nanomaterials**
CLO 3	**To learn the applications of the nanomaterials**

B. Syllabus

Module I

Introduction and Definition, about Bionanomachines, Molecular Bionanotechnology. History of Bionanotechnology; Richard Feynman and his contributions. Biotechnology versus Binantechnology. Natural Bionanamachines.

Module II

Structural Principles of Bionanaotechnology-Environment in which the Bionanomachines Functions. Principles behind design of Natural Bionanaomachines- Covalent bonding, Dispersions and repulsion forces. Hydrogen bonding, Electrostatic Interaction, Hydrophobic effect. Hierarchical strategy in construction of Bionanomachines - Selfassembly, Self-organization. Concept of Molecular recognition.

Module III

Functional Principles of Bionanotechnology- Information storage- Nucliec acid, Ribosomes as assembler to construct proteins. Energetics- Energy from Light, electron transport pathways, electrochemical gradient. Biocatalysts- Enzymes and its regulation. Biomaterials. Biomolecular motors.

Module IV

Tools and technique required for Bionanaotechnology- Recombinant DNA technology; site directed mutagenesis, Fusion proteins. X-Ray Crystallography, NMR, Electron Microscopy, Atomic force Microscopy. Bioinformatics- Molecular Modeling, Docking, Computer assisted Molecular design.

Module V

Applications of Bionanotechnology- Nanomedicines; Immunotoxins, Liposomes as drug carriers, Gene therapy, Personalised Medicines; Lab on chip concept. DNA Computers, Artificial Life, Hybrid materials,

Molecular sensing- Biosensors, Definitions, history and market needs, Sensors based on: enzymes, affinity and wholecells.Transducers: electrodes, photometric and acoustic, Signalprocessing. Case studies: immunosensors. Novel transducersand synthetic receptors. Clinical, environmental, industrial andmilitary applications.

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. 1.Goodsell - Bionanotechnology

2.Parag Diwan and Asish Bharadwaj, . - Nanomedicines Pentagan Press, 2006.

3.Vladimir P Torchilin, Nanoparticles as Drug Carriers. Imperial College Press, North Eastern University, USA. 2006

4. Challa S.S.R. Kumar (Ed.).2006. Biological and Pharmaceutical nonmaterial's Wiley- VCH Verlag Gmbh and Co., KgaA.

5. K.K. Jain 2006 Nanobiotechnology in Molecular Diagnostics: Current Techniques and Applications Horizon Biosciences.

6. Niemeyer, C.M. Mirking C.A., (Eds.) 2004. Nono biotechnology concepts.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Soil Microbiology	BSM 312	3:0:0	3	3

A. Course Learning Outcomes (CLO)

CLO 1	To study the soil microflora of the regions
CLO 2	To understand the interactions amongst soil microflora
CLO 3	To study the biogeochemical cycles of major nutrients

B. Syllabus

Module I

Soil environment, soil, structure, physico chemical characteristics, microbial composition and influence of soil and environmental factors on soil microflora. Quantitative and qualitative estimation of microorganisms in soil. Organic matter decomposition, Methanogenesis Humus formation.

Module II

Major biogeochemical cycles and the organisms. Microbial transformation of carbon-nitrogen-phosphorus and sulphur. Microbes in composting and biogas production

Module III

Microorganisms in soil fertility. Rhizosphere concept, R:S ratio, Interaction between plant and rhizosphere flora. Growth promoting rhizobacteria, soil enzymes, Biocheleters (siderophore).

Module IV

Biological nitrogen fixation Nitrogenase enzyme, nif genes symbiotic, nitrogen fixation (Rhizobia, Frankia), non symbiotic nitrogen fixation (Azotobacter, Azospirillum).VAM ecto-endo-ectendo-mycorrhizae.

Module V

Plant growth promoting bacteria, Biofertilizers productions, biopesticide production, soil nutrients formulations. Soil Tailoring and Possible Mitigation. Microbial Rehabilitation of degraded lands.

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1.Soil Microbiology;An exploratory approach by Mark.s.coyne

2.Introduction to soil microbiology by MartinAlexander

3.Soil microorganisms and plant growth by N.S.Subba Rao

4.Soil microorganisms and plant growth by Somani.L.L and Bhandari,S.C

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Food Biotechnology	BSM 313	3:0:0	3	3

A. Course Learning Outcomes (CLO)

CLO 1	**To learn the applications of the food processing**
CLO 2	**To study the food regulations and agencies**
CLO 3	**To determine the food quality on the basis of food analysis**

B. Syllabus

Module I: Introduction

Scope and importance of food industry; RDT and other technologies involved in development of food products; Concept of 'functional food'; Advances and trends, ethical issues, quality control, legislation, FDA & FPO (India), patenting processes and products, consumer acceptance scenario for GM food products and GM crops.

Module II: Techniques used in Food Industry

Sterilization, isolation, screening and strain improvement, cell harvesting and disruption, recovery and purification, production of organic acids – citric acid, lactic acid and acetic acid; Gene cloning, production of recombinant proteins e.g. chymosin

Module III: Dairy Biotechnology

Starter cultures, prebiotics, probiotics – their use as flavor enhancers and disease/ infection combats, applications in production of cheese, butter, ice-cream, yoghurt; applications in biomedical research, e.g. recombinant LABs as vaccines; Modified milk proteins.

Module IV:Microbial, Plant and Animal Biotechnology

Production of SCP (Single cell protein), production of baker's yeast, brewing industry, applications of transgenic plants in food production, transgenic fist, and transgenic poultry.

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Food Biotechnology - 2. 1988. R.D. King and P.S.J. Cheetham (Eds.). Elsevier Applied Science, NY.

- Introduction to Food Biotechnology. Green, Perry Johnson. 2002. CRC Press, Boca Raton, Florida.
- Food Biotechnology-Techniques and Applications. Gauri S. Mittal. 1992. Technomic Publishing Co., Inc., Lancaster, PA.

AMITY UNIVERSITY
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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Cell Biology	BSM 314	3:0:0	3	3

A. Course Learning Outcomes (CLO)

CLO 1	**To understand the cell signaling**
CLO 2	**To study about the functioning of the cell organelles**
CLO 3	**To understand the cell behavior, cancer and apoptosis**

B. Syllabus

Module I: - Protein Sorting and Transport

The Endoplasmic reticulum, The Golgi Apparatus, Mechanism of Vesicular Transport, Lysosomes, Transport of small molecules across plasma membrane, Endocytosis

Module II: -The Cell Cycle

Eukaryotic Cell Cycle, Regulation of Cell cycle progression, Events of Mitotic Phase, Meiosis and Fertilization.

Module III: - Cell Signaling

Signaling molecules and their receptor; functions of cell surface receptors; Intracellular signal transduction pathway; signaling networks.

Module IV: - Cell Death and Cell Renewal

Programmed Cell Death, Stem Cells and Maintenance of adult tissues, Embryonic Stem Cells and Therapeutic cloning.

Module V: - Cancer

Development and Causes of Cancer, Tumor Viruses, Oncogenes, Tumor Suppressor genes, Cancer Treatment- molecular approach.

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1 Karp, G. (2010). Cell and Molecular Biology: Concepts and Experiments. VI Edition.John Wiley & Sons. Inc.

2. De Robertis, E.D.P. and De Robertis, E.M.F. (2006). Cell and Molecular Biology.VIII Edition. Lippincott Williams and Wilkins, Philadelphia.

3. Cooper, G.M. and Hausman, R.E. (2009). The Cell: A Molecular Approach. VEdition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.

4. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. (2009). The World ofthe Cell. VII Edition. Pearson Benjamin Cummings Publishing, San Francisco.

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Course Name	Course Code	LTP	Credit	Semester
Term Paper	BSM 330	NTCC	3	3

A. Course Learning Outcomes (CLO)

CLO 1	**To study the scientific writing ethics**
CLO 2	**To understand the importance of writing ethics**
CLO 3	**To study the statistical tools and techniques**

B. Syllabus

Course objectives

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consist of the following steps:

1. Choosing a subject
2. Finding sources of materials
3. Collecting the notes
4. Outlining the paper
5. Writing the first draft
6. Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

a) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.

b) Begin by making a list of subject-headings under which you might expect the subject to be listed.

c) The sources could be books and magazine articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

a) Get facts, not just opinions. Compare the facts with author's conclusion.

b) In research studies, notice the methods and procedures, results & conclusions.

c) Check cross references.

4. Outlining the paper

a) Review notes to find main sub-divisions of the subject.

b) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose

b) main body of the paper

c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main idea.

6. Editing &preparing the final Paper

a) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of

a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.

b) Read the paper to ensure that the language is not awkward, and that it "flows" properly.

c) Check for proper spelling, phrasing and sentence construction.

d) Check for proper form on footnotes, quotes, and punctuation.

e) Check to see that quotations serve one of the following purposes:

(i) Show evidence of what an author has said.

(ii) Avoid misrepresentation through restatement.

(iii) Save unnecessary writing when ideas have been well expressed by the original author.

f) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

1) Title page
2) Table of contents
3) Introduction
4) Review
5) Discussion&Conclusion
6) References
7) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

1. summary of question posed
2. summary of findings

3. summary of main limitations of the study at hand
4. details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited volumes

Gass, S./ Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic journal articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished theses/ dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation	**40%**
(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)	
Final Evaluation	**60%**
(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the	

research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Communication Skills - I	BCS 301	1:0:0	1	3

A. Course Learning Outcomes (CLO)

CLO 1	Simulate to choose and control every and any type of conversation within a group
CLO 2	Encourage to use their creative writing skills
CLO 3	Effective use of technical writing skills
CLO 4	Using effective and appropriate nonverbal communication

B. Syllabus

Topic
Self-Actualization (Baseline, Self-Image Building, SWOT, Goal Setting)
Telephone Etiquette
GD-1 (Basics, Do's & Don'ts, Mannerism, Dynamics, GD Markers)
Book Review Presentation

Examination Scheme:

Components	Self-Introduction	GD	Book Review Presentation	Attendance
Weightage (%)	30	35	30	5

SUGGESTED READINGS

1. Business Communication, Raman – Prakash, Oxford
2. Creative English for Communication, Krishnaswamy N, Macmillan
3. Textbook of Business Communication, Ramaswami S, Macmillan
4. Writing Skills, Coe/Rycroft/Ernest, Cambridge

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Behavioural Science- III (Interpersonal Communication and Relationship Management)	BSS 303	1:0:0	1	3

A. Course Learning Outcomes (CLO)

CLO 1	Demonstrate knowledge of strategies for developing a healthy interpersonal communication
CLO 2	Recognize the importance of transactional analysis, script analysis
CLO 3	Identify the difference between healthy and unhealthy expression of emotions and develop emotional competence necessary for conflict resolution and impression management
CLO 4	Demonstrate knowledge of strategies for developing a healthy interpersonal relationship

B. Syllabus

Course Contents:

Module I: Interpersonal Communication

Importance of Behavioural/ Interpersonal Communication
Types – Self and Other Oriented
Rapport Building – NLP, Communication Mode
Steps to improve Interpersonal Communication

Module II: Interpersonal Styles

Transactional Analysis
Life Position/Script Analysis
Games Analysis
Interactional and Transactional Styles
Bridging differences in Interpersonal Relationship through TA
Communication Styles

Module III: Conflict Management and Negotiation

Meaning and Nature of conflicts
Styles and techniques of conflict management
Meaning of Negotiation
Process and Strategies of Negotiation
Interpersonal Communication: Conflict Management and Negotiation

Module IV: Interpersonal Relationship Development

Importance of Interpersonal Relationships
Interpersonal Relationship Skills
Types of Interpersonal Relationships
Relevance of Interpersonal Communication in Relationship Development

Module V: Impression Management
Meaning & Components of Impression Management
Impression Management Techniques
Impression Management Training-Self help and Formal approaches

Examination Scheme:

Components	SAP	Attendance	Mid Term Test (CT)	VIVA	Journal for Success (JOS)
Weightage (%)	20	05	20	30	25

SAP- Social Awareness Programme; **JOS**-Journal of Success; **HA**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **FC-** Flip class; **MA-** Movie Analysis; **CS-** Case study; **A**-Attendance

Text & References:

1. Vangelist L. Anita, Mark N. Knapp, Interpersonal Communication and Human Relationships: Third Edition, Allyn and Bacon
2. Julia T. Wood. Interpersonal Communication everyday encounter
3. Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers.
4. Rosenfeld, P., Giacalone, R.A. and Catherine, A.R. (2003). Impression Management: Building and Enhancing Reputations at Work. Thomson Learning, Singapore.

AMITY UNIVERSITY
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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language -III French	FLT 301	2:0:0	1	1

A. Course Learning Outcomes (CLO)

CLO 1	Identify and express in French vocabulary and grammar norms
CLO 2	Interpret different types of texts as well as cultural ideas and themes
CLO 3	Demonstrate comprehension of nuance between script and sound in French
CLO 4	Narrate clearly ideas, themes in simple standard French

B. Syllabus

Module B: pp. 76 – 88 Unité 6

Module C: pp. 89 to103 Unité 7

Contenu lexical: Unité 6:se faire plaisir

1. acheter : exprimer ses choix, décrire un objet (forme, dimension, poids et matières) payer
2. parler de la nourriture, deux façons d'exprimer la quantité, commander un repas au restau
3. parler des différentes occasions de faire la fête

Unité 7: Cultiverses relations

1. maîtriser les actes de la communication sociale courante

(Salutations, présentations, invitations, remerciements)

annoncer un événement, exprimer un souhait, remercier, s'excuser par écrit.

3. caractériser une personne (aspect physique et caractère)

Contenu grammatical:

1. accord des adjectifs qualificatifs
2. articles partitifs
3. Négations avec de, ne…rien/personne/plus
4. Questions avec combien, quel…

5. expressions de la quantité
6. ne…plus/toujours – encore
7. pronoms compléments directs et indirects
8. accord du participe passé (auxiliaire « avoir ») avec
   l'objet direct
9. Impératif avec un pronom complément direct ou indirect
10. construction avec « que » - Je crois que/ Je pense que/ Je sais que

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation I – Interaction/Conversation Practice

Text & References:

le livre à suivre : Campus: Tome 1

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language -III German	FLG 301	2:0:0	2	3

A. Course Learning Outcomes (CLO)

CLO 1	
CLO 2	
CLO 3	
CLO 4	

B. Syllabus

Module I: Modal verbs

Module I: Modal verbs

Modal verbs with conjugations and usage

Imparting the finer nuances of the language

Module II: Information about Germany (ongoing)

Information about Germany in the form of presentations or "Referat"– neighbors, states and capitals, important cities and towns and characteristic features of the same, and also a few other topics related to Germany.

Module III: Dative case

Dative case, comparison with accusative case

Dative case with the relevant articles

Introduction to 3 different kinds of sentences – nominative, accusative and dative

Module IV: Dative personal pronouns

Nominative, accusative and dative pronouns in comparison

Module V: Dative prepositions

Dative preposition with their usage both theoretical and figurative use

Module VI: Dialogues

In the Restaurant,

At the Tourist Information Office,

A telephone conversation

Module VII: Directions

Names of the directions

Asking and telling the directions with the help of a roadmap

Module VIII: Conjunctions

To assimilate the knowledge of the conjunctions learnt indirectly so far

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2

- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language -III Spanish	FLS 301	2:0:0	1	3

A. Course Learning Outcomes (CLO)

CLO 1	
CLO 2	
CLO 3	
CLO 4	

B. Syllabus

Module I

Revision of earlier semester modules

Set expressions (idiomatic expressions) with the verb *Tener, Poner, Ir….*

Weather

Module II

Introduction to *Gustar*…and all its forms. Revision of *Gustar* and usage of it

Module III

Translation of Spanish-English; English-Spanish. Practice sentences.

How to ask for directions (using estar)

Introduction to IR + A + INFINITIVE FORM OF A VERB

Module IV

Simple conversation with help of texts and vocabulary

En el restaurante

En el instituto

En el aeropuerto

Module V

Reflexives

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- Español, EnDirecto I A
- Español Sin Fronteras -Nivel Elemental

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language -III Chinese	FLC 301	2:0:0	1	1

A. Course Learning Outcomes (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. Syllabus

Module I

Drills

Dialogue practice

Observe picture and answer the question.

Introduction of written characters.

Practice reading aloud

Practice using the language both by speaking and by taking notes.

Character writing and stroke order

Module II

Measure words

Position words e.g. inside, outside, middle, in front, behind, top, bottom, side, left, right, straight.

Directional words – beibian, xibian, nanbian, dongbian, zhongjian.

Our school and its different building locations.

What game do you like?

Difference between “hii” and “neng”, “keyi”.

Module III

Changing affirmative sentences to negative ones and vice versa

Human body parts.

Not feeling well words e.g. ; fever, cold, stomach ache, head ache.

Use of the modal particle “le”

Making a telephone call

Use of “jiu” and “cal” (Grammar portion)

Automobiles e.g. Bus, train, boat, car, bike etc.

Traveling, by train, by airplane, by bus, on the bike, by boat.. etc.

Module IV

The ordinal number “di”

“Mei” the demonstrative pronoun e.g. mei tian, meinian etc.

use of to enter to exit

Structural particle “de” (Compliment of degree).

Going to the Park.

Description about class schedule during a week in school.

Grammar use of “li” and “cong”.

Comprehension reading followed by questions.

Module V

Persuasion-Please don’t smoke.

Please speak slowly

Praise – This pictorial is very beautiful

Opposites e.g. Clean-Dirty, Little-More, Old-New, Young-Old, Easy-Difficult, Boy-Girl, Black-White, Big-Small, Slow-Fast … etc.

Talking about studies and classmates

Use of “it doesn’t matter”

Enquiring about a student, description about study method.

Grammar: Negation of a sentence with a verbal predicate.

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text books & References

1. Professionals' Handbook For Learning Chinese Vol 1

2. ECR book-I (suggested reading)

3. Practical Chinese Grammar for foreigners (suggested reading)

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Anandam - III	AND 003	NTCC	2	3

A. Course Learning Outcomes (CLO)

CLO 1	Awareness and empathy regarding community issues
CLO 2	Interaction with the community and impact on society
CLO 3	Interaction with mentor and development of Student teacher relationship
CLO 4	Interaction among students, enlarge social network
CLO 5	Cooperative and Communication skills and leadership qualities
CLO 6	Critical thinking, Confidence and Efficiency

B. Syllabus

Course Objectives:

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

- apply their knowledge and skills to solve specific community problem
- learn to plan, lead, and organize community events have a sense of belonging to their college campus and community and find something they are interested in doing during their free time
- make new friends, expand social network, and boost social skills and mental health.
- be useful to society as it will protect them against stress, frustration, and depression

Course Contents:

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants, phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any

- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)

ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY
(AIMT)

Program Name: B.Sc. (Hons.) MICROBIOLOGY

FOURTH SEMESTER

Course Code	Course Title	Category	Lectures(L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
BSM 401	Immunology	CC	3	1	-	4
BSM 402	Fermentation Technology & Industrial Microbiology	CC	3	-	-	3
BSM 403	Medical Microbiology	CC	3	-	-	3
BSM 421	Immunology & Medical Microbiology Lab.	CC	-	-	4	2
BSM 422	Fermentation Technology & Industrial Microbiology Lab.	CC	-	-	4	2
Domain Elective-II: Choose any one from the following courses						
BSM 411	Bioinformatics	DE	3	-	-	3
BSM 412	Pharmaceutical Technology & Microbiology					
BSM 413	Biomaterial Science					
BSM 414	Inheritance Biology					
Minor Track- III		MT				3
BCS 401	Communication Skills – II	VA	-	-	-	1
BSS 403	Behavioural Science-IV (Group Dynamics and Team Building)	VA	-	-	-	1
FLT 401 FLG 401 FLS 401 FLC 401	Foreign Language – IV French German Spanish Chinese	VA	-	-	-	2
AND 004	Anandam-IV	NTCC	-	-	-	2
					TOTAL	**26**

Note: - Students will be required to undergo summer training of 45 days in industry/ research institution/ academic institution. Work progress will be evaluated in V semester.

AMITY UNIVERSITY
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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Immunology	BSM 401	3:1:0	4	4

A. Course Learning Outcomes (CLO)

CLO 1	Description of the cells, organs and molecules involved in immunity
CLO 2	Ability to describe the basic mechanisms that provide innate immunity
CLO 3	Understanding of the cell-mediated and humoral adaptive immune responses against extra and intracellular pathogens
CLO 4	Understanding of immuno-technologies

B. Syllabus

Module I: - Introduction

Contributions of following scientists to the development of field of immunology - Edward Jenner, Karl Landsteiner, Robert Koch, Paul Ehrlich, Louis Pasteur, Elie Metchnikoff, Peter Medawar, MacFarlane Burnet, Neils K Jerne, Rodney Porter and Susumu Tonegawa, Concept of Innate and Adaptive immunity

Module II: - Immune Cells and Organs

Structure, Functions and Properties of: Immune Cells – Stem cell, T cell, B cell, NK cell, Macrophage, Neutrophil, Eosinophil, Basophil, Mast cell, Dendritic cell, NKT cells; and Immune Organs – Bone Marrow, Thymus, Lymph Node, Spleen, GALT, MALT, CALT

Antigens Characteristics of an antigen (Foreignness, Molecular size and Heterogeneity); Haptens; Epitopes (T & B cell epitopes); T-dependent and T-independent antigens; Adjuvants

Antibodies Structure, Types, Functions and Properties of antibodies; Antigenic determinants on antibodies (Isotypic, allotypic, idiotypic); VDJ rearrangements; Monoclonal and Chimeric antibodies

Module III: - Major Histocompatibility Complex & Complement System

Organization of MHC locus (Mice & Human); Structure and Functions of MHC I & II molecules; Antigen processing and presentation (Cytosolic and Endocytic pathways)

Components of the Complement system; Activation pathways (Classical, Alternative and Lectin pathways); Biological consequences of complement activation

Module IV: - Generation of Immune Response

Primary and Secondary Immune Response; Generation of Humoral Immune Response (Plasma and Memory cells); Generation of Cell Mediated Immune Response (Self MHC restriction, T cell activation, Costimulatory signals); Killing Mechanisms by CTL and NK cells, Self tolerance.

Module V: - Immunological Disorders and Tumor Immunity

Types of Autoimmunity and Hypersensitivity with examples; Immunodeficiencies - Animal models (Nude and SCID mice), SCID, DiGeorge syndrome, Chediak- Higashi syndrome, Leukocyte adhesion deficiency, CGD; Characteristics of tumor antigens.

Module VI: - Immunological Techniques

Principles of Precipitation, Agglutination, Immunodiffusion, Immunoelectrophoresis, ELISA, ELISPOT, Western blotting, Immunofluoresence, Flow cytometry, Immunoelectron microscopy, RIST, RAST, MLR., Vaccines- general principle & types

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Abbas AK, Lichtman AH, Pillai S. (2007). Cellular and Molecular Immunology. 6th edition Saunders Publication, Philadelphia.

2. Delves P, Martin S, Burton D, Roitt IM. (2006). Roitt's Essential Immunology. 11th edition Wiley-Blackwell Scientific Publication, Oxford.

3. Goldsby RA, Kindt TJ, Osborne BA. (2007). Kuby's Immunology. 6th edition W.H. Freeman and Company, New York.

4. Murphy K, Travers P, Walport M. (2008). Janeway's Immunobiology. 7th edition Garland Science Publishers, New York.

5. Peakman M, and Vergani D. (2009). Basic and Clinical Immunology. 2nd edition Churchill Livingstone Publishers, Edinberg.

6. Richard C and Geiffrey S. (2009). Immunology. 6th edition. Wiley Blackwell Publication.

AMITY UNIVERSITY
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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Fermentation Technology & Industrial Microbiology	BSM 402	3:0:0	3	4

A. Course Learning Outcomes (CLO)

CLO 1	Introduction to metabolic pathways and industrial productions
CLO 2	Understanding of the Fermentation Economics and Bioprocess Development.
CLO 3	Creating and Understanding the design of specialized Bioreactors.

B. Syllabus

Module I: - Introduction

Brief history and developments in Fermentation Technology & Industrial Microbiology, Primary and secondary screening, strain development, Typical composition & characteristics of industrial fermentation media, Crude and synthetic media; molasses, corn-steep liquor, sulphite waste liquor, whey and yeast extract

Module II: - Fermentation processes & Instrumentation

Solid-state and liquid-state (stationary and submerged) fermentations; Batch, fedbatch and continuous fermentations, Components of a typical bioreactor, types of bioreactors-Laboratory, pilot- scale, and production fermenters; constantly stirred tank fermenter, tower fermenter, fixed bed and fluidized bed bioreactors and air-lift fermenter.

Module III: - Measurement and control of fermentation parameters

Monitoring and control of pH, temperature, dissolved oxygen, foaming and aeration during fermentation

Module IV: - Down-stream Processing

Filtration, centrifugation, cell disruption, solvent extraction, precipitation and ultrafiltration, lyophilization, spray drying

Module V: - Microbial production of industrial products

Citric acid, ethanol, vinegar, penicillin, glutamic acid, riboflavin, enzymes (amylase, cellulase, protease, lipase, glucose isomerase, glucose oxidase), wine, beer, bioinsecticides (Bt) and Steroid transformations

Module VI: - Enzyme & Cell immobilization

Methods of immobilization, advantages and applications of immobilization, Applications of immobilized enzymes & cells

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Casida LE. (1991). Industrial Microbiology. 1st edition. Wiley Eastern Limited.

2. Crueger W and Crueger A. (2000). Biotechnology: A textbook of Industrial Microbiology. 2nd edition. Panima Publishing Co. New Delhi.

3. Patel AH. (1996). Industrial Microbiology. 1st edition, Macmillan India Limited.

4. Stanbury PF, Whitaker A and Hall SJ. (2006). Principles of Fermentation Technology. 2nd edition, Elsevier Science Ltd.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Medical Microbiology	BSM 403	3:0:0	3	4

A. Course Learning Outcomes (CLO)

CLO 1	Explain the diversity in the microbial world including bacteria, viruses, fungi, microsporidia
CLO 2	Explain the role of microorganisms in a range of diseases, including the nature of the disease-causing organisms as well as their routes of transmission & how we can control them.
CLO 3	Explain Factors that limit microbial growth and survival in disease
CLO 4	Application of medical microbiology principles for clinical or public health benefits

B. Syllabus

Module I: Introduction& Diagnostics

Normal microflora of the human body- Skin, throat, gastrointestinal tract, urogenital tract, Collection, transport and culturing of clinical samples, principles of different diagnostic tests (Culture, microscopy, ELISA, Immunofluorescence, Agglutination based tests, Complement fixation, PCR, DNA probes).

Module II: - Host-pathogen interactions

Infection sources & transmission, Entry of pathogens into the host, types of bacterial pathogens, Mechanism of bacterial pathogenicity, colonization and growth, Virulence, Virulence factors – exotoxins, enterotoxins, endotoxins, neurotoxins. – avoidance of host defense mechanisms, damage to host cell, Host factors for infection and innate resistance to infection opportunistic infections, septicemia, septic shock, systemic infection

Module III: - Bacterial diseases (symptoms, pathogenesis, transmission, diagnosis, treatment prophylaxis and control)

Bacillus anthracis, *Corynebacterium diphtheriae*, *Streptococcus pyogenes*, *Escherichia coli*, *Salmonella typhi* and paratyphi, *Shigella dysenteriae*, *Helicobacter pylori, Vibrio cholerae, Haemophilus influenza, Neisseria gonorrhoeae, Mycobacterium tuberculosis, Treponema pallidum*

Module IV: - Viral diseases (symptoms, pathogenesis, transmission, diagnosis, treatment, prophylaxis and control), Introduction protozoan & fungal diseases

Polio, Chicken pox, Herpes, Hepatitis, Rabies, Influenza with brief description of bird and swine flu, Dengue, AIDS, Viral cancers. An overview of emerging viral diseases: Japanese Encephalitis, Ebola, Marburg, SARS, Hanta, Nipah, Chandipura, Chikungunya.

Malaria, Kala-azar, and Toxoplasmosis, aspergelosis and dermatomycoses

Module V: - Antimicrobial agents, drug resistance & Epidemiology of Infectious Diseases

Antibiotics, mechanism of action of important chemotherapeutic agents, Principles of drug resistance in bacteria

Principles of epidemiology, Current epidemics (AIDS, Nosocomical, Acute respiratory Syndrome) Measures for prevention of epidemics –Global health consideration, Emerging and reemerging infectious diseases Biological warfare and biological weapons

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Ananthanarayan R and Paniker CKJ. (2005). Textbook of Microbiology. 7th edition (edited by Paniker CKJ). University Press Publication.

2. Brooks GF, Carroll KC, Butel JS and Morse SA. (2007). Jawetz, Melnick and Adelberg's Medical Microbiology. 24th edition. McGraw Hill Publication.

3. Goering R, Dockrell H, Zuckerman M and Wakelin D. (2007). Mims' Medical Microbiology. 4th edition. Elsevier.

4. Joklik WK, Willett HP and Amos DB (1995). Zinsser Microbiology. 19th edition. Appleton-Centuary-Crofts publication.

5. Willey JM, Sherwood LM, and Woolverton CJ. (2008). Prescott, Harley and Klein's Microbiology. 7th edition. McGraw Hill Higher Education.

AMITY UNIVERSITY
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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Immunology & Medical Microbiology Lab.	BSM 421	0:0:4	2	4

A. Course Learning Outcomes (CLO)

CLO 1	**To perform the antigen antibody interactions**
CLO 2	**To culture medically important pathogens**
CLO 3	**To determine the clinical traits of various human pathogens**

B. Syllabus

Course Objective: -

Aim of the course is to give hands on training to students for enhancing their practical skills of the subject domain.

Course Content

Minimum of 5-8 laboratory exercises will be conducted based on theory papers BSM 401 & BSM 403

Examination Scheme:

Components	Performance	Lab record	Viva	Observations	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Abbas AK, Lichtman AH, Pillai S. (2007). Cellular and Molecular Immunology. 6th edition Saunders Publication, Philadelphia.

2. Delves P, Martin S, Burton D, Roitt IM. (2006). Roitt's Essential Immunology. 11th edition Wiley-Blackwell Scientific Publication, Oxford.

3. Goldsby RA, Kindt TJ, Osborne BA. (2007). Kuby's Immunology. 6th edition W.H. Freeman and Company, New York.

4. Murphy K, Travers P, Walport M. (2008). Janeway's Immunobiology. 7th edition Garland Science Publishers, New York.

5. Peakman M, and Vergani D. (2009). Basic and Clinical Immunology. 2nd edition Churchill Livingstone Publishers, Edinberg.

6. Richard C and Geiffrey S. (2009). Immunology. 6th edition. Wiley Blackwell Publication.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Fermentation Technology & Industrial Microbiology Lab.	BSM 422	0:0:4	2	4

A. Course Learning Outcomes (CLO)

CLO 1	**To learn about the batch and continuous fermentations**
CLO 2	**To screen microbial cells for various enzymes productions**
CLO 3	**To determine the microbial metabolites in a fermentation broth**

B. Syllabus

Course Objective: -

Aim of the course is to give hands on training to students for enhancing their practical skills of the subject domain.

Course Content

Minimum of 5-8 laboratory exercises will be conducted based on theory papers BSM 402

Examination Scheme:

Components	Performance	Lab record	Viva	Observations	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Casida LE. (1991). Industrial Microbiology. 1st edition. Wiley Eastern Limited.

2. Crueger W and Crueger A. (2000). Biotechnology: A textbook of Industrial Microbiology. 2nd edition. Panima Publishing Co. New Delhi.

3. Patel AH. (1996). Industrial Microbiology. 1st edition, Macmillan India Limited.

4. Stanbury PF, Whitaker A and Hall SJ. (2006). Principles of Fermentation Technology. 2nd edition, Elsevier Science Ltd.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Bioinformatics	BSM 411	3:0:0	3	4

A. Course Learning Outcomes (CLO)

CLO 1	**To learn the computer-based technologies for DNA analysis**
CLO 2	**To learn the study of genomic tools**
CLO 3	**To understand the molecular docking and analysis**

B. Syllabus

Module I: -

Scope of Bioinformatics and internet basics. Database management system: Data life cycle, Database architecture, Data format, Database abstraction, relational database system. Database searching: Protein sequence databases, genome databases, protein structure databases, conserved sequence databases, literature databases, BLAST and its types.

Module II: -

Sequences and their alignment: Meaning of sequence, sequence similarity, homology. Pairwise Sequence Alignment: Different scoring models, Substitution matrices (PAM and BLOSUM), Concept of Global and Local Alignment, Dot matrix method, Dynamic programming (Needleman-Wunsch algorithm, SmithWaterman algorithm), Choosing of best scoring matrix, gap penalties, BLAST (Word) algorithms.

Module III: -

Multiple Sequence alignment: Multiple Sequence Alignment methods (MSA), Progressive, Iterative and Hidden Markov Model (HMM) methods of MSA.Whole genome assemblies, optical mapping, whole genome comparisons, Phylogenetic Analysis

Module IV: -

Electronic journals: importance of E-journals and their features like electronic submission, downloading, reference and citations.

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. D.W. Mount Bioinformatics: Genome and Sequence Analysis: (2001) Cold Spring Harbor Laboratory Press, Cold Spring Harbor, New York.

2. D. Higgins and Willie Taylor. Bioinformatics: Sequences, structures and databanks. Oxford.

3. A.D. Baxevanis and B.F. Francis Ouellette. Bioinformatics: A practical guide to the analysis of genes and proteins

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Pharmaceutical Technology & Microbiology	BSM 412	3:0:0	3	4

A. Course Learning Outcomes (CLO)

CLO 1	Understand the role of Pharmaceutical technology and microbiology in Pharmaceutical Industries.
CLO 2	Understanding of Pharmaceutical Dosage Forms & New Drug Delivery Systems.
CLO 3	Understanding of the Scope of Microbiology in Pharmaceutical Product development.
CLO 4	Understanding of pharmaceutical industrial process.

B. Syllabus

Module –I:

Pharmaceutical calculations: Posology, calculation of doses for infants, adults and elderly patients; Enlarging and reducing recipes percentage solutions, allegation, alcohol dilution, proof spirit, isotonic solutions, displacement value etc.

Pharmacopoeias & Formularies: IP,BP,USP, Drug & cosmetic act and rules, Good manufacturing practices, Good laboratories practices and requirements of premises, plant and equipment for pharmaceutical products including Master & Batch formula records. (Schedule-M).

Module-II

Pharmaceutical Dosage Forms & Drug Delivery Systems:

Introduction to different dosage forms, their classification with examples (Official formulation), their relative application. Various route of drug administration.

Module III

Pharmaceutical Microbiology:

Disinfection: Classification, mode of action, factors influencing disinfectants, uses, evaluation and effectiveness. **Sterilization:** Introduction, significance, sensitivity of microorganisms,

detailed methods for sterilization processes. Sterilization control and sterility assurance. Sterility testing of pharmaceutical products as per pharmacopoeial standards.

Microbiological assays of antibiotics, vitamins, amino acids, Microbial limit tests for Pharmaceutical dosage forms

Module-IV

Antibiotics: Historical development of antibiotics. Antimicrobial spectrum and methods used for their standardization. Classification of antimicrobial drugs based on mechanism of action. Problems arising with use of Antimicrobial drugs (Toxicity, Hypersensitivity reactions, Drug resistance, Super-infection, Nutritional deficiencies.

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. 1 Pharmaceutical Biotechnology, by Daan J. A. Crommelin, Robert D. Sindelar. Informa Healthcare USA, Inc, 3rd edition.
2. Textbook of Pharmaceutical Biotechnology, By Chandrakant Kokate, Pramod H.J, SS Jalalpure , Publisher: Elsevier India Pvt Ltd.
3. Vyas SP, Dixit VK."Pharmaceutical Biotechnology", 1st edition ,2007, CBS Publishers & Distributors, New Delhi
4. Textbook Of Physical Pharmaceutics by C.V.S. Subrahmanyam, Vallabh Prakashan.
5. Text book of Pharmaceutical Engineering by C.V.S. Subrahmanyam, Vallabh Prakashan.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Biomaterial Science	BSM 413	3:0:0	3	4

A. Course Learning Outcomes (CLO)

CLO 1	**To study the different biomaterials developed**
CLO 2	**To study the applications of the biomaterials**
CLO 3	**To determine the characteristics of the biomaterials**

B. Syllabus

Module I: - Classification, Chemistry and characterization of biomaterials

Definition and classification of bio-materials, Structure of bio-material:Metallic implant materials, stainless steels, Co-based alloys, Ti-based alloys, ceramic implant materials, aluminum oxides, hydroxyapatite glass ceramics, carbons.

Polymeric implant materials: definition of DP, CRU, Monomer, classification of polymers, polyolefin, polyamines, Acryrilic, polymers, rubbers, high strength thermoplastics, PVC, HEMA, hydrogels. Nanomaterials: fullerenes, carbon nanotubes, nanomembranes. Synthesis of bio-materials, Characterization of chemical, physical, mechanical properties, visco elasticity, end group analysis, determination of molecular weight of a polymer.

Module II: - Biocompatibility

Biocompatibility of Bio-materials, wound-healing process, body response to implants, blood compatibility. Tests to assess biocompatibility of a polymer, modifications to improve biocompatibility. Reactions of biomaterials with cellular and extra cellular components

Module III: - Modified biomaterials

Biodegradative biomaterials, Bioactive polymers and biosynthetic polymers, inert biomaterials, genetically engineered biomaterials

Module IV: - Applications of Biomaterials

Tissue Replacement Implants, Soft-tissue replacements, sutures, surgical tapes, adhesive, percutaneous and skin implants, maxillofacial augmentation, blood interfacing implants, hard tissue replacement implants, internal Fractures fixation devices, joint replacements. Artificial Organs, Artificial Heart, Prosthetic cardiac Valves, Limb prosthesis, Externally Powered limb, prosthesis, Dental Implants, Other applications, Liposomes, hydrogels andNanomaterials in drug delivery. Biomaterials in diagnostics and bioanalytical techniques.

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

. Sujata V. Bhat, Biomaterials , 2 nd edition, Narosa Publishing House, New Delhi, 2006.

2. Buddy D. Ratner, B. D. Ratner,Allan S. Hoffman, Biomaterials Science: An Introduction To Materials In Medicine, 2nd Edition(2004) Publisher: Academic Press.

3. Fred W.Billmeyer, Text book of Polymer Science. 3 rd edition John Wiley and sons publications.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Inheritance Biology	BSM 414	3:0:0	3	4

A. Course Learning Outcomes (CLO)

CLO 1	**To learn the Mendel genetics experiments**
CLO 2	**To study the population genetics**
CLO 3	**To learn the chromosome behaviors**

B. Syllabus

Module I: - Introduction to Genetics

Mendel's work on transmission of traits, Genetic Variation, Molecular basis of Genetic Information, Principles of Inheritance, Chromosome theory of inheritance, Laws of Probability, Pedigree analysis, Incomplete dominance and codominance, Multiple alleles, Lethal alleles, Epistasis, Pleiotropy, Environmental effects on phenotypic expression, sex linked inheritance, sex determination

Module II: - Linkage, Crossing Over and Chromosomal Mapping

Linkage and crossing over, Cytological basis of crossing over, Molecular mechanism of crossing over, Recombination frequency as a measure of linkage intensity, two factor and three factor crosses, Interference and coincidence, Somatic cell genetics – an alternative approach to gene mapping.

Module III: - Mutations

Chromosomal Mutations: Deletion, Duplication, Inversion, Translocation, Aneuploidy and Polyploidy. Gene mutations: Induced versus Spontaneous mutations, Back versus Suppressor mutations, Molecular basis of Mutations in relation to UV light and chemical mutagens, Detection of mutations: CLB method, Attached X method, DNA repair mechanisms.

Module IV: Extrachromosomal Inheritance Quantitative Genetics

Chloroplast mutation/Variegation in Four o' clock plant and Chlymodomonas, Mitochondrial mutations in Neurospora and yeast, Maternal effects, Infective heredity- Kappa particles in Paramecium, Quantitative and multifactor inheritance, Transgressive variations, Heterosis.

Module V: - Population Genetics & Evolutionary Genetics

Allele frequencies, Genotype frequencies, Hardy-Weinberg Law, role of natural selection, mutation, genetic drift, Genetic variation and Speciation.

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). VIII ed. Principles of Genetics. Wiley India.

2. Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley and Sons Inc.

3. Klug, W.S., Cummings, M.R., Spencer, C.A. (2009). Concepts of Genetics. XI Edition. Benjamin Cummings.

4. Russell, P. J. (2009). iGenetics- A Molecular Approach. III Edition. Benjamin Cummings.

5. Glick, B.R., Pasternak, J.J. (2003). Molecular Biotechnology- Principles and Applications of recombinant DNA. ASM Press, Washington.

6. Pevsner, J. (2009). Bioinformatics and Functional Genomics. II Edition. John Wiley & Sons.

7. Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. IX Edition. Introduction to Genetic Analysis, W. H. Freeman & Co.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Communication Skills- II	BCS 401	1:0:0	1	4

A. Course Learning Outcomes (CLO)

CLO 1	Identify steps to professional communication
CLO 2	Identify the key components of meeting, agendas and meeting minutes
CLO 3	Understand the key skills and behaviors required to facilitate a group discussion/presentation
CLO 4	Polish current affairs & rapport building

B. Syllabus

Topic
Enhancing Speaking Skills (Public Speaking)
Resume Building-1
GD-2 (Specifically: Social & Political)
Presentations-2

Examination Scheme:

Components	Public Speaking	GD	Poster Presentation	Attendance
Weightage (%)	30	30	35	5

Suggested Readings

1. Essential Telephoning in English, Garside/Garside, Cambridge
2. Working in English, Jones, Cambridge
3. Dr. P.Prasad. Communication Skills.S.K.Kataria &Sons
4. Koneru, Aruna. Professional Communication. The McGraw Hill: New Delhi, 2008. Print
5. Krishnaswamy N, Creative English for Communication. Delhi: Macmillan
6. Publishers India Ltd. Print. 2007

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Behavioural Science- IV (Group Dynamics and Team Building)	BSS 403	1:0:0	1	4

A. Course Learning Outcomes (CLO)

CLO 1	Compare the difference between the groups and teams and their strength and weaknesses. Also, the internal and external factors that affect their functioning
CLO 2	Access when there is a need of group formation and when it is needed to be transformed into team
CLO 3	Identify the characteristics of leaders and the power practiced by them
CLO 4	Apply the type of leadership style power practiced in different situation

B. Syllabus

Course Contents:

Module I: Group formation

Definition and Characteristics
Importance of groups
Classification of groups
Stages of group formation
Benefits of group formation

Module II: Group Functions

External Conditions affecting group functioning: Authority, Structure, Org. Resources, Organizational policies etc.
Internal conditions affecting group functioning: Roles, Norms, Conformity, Status, Cohesiveness, Size, Inter group conflict.
Group Cohesiveness and Group Conflict
Adjustment in Groups

Module III: Teams

Meaning and nature of teams
External and Internal factors effecting team
Building Effective Teams
Consensus Building
Collaboration

Module IV: Leadership

Meaning, Nature and Functions

Self leadership
Leadership styles in organization
Leadership in Teams

Module V: Power to empower: Individual and Teams
Meaning and Nature
Types of power
Relevance in organization and Society

Examination Scheme:

Components	SAP	Attendance	FC/MA/CS/HA	VIVA	Journal for Success (JOS)
Weightage (%)	25	05	30	25	15

SAP- Social Awareness Programme; **JOS**-Journal of Success; **HA**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **FC-** Flip class; **MA-** Movie Analysis; **CS-** Case study; **A**-Attendance

Text & References:

1. Organizational Behaviour, Davis, K.
2. Hoover, Judhith D. Effective Small Group and Team Communication, 2002,Harcourt College Publishers
3. Dick, Mc Cann & Margerison, Charles: Team Management, 1992 Edition, viva books
4. LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
5. Smither Robert D.; The Psychology of Work and Human Performance, 1994, Harper Collins College Publishers

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language -IV French	FLT 401	2:0:0	1	1

A. Course Learning Outcomes (CLO)

CLO 1	Identify and express in French vocabulary and grammar norms
CLO 2	Interpret different types of texts as well as cultural ideas and themes
CLO 3	Demonstrate comprehension of nuance between script and sound in French
CLO 4	Narrate clearly ideas, themes in simple standard French

B. Syllabus

Module C: pp. 104 – 139 : Unités 8,9

Contenu lexical : Unité 8: Découvrir le passé

1. parler du passé, des habitudes et des changements.
2. parler de la famille, raconter une suite d'événements/préciser leur date et leur durée.
3. connaître quelques moments de l'histoire

Unité 9: Entreprendre

1. faire un projet de la réalisation: (exprimer un besoin, préciser les étapes d'une réalisation)
2. parler d'une entreprise
3. parler du futur

Contenu grammatical:

1. Imparfait
2. Pronom « en »
3. Futur
4. Discours rapporté au présent

5. Passé récent
6. Présent progressif

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- le livre à suivre : Campus: Tome 1

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language -IV German	FLG 401	2:0:0	1	1

A. Course Learning Outcomes (CLO)

CLO 1	Students will be able to ask and tell time
CLO 2	Interpret different types of texts as well as cultural ideas and themes, daily routine using Separable verb
CLO 3	Demonstrate Student will be able to write and speak sentences using modal verbs
CLO 4	Narrate clear ideas, themes in simple standard German, frame sentences and speak using was/were/had

B. Syllabus

Module I: Present perfect tense

Present perfect tense, usage and applicability

Usage of this tense to indicate near past

Universal applicability of this tense in German

Module II: Letter writing

To acquaint the students with the form of writing informal letters.

Module III: Interchanging prepositions

Usage of prepositions with both accusative and dative cases

Usage of verbs fixed with prepositions

Emphasizing on the action and position factor

Module IV: Past tense

Introduction to simple past tense

Learning the verb forms in past tense

Making a list of all verbs in the past tense and the participle forms

Module V: Reading a Fairy Tale

Comprehension and narration

Rotkäppchen

Froschprinzessin

Die Fremdsprache

Module VI: Genitive case

Genitive case – Explain the concept of possession in genitive

Mentioning the structure of weak nouns

Module VII: Genitive prepositions

Discuss the genitive propositions and their usage: (während, wegen, statt, trotz)

Module VIII: Picture Description

Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;

Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language -IV Spanish	FLS 401	2:0:0	2	4

A. Course Learning Outcomes (CLO)

CLO 1	Identify and express in Spanish vocabulary and grammar norms
CLO 2	Interpret different types of texts as well as cultural ideas and themes
CLO 3	Demonstrate comprehension of nuance between script and sound in Spanish
CLO 4	Narrate clearly ideas, themes in simple standard Spanish

B. Syllabus

Module I

Revision of earlier semester modules

Introduction to Present Continuous Tense (Gerunds)

Module II

Translation with Present Continuous Tense

Introduction to Gustar, Parecer, Apetecer, doler

Module III

Imperatives (positive and negative commands of regular verbs)

Module IV

Commercial/business vocabulary

Module V

Simple conversation with help of texts and vocabulary

En la recepcion del hotel

En el restaurante

En la agencia de viajes

En la tienda/supermercado

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- Español Sin Fronteras (Nivel – Elemental)

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language -IV Chinese	FLC 401	2:0:0	1	4

A. Course Learning Outcomes (CLO)

CLO	CLO Statement
CLO 1	1. Learn words, and expressions related to size, quantity, shopping, and transportation.
CLO 2	2. Exchange dialogues related to the above topics in Chinese.
CLO 3	3. Learn grammar points used in lessons 14-17.

B. Syllabus

Module I

Dialogue Practice

Observe picture and answer the question

Pronunciation and intonation

Character writing and stroke order.

Electronic items

Module II

Traveling – The Scenery is very beautiful

Weather and climate

Grammar question with – "bu shi …. Ma?"

The construction "yao … le" (Used to indicate that an action is going to take place)

Time words "yiqian", "yiwai" (Before and after).

The adverb "geng".

Module III

Going to a friend house for a visit meeting his family and talking about their customs.

Fallen sick and going to the Doctor, the doctor examines, takes temperature and writes prescription.

Aspect particle "guo" shows that an action has happened some time in the past.

Progressive aspect of an actin "zhengzai" Also the use if "zhe" with it.

To welcome someone and to see off someone …. I cant go the airport to see you off… etc.

Module IV

Shipment. Is this the place to checking luggage?

Basic dialogue on – Where do u work?

Basic dialogue on – This is my address

Basic dialogue on – I understand Chinese

Basic dialogue on – What job do u do?

Basic dialogue on – What time is it now?

Module V

Basic dialogue on – What day (date) is it today?

Basic dialogue on – What is the weather like here.

Basic dialogue on – Do u like Chinese food?

Basic dialogue on – I am planning to go to China.

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation, I – Interaction/Conversation Practice

Text Book :
Professionals' Handbook for Learning Chinese Vol-I, GBD books.

In this session Professionals' Handbook for Learning Chinese Vol-I, lessons14 to17 i.e. topics titleddescription of size; description of quantity; shopping; transportation will be covered.

Reference books:
Learn Chinese with me Vol- 1, GBD books; Elementary Chinese Reader Vol-1
Mobile app –HSK-I
Internet sources- Video clippings related to topics.

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Course Name	Course Code	LTP	Credit	Semester
Anandam - IV	AND 004	NTCC	2	4

A. Course Learning Outcomes (CLO)

CLO 1	Awareness and empathy regarding community issues
CLO 2	Interaction with the community and impact on society
CLO 3	Interaction with mentor and development of Student teacher relationship
CLO 4	Interaction among students, enlarge social network
CLO 5	Cooperative and Communication skills and leadership qualities
CLO 6	Critical thinking, Confidence and Efficiency

B. Syllabus

Course Objectives:

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

- apply their knowledge and skills to solve specific community problem
- learn to plan, lead, and organize community events have a sense of belonging to their college campus and community and find something they are interested in doing during their free time
- make new friends, expand social network, and boost social skills and mental health.
- be useful to society as it will protect them against stress, frustration, and depression

Course Contents:

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants, phone number/mobile no, email, and address)
- Location / community where the work was carried out
- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any

- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)

ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Program Name: B.Sc. (Hons.) MICROBIOLOGY

FIFTH SEMESTER

Course Code	Course Title	Category	Lectures(L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
BSM 501	Microbial Ecology & Diversity	CC	3	-	-	3
BSM 502	Microbial Genetics & Genomics	CC	3	-	-	3
BSM 503	Plant Pathology	CC	3	-	-	3
BSM 521	Microbial Ecology & Plant Pathology Lab.	CC	-	-	4	2
BSM 522	Microbial Genetics & Genomics Lab.	CC	-	-	4	2
Domain Elective-III: Choose any one from the following courses						
BSM 511	Industrial Safety & Management	DE	3	-	-	3
BSM 512	IPR & Bioethics					
BSM 513	GMP & Microbial Quality Control					
BSM 514	Clinical Research & Pharmacovigilance					
Minor Track- IV		MT				3
BSM 550	Summer Training Evaluation	CC	-	-	-	3
BCS 501	Communication Skills – III	VA	-	-	-	1
BSS 503	Behavioural Science-V (Individual, Society and Nation)	VA	-	-	-	1
FLT 501 FLG 501 FLS 501 FLC 501	Foreign Language – V French German Spanish Chinese	VA	-	-	-	2
AND 005	Anandam-V	NTCC	-	-	-	2
					TOTAL	**28**

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Microbial Ecology & Diversity	BSM 501	3:0:0	3	5

A. Course Learning Outcomes (CLO)

CLO 1	Explain the microbial ecology and diversity
CLO 2	Explain role of microorganisms in environment

B. Syllabus

Module I: - Field of Microbial Ecology

Contributions of Beijerinck, Winogradsky, Kluyver, Van Niel, Martin Alexander,Selman A. Waksman, terrestrial microflora,microflora of Freshwater & Marine habitats, aeromicroflora, Extremophiles: Microbes thriving at high & low, temperatures, pH, high hydrostatic & osmotic pressures, salinity, & low nutrientlevels

Module II: - Biological Interactions

Microbe–Microbe Interactions- Mutualism, Synergism, Commensalism, Competition, Amensalism, Parasitism,Predation,

Microbe–Plant Interactions- Roots, Aerial Plant surfaces, Biological Nitrogen fixation (symbiotic/nonsymbiotic- biofertilizers)

Microbe–Animal Interactions- role of microbes in ruminants, nematophagus fungi, luminescent bacteria assymbiont

Module III: - Biogeochemical cycles

Carbon cycle- Microbial degradation of polysaccharide (cellulose, hemicellulose, lignin, chitin)

Nitrogen cycle- Ammonification, nitrification, denitrification & nitrate reduction

Phosphorous cycle- Phosphate immobilization and phosphate solubilization

Sulphur Cycle

Module IV: - Advances in Microbial Ecology

Structure & dynamics of microbialcommunities, diversity & Stability, population selectionwithin communities, succession within microbial communities with one example, microbial adaptation to extreme environments

Classical and modern methods to study microbial diversity, Molecular Phylogenetics,16s rRNA technique.

Bioleaching, Microbial deterioration of metals (corrosion), textile and paper

Module V: - Waste Management

Sources and types of solid waste, methods of disposal of solid waste (incineration, composting, sanitary landfill)Liquid Waste Management, Composition of sewage; strength of sewage (BOD and COD); Primary, secondary(aerobic – oxidation pond, trickling filter, rotating biological contractor/biodiscsystem, activated sludge process and anaerobic – septic tank, imhoff tank,anaerobic digestor) and tertiary sewage treatment

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Atlas RM and Bartha R. (2000). Microbial Ecology: Fundamentals &Applications. 4th edition. Benjamin/Cummings Science Publishing, USA.

2. Atlas RM. (1989). Microbiology: Fundamentals and Applications. 2nd Edition,MacMillan Publishing Company, New York.

3. Madigan MT, Martinko JM and Parker J. (2009). Brock Biology ofMicroorganisms. 12th edition. Pearson/ Benjamin Cummings.

4. Campbell RE. (1983). Microbial Ecology. Blackwell Scientific Publication,Oxford, England.

5. Coyne MS. (2001). Soil Microbiology: An Exploratory Approach. DelmarThomson Learning.

6. Lynch JM &Hobbie JE. (1988). Microorganisms in Action: Concepts &Application in Microbial Ecology. Blackwell Scientific Publication, U.K.

7. Maier RM, Pepper IL and Gerba CP. (2009). Environmental Microbiology. 2nd edition, Academic Press.

8. Martin A. (1977). An Introduction to Soil Microbiology. 2nd edition. John Wiley & Sons Inc. New York & London.

9. Stolp H. (1988). Microbial Ecology: Organisms Habitats Activities. CambridgeUniversity Press, Cambridge, England.
10. Subba Rao NS. (1999). Soil Microbiology. 4th edition. Oxford & IBH PublishingCo. New Delhi.

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Course Name	Course Code	LTP	Credit	Semester
Microbial Genetics & Genomics	BSM 502	3:0:0	3	5

A. Course Learning Outcomes (CLO)

CLO 1	Understanding of bacterial and viral genetics
CLO 2	Knowledge of the genomics tools and techniques
CLO 3	Ability to demonstrate experiments of basic microbial genetics and genomics

B. Syllabus

Module I: - Introduction

DNA topology - linking number, topoisomerases, organization of chromosomes in prokaryotes and eukaryotes, organelle DNA- mitochondria and chloroplast, Plasmids- structure, types, replication, properties incompatibility, Transposons- types, function and mechanism of transposition, other repetitive DNA in genome

Module II: - Genetic Exchange

Transduction, Transformation and Conjugation, mechanisms of genetic recombination

Module III: - Genome Regulation

Principles of transcriptional regulation in prokaryotes, regulation at initiation with examples fromlac and trp operons, Transcription regulation in eukaryotes, conserved mechanism of regulation, Eukaryotic activators, Signal integration,combinatorial control, transcriptional repressors, signal transduction and control oftranscriptional regulator, Gene Silencing

Regulation of translation- translation-dependent regulation of mRNA and Protein Stability

Regulatory RNAs- Riboswitches, RNA interference, miRNA, siRNA

Cell signelling in prokaryotes, One-Two component regulatory system, quorum sensing

Global & heat shoock response in bacteria, Stress reponse in bacteria

Module IV: - Genome, transcriptome and proteome analysis- I

Agarose gel electrophoresis, Southern - and Northern - blotting techniques, dot blot

and colony hybridizations. Chromosome walking and jumping. DNA fingerprinting by RFLP and RAPD. Gel retardation assays. DNA footprinting by DNase I, DNA microarray analysis. SDS-PAGE and Western blotting. Phage display

Polymerase chain reaction – principle enzymes used, primer design, reverse transcritase PCR, realtime PCR, colony PCR, LAMP

Module V: - Genome, transcriptome and proteome analysis- II

Genomic and cDNA libraries: Preparation and uses, Maxam-Gilbert's and Sanger's method. Automated sequencing. Human genomesequencing project

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Gardner, E.J., Simmons, M.J., Snustad, D.P. (2006). Principles of Genetics. VIIIEdition John Wiley & Sons.

2. Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wileyand Sons Inc.

3. Klug, W.S., Cummings, M.R., Spencer, C.A. (2009). Concepts of Genetics. IXEdition. Benjamin Cummings.

4. Russell, P. J. (2009). *i*Genetics- A Molecular Approach. III Edition. BenjaminCummings.

5. Glick, B.R., Pasternak, J.J. (2003). Molecular Biotechnology- Principles andApplications of recombinant DNA. ASM Press, Washington.

6. Pevsner, J. (2009). Bioinformatics and Functional Genomics. II Edition. John Wiley& Sons.

7. Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. IX Edition.Introduction to Genetic Analysis, W. H. Freeman & Co.

8. Ghosh, Z. and Mallick,V. (2008). Bioinformatics-Principles and Applications. OxfordUniv. Press

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Course Name	Course Code	LTP	Credit	Semester
Plant Pathology	BSM 503	3:0:0	3	5

A. Course Learning Outcomes (CLO)

CLO 1	Students will be exposed to Disease Cycle and relevant scientific contributions.
CLO 2	Explain Host – pathogen Interaction including plant defence mechanisms.
CLO 3	Exposure of Various Plant Diseases and their control measures

B. Syllabus

Module I: - Introduction

Concept of plant disease- definitions of disease, disease cycle & pathogenicity,symptoms associated with microbial plant diseases, types of plant pathogens,economic losses and social impact of plant diseases.Significant landmarks in the field of plant pathology- Contributions of Anton DeBary, Millardet, Burrill, E. Smith, Adolph Mayer, Ivanowski, Diener, Stakman,H.H. Flor, Van Der Plank, molecular Kochs postulates. Contributions of eminentIndian plant pathologists.

Module II: - Host Pathogen Interactions & Defense Mechanisms

Infection, invasion, colonization, dissemination of pathogens and perennation.Virulence factors of pathogens: enzymes, toxins (host specific and nonspecific)growth regulators, virulence factors in viruses (replicase, coat protein, silencingsuppressors) in disease development. Effects of pathogens on host physiological processes (photosynthesis, respiration,cell membrane permeability, translocation of water and nutrients, plant growth andreproduction)

Concepts of constitutive defense mechanisms in plants, inducible structuraldefenses (histological-cork layer, abscission layer, tyloses, gums), induciblebiochemical defenses [hypersensitive response (HR), systemic acquired resistance(SAR), phytoalexins, pathogenesis related (PR) proteins, plantibodies, phenolics,quinones, oxidative bursts].

Module III: - Epidemiology and Genetics of Plant Diseases

Concepts of monocyclic, polycyclic and polyetic diseases, disease triangle &disease pyramid, forecasting of plant diseases and its relevance in Indian context.

Concept of resistance (R) gene and avirulence (avr) gene; gene for gene hypothesis,types of plant resistance: true resistance– horizontal & vertical, apparent resistance.

Module IV: - Specific Plant diseases

Fungal Diseases

_ White rust of crucifers - *Albugo candida*

_ Downy mildew of onion - *Peronospora destructor*

_ Late blight of potato - *Phytophthora infestans*

_ Powdery mildew of wheat - *Erysiphe graminis*

_ Ergot of rye - *Clavicepspurpurea*

_ Black stem rust of wheat - *Puccinia graministritici*

_ Loose smut of wheat - *Ustilago nuda*

_ Wilt of tomato - *Fusarium oxysporum*f.sp. *lycopersici*

_ Red rot of sugarcane - *Colletotrichum falcatum*

_ Early blight of potato - *Alternaria solani*

Bacterial Diseases

Angular leaf spot of cotton, bacterial leaf blight of rice, crown galls, bacterial cankers of citrus

PhytoplasmasDiseases

Aster yellow, citrus stubborn

Viral Diseases

Papaya ring spot, tomato yellow leaf curl, banana bunchy top, rice tungro

Viroid Diseases

Potato spindle tuber, coconut cadangcadang

Module V: - Control of Plant Diseases

Principles & practicesinvolved in the management of plant diseases by different methods, *viz.***regulatory** - quarantine, crop certification, avoidance of pathogen, use of pathogen free propagative material, **cultural** - host eradication, crop rotation, sanitation, polyethylene traps and mulches, **chemical** - protectants and systemic fungicides, antibiotics, resistance of pathogens to chemicals, **biological** - suppressive soils, antagonistic microbes-bacteria and fungi, trap plants, **genetic engineering** of disease resistant plants- with plant derived genes and

pathogen derived genes

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Agrios GN. (2006). *Plant Pathology*. 5th edition. Academic press, San Diego,
2. Lucas JA. (1998). *Plant Pathology and Plant Pathogens*. 3rd edition. BlackwellScience, Oxford.
3. Mehrotra RS. (1994). *Plant Pathology*. Tata McGraw-Hill Limited.
4. Rangaswami G. (2005). *Diseases of Crop Plants in India*. 4th edition. Prentice Hallof India Pvt. Ltd., New Delhi.

Singh RS. (1998). *Plant Diseases Management*. 7th edition. Oxford & IBH, NewDelhi.

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Course Name	Course Code	LTP	Credit	Semester
Microbial Ecology & Plant Pathology Lab.	BSM 521	0:0:4	2	5

A. Course Learning Outcomes (CLO)

CLO 1	**To understand the factors involved in the microbial ecology**
CLO 2	**To study the cell behaviors in different ecological niche**
CLO 3	**To understand the methods involved in cultivation of microbial cells**

B. Syllabus

Course Objective: -

Aim of the course is to give hands on training to students for enhancing their practical skills of the subject domain.

Course Content

Minimum of 5-8 laboratory exercises will be conducted based on theory papers BSM 501 & BSM 503

Examination Scheme:

Components	Performance	Lab record	Viva	Observations	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Atlas RM and Bartha R. (2000). Microbial Ecology: Fundamentals &Applications. 4th edition. Benjamin/Cummings Science Publishing, USA.

2. Atlas RM. (1989). Microbiology: Fundamentals and Applications. 2nd Edition,MacMillan Publishing Company, New York.

3. Madigan MT, Martinko JM and Parker J. (2009). Brock Biology ofMicroorganisms. 12th edition. Pearson/ Benjamin Cummings.

4. Campbell RE. (1983). Microbial Ecology. Blackwell Scientific Publication,Oxford, England.

5. Coyne MS. (2001). Soil Microbiology: An Exploratory Approach. DelmarThomson Learning.

6. Lynch JM &Hobbie JE. (1988). Microorganisms in Action: Concepts &Application in Microbial Ecology. Blackwell Scientific Publication, U.K.

7. Maier RM, Pepper IL and Gerba CP. (2009). Environmental Microbiology. 2nd edition, Academic Press.

8. Martin A. (1977). An Introduction to Soil Microbiology. 2nd edition. John Wiley & Sons Inc. New York & London.

9. Stolp H. (1988). Microbial Ecology: Organisms Habitats Activities. CambridgeUniversity Press, Cambridge, England.

10. Subba Rao NS. (1999). Soil Microbiology. 4th edition. Oxford & IBH PublishingCo. New Delhi.

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Course Name	Course Code	LTP	Credit	Semester
Microbial Genetics & Genomics Lab.	BSM 522	0:0:4	2	5

A. Course Learning Outcomes (CLO)

CLO 1	**To learn methods used in understanding the microbial genetics**
CLO 2	**To study the methods used for DNA purification and modifications**
CLO 3	**To learn about the process of the RDT**

B. Syllabus

Course Objective: -

Aim of the course is to give hands on training to students for enhancing their practical skills of the subject domain.

Course Content

Minimum of 5-8 laboratory exercises will be conducted based on theory papers BSM 502

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Gardner, E.J., Simmons, M.J., Snustad, D.P. (2006). Principles of Genetics. VIIIEdition John Wiley & Sons.

2. Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wileyand Sons Inc.

3. Klug, W.S., Cummings, M.R., Spencer, C.A. (2009). Concepts of Genetics. IXEdition. Benjamin Cummings.

4. Russell, P. J. (2009). *i*Genetics- A Molecular Approach. III Edition. BenjaminCummings.

5. Glick, B.R., Pasternak, J.J. (2003). Molecular Biotechnology- Principles andApplications of recombinant DNA. ASM Press, Washington.

6. Pevsner, J. (2009). Bioinformatics and Functional Genomics. II Edition. John Wiley& Sons.

7. Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. IX Edition.Introduction to Genetic Analysis, W. H. Freeman & Co.

8. Ghosh, Z. and Mallick,V. (2008). Bioinformatics-Principles and Applications. OxfordUniv. Press

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Course Name	Course Code	LTP	Credit	Semester
Industrial Safety & Management	BSM 511	3:0:0	3	5

A. Course Learning Outcomes (CLO)

CLO 1	**To understand the levels of hazards in industrial management**
CLO 2	**To learn the methods adopted for industrial safety**
CLO 3	**To learn the regulations related to the industrial safety**

B. Syllabus

Module I: - Hazards

Classification: Chemical hazards. Radiation hazards and control of exposure to radiation. Types of fire and fire prevention methods. Mechanical hazards. Electrical hazards. Biological hazards.

Module II: - Psychology and Hygiene

Industrial psychology Industrial hygiene. Safety in plant site selection and plant layout. Industrial lighting and ventilation. Industrial noise.

Module III: - Occupational diseases and control

Occupational diseases and prevention methods. Safe housekeeping, Instrumentation for safe operation. Personal protective equipments. Safety in chemical operations and processes.

Module IV: - Management

Safety organization – safety committee – safety education and training. Management process. Philosophy and need for Industrial safety. Role of Government in Industrial safety. Waste management (Effluent treatment).

Module V: - Laws

Factory Act. ESI Act, Environmental Act

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE

Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. 1. Safety and Accident Prevention in Chemical Operation 2nd Edn., H.H. Fawcett& W.S .Wood Wiley Interscience(1982)
2. Industrial Safety Management by L M Deshmukh Publisher Tata McGraw-Hill Education(2005)
3. Industrial Safety and Health Management by C. Ray Asfahl , David W. Rieske, 6th Edition Publisher: Prentice Hall(2009)

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Course Name	Course Code	LTP	Credit	Semester
IPR and Bioethics	BSM 512	3:0:0	3	5

A. Course Learning Outcomes (CLO)

CLO 1	**To learn about the process of the IPR filling**
CLO 2	**To determine the factors and data relevant to the IPR filing**
CLO 3	**To understand the bioethics in microbiology**

B. Syllabus

Module I:-

Introduction to human rights, International instruments: United Nation Commission for human rights, European convention for human rights, Universal Declaration of Human Rights (UDHR), National instruments: Development of human rights- Article 21 of Indian Constitution.

Module II:-

Human relations- ethnic and communal relations, socio-cultural relations etc. Economics of human rights and relations- Adam Smith's thoughts on moral sentiments, Economic philosophy of Thiruvalluvar. Gene cloning and bioethics.

Module III:-

Objectives of Intellectual Property Rights, tangible and intangible property; concept and classification of intellectual property: Copyrights and related rights, Trademarks and Geographical indications, Rights of traditional Knowledge and Protection of Plant varieties. IPR-National and International perspective, TRIPS and WIPO.

Module IV:-

Patent- Basic criterion for patentability, Patentable subjects, patentable inventions, patent acquisition, infringement of patent, discovery Vs invention, product patenting Vs process patenting, special issue in biotechnology patent, Patenting laws in Indian and International perspective,

Module V: -

Case studies: Basmati case, Neem controversy, Turmeric case.

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Beauchamp, T. L., Walters, L., Kahn, J. P., Mastroianni, A. C. 2007. Contemporary Issues in Bioethics. 7th Edition. Wasdsworth Publishing Company, California.

2. Paul, R.C. 2000. Situation of Human Rights in India. Commonwealth Publishers, New Delhi.

3. Daniel, Wayne W.: Biostatistics — A Foundations for Analysis in the Health Sciences. Wiley & Sons, New York, 6th ed. 1995,

4. Biostatistics: A manual of Statistical Methodology for use in Health, Nutrition and Anthropology, K. Visweswara Rao. Publisher: Jaypee Brothers, Second edition (1 January 2007).

5. Fundamentals of Mathematical Statistics, Eleventh Edition (2014)S.C Gupta and V.K Kapoor. Publisher: S. Chand & Co

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Course Name	Course Code	LTP	Credit	Semester
GMP & Microbial Quality Control	BSM 513	3:0:0	3	5

A. Course Learning Outcomes (CLO)

CLO 1	**To understand the good manufacturing practices adopted**
CLO 2	**To learn the importance of the quality control in the industry**
CLO 3	**To study the interconnections of quality control and quality assurance**

B. Syllabus

Module I: -Definition - Quality control and Quality assurance, concept andphilosophy of TQM, GMP, ICH and ISO 9000.

Module II: -GLP: Scope of GLP, Quality assurance unit, SOP, protocols forconduct of clinical & non clinical testing, control on animal house,report preparation and documentation.

Module III: -Quality control test for raw materials, packaging materials in food and pharmaceutical industry.Document maintenance in pharmaceutical industry: Batch FormulaRecord, Master Formula Record, Quality audit reports and documents,quality reports, distribution records, complaints and evaluation ofcomplaints, Handling of return good, recalling and waste disposal.

Module IV: -In process quality control and finished products quality control in pharma and food industry, quality control of radio pharmaceuticals

Module V: - Regulatory affairs- international and national regulatory bodies for food and phamaceuticals

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. Quality Assurance Guide by organization of Pharmaceutical Procedures of India, 3rd revisededition, Volume I & II, Mumbai, 1996.

2. Good Laboratory Practice Regulations, 2nd Edition, Sandy Weinberg Vol. 69, Marcel DekkerSeries, 1995.

3. Quality Assurance of Pharmaceuticals- A compedium of Guide lines and Related materials Vol I& II, 2nd edition, WHO Publications, 1999.

4. How to Practice GMP's – P P Sharma, Vandana Publications, Agra, 1991.

5. The International Pharmacopoeia – vol I, II, III, IV & V - General Methods of Analysis andQuality specification for Pharmaceutical Substances, Excepients and Dosage forms, 3rd edition,WHO, Geneva, 2005.

6. Good laboratory Practice Regulations – Allen F. Hirsch, Volume 38, Marcel Dekker Series,1989.

7. ICH guidelines

8. ISO 9000 and total quality management

9. The drugs and cosmetics act 1940 – Deshpande, Nilesh Gandhi, 4th edition, SusmitPublishers,2006.

10. QA Manual – D.H. Shah, 1st edition, Business Horizons, 2000.

11. Good Manufacturing Practices for Pharmaceuticals a plan for total quality control – Sidney H.Willig, Vol. 52, 3rd edition, Marcel Dekker Series.

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Course Name	Course Code	LTP	Credit	Semester
Clinical Research & Pharmacovigilance	BSM 514	3:0:0	3	5

A. Course Learning Outcomes (CLO)

CLO 1	Understanding of Drug Discovery and Development Process
CLO 2	Understanding for Profile of Clinical research and pharmacovigilance organizations
CLO 3	Understanding of drug regulatory aspects behind the Clinical research and pharmacovigilance
CLO 4	Understanding of Clinical trials designs and control

B. Syllabus

UNIT-I

Basics of general Pharmacology & Drug discovery process

Drug, Receptors, Dosage forms, routes of drug administration, drug receptor interactions, drug drug interactions, drug resistance, drug tolerance, drug dependence, Pharmacokinetic (ADME) and Pharmacodynamic of drugs, Adverse drug effects.

General introduction about Drug discovery and development process, Bioavailability /Bioequivalence Studies and Pharmacovigilance.

UNIT-II

Basics of Clinical trials - Basics of clinical trials, Introduction and history of clinical trials, Types of clinical trials, Inclusion and exclusion criteria, Primary and Secondary outcome/endpoint of clinical trials, Needs of Clinical trials and Phases of clinical trials.

Various Key documents, application filling and Ethical regulation of Clinical trials:

- Investigator Brochure (IB), Protocol & Amendment in Protocol , Case Report Form (CRF),
- Informed Consent Form (ICF) , Essential Documents in Clinical Trial Good Clinical Practice: ICH guidelines, Indian GCP guidelines (CDCSO guidelines),
- Investigational new drug (IND) / clinical trial exception (CTX) / clinical trial authorization (CTA) application

- New drug application (NDA/ANDA) / marketing authorization application (MAA)
- ICMR Guideline - Ethical Guideline for Biomedical Research on Human Subjects & Schedule Y
- Ethical Codes – The Declaration of Helsinki.

UNIT-III

Clinical trial design: Need of clinical trial design

Treatment studies- Randomized controlled trial, Adaptive clinical trial, Nonrandomized trial, Observational studies- Cohort study, Case control study, Cross sectional study, Ecological study

UNIT-IV

Pharmacovigilance:

Introduction to adverse drug reactions: Definitions and classification of ADRs, Detection and eporting, Causality assessment, Severity and seriousness assessment , Predictability and preventability assessment, Management of adverse drug reactions.

Introduction to pharmacovigilance: History and development of pharmacovigilance, Importance of safety monitoring / Why pharmacovigilance

National and international scenario: Pharmacovigilance in India, Pharmacovigilance global perspective, WHO international drug monitoring programme

Adverse drug reaction reporting: Introduction to reporting systems, Spontaneous reporting system , Reporting to regulatory authorities , Guidelines for reporting ADRs in biomedical literature

Drug dictionaries and coding in pharmacovigilance: WHO adverse reaction terminologies, MedDRA and Standardised MedDRA queries.

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1. 1 Methodology of Clinical Drug Trials, 2nd Edition. Spriet A., Dupin-Spriet T., Simon P. Publisher: Karger.
2. Design and Analysis of Clinical Trials: Concepts and Methodologies, 3rd Edition. SheinChung Chow, Jen-Pei Liu. Publisher: Wiley.
3. New Drug Development: Design, Methodology, and Analysis, by J. Rick Turner, Published by John Wiley & Sons, 2007.

4. Essentials of Medical Pharmacology by K D Tripathi, Published by JAYPEE Brothers Medical Publishers (P) Ltd. 7th Edition 2010.
5. Drug Discovery and Clinical Research, by S.K Gupta, Published by JAYPEE Brothers Medical Publishers (P) Ltd.
6. A Textbook of Pharmacovigilance: Concept and Practice, by Guru Prasad Mohanta, Published by PharmaMed Press/BSP Books (2015).
7. An Introduction to Pharmacovigilance, by Patrick Waller, Published by October 2009, Wiley-Blackwell.

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Course Name	Course Code	LTP	Credit	Semester
Summer Training Evaluation	BSM 550	NTCC	3	5

A. Course Learning Outcomes (CLO)

CLO 1	**To understand the functioning of Industrial setup**
CLO 2	**To study the scale of production at large scale**

Guidelines

- Students are needed to prepare a detail report of industrial learning in prescribed format followed by are the departmental viva voce

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Course Name	Course Code	LTP	Credit	Semester
Communication Skills- III	BCS 501	1:0:0	1	5

A. Course Learning Outcomes (CLO)

CLO 1	Create right selection of words and ideas while also choosing the appropriate channel of formal communication
CLO 2	Demonstrate the ability to analyse a problem and devise a solution in a group
CLO 3	Demonstrate proficiency in the use of written communication
CLO 4	Recognize the mannerisms and methodology of Interview and GD to become more expressive in their body language and verbal performance

B. Syllabus

Topic
Email Writing (Briefing, Do's & Don'ts & Practice)
Corporate Dressing & Body Language (Verbal & Non-Verbal Cues & its role in Interview Selection)
Interview-1 (Briefing, Do's & Don'ts, Questions, Mock Sessions)
GD-3(Practice Sessions)

Examination Scheme:

Components	Email Writing	GD	Personal Interview	Attendance
Weightage (%)	30	30	35	5

Suggested Readings

1. Essential Telephoning in English, Garside/Garside, Cambridge
2. Working in English, Jones, Cambridge
3. Dr. P.Prasad. *Communication Skills*.S.K.Kataria&Sons
4. Koneru, Aruna. *Professional Communication*. The McGraw Hill: New Delhi, 2008. Print
5. Krishnaswamy N,*Creative English for Communication*. Delhi: Macmillan
6. Publishers India Ltd. Print. 2007.

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Course Name	Course Code	LTP	Credit	Semester
Behavioural Science- V (Individual, Society and Nation)	BSS 503	1:0:0	1	5

A. Course Learning Outcomes (CLO)

CLO 1	Recognize their personality and individual differences and identify its importance of diversity at workplace and ways to enhance it
CLO 2	Recognize effective socialization strategies and importance of patriotism and taking accountability of integrity
CLO 3	Recognize different types of human rights and its importance
CLO 4	Identify Indian values taught by different religions
CLO 5	Identify long term goals and recognize their talent, strengths and styles to achieve them

B. Syllabus

Course Contents:

Module I: Individual differences & Personality
Personality: Definition& Relevance
Importance of nature & nurture in Personality Development
Importance and Recognition of Individual differences in Personality
Accepting and Managing Individual differences (Adjustment Mechanisms)
Intuition, Judgment, Perception & Sensation (MBTI)
BIG5 Factors

Module II: Socialization
Nature of Socialization
Social Interaction
Interaction of Socialization Process
Contributions to Society & Nation

Module III: Patriotism and National Pride
Sense of Pride and Patriotism
Importance of Discipline and hard work
Integrity and accountability

Module IV: Human Rights, Values and Ethics

Meaning of Human Rights
Human Rights Awareness
Importance of human rights
Values and Ethics- Learning based on project work on Scriptures like Ramayana, Mahabharata, Gita etc

Module V: Personal and Professional Excellence

- Personal excellence:
    - Identifying Long-term choices and goals
    - Uncovering talent, strength and style

Alan P. Rossiter's eight aspects of Professional Excellence
Resilience during challenge and loss
Continued Reflection (Placements, Events, Seminars, Conferences, Projects, Extracurricular Activities, etc.)

Examination Scheme:

Components	SAP	Attendance	FC/MA/CS/HA	VIVA	Journal for Success (JOS)
Weightage (%)	25	05	30	25	15

SAP- Social Awareness Programme; **JOS**-Journal of Success; **HA**-Home Assignment; **P**-Presentation; **V**-Viva; **Q**-Quiz; **FC-** Flip class; **MA-** Movie Analysis; **CS-** Case study; **A**-Attendance

Text & References:

1. Bates, A. P. and Julian, J.: Sociology - Understanding Social Behaviour
2. Dressler, David and Cans, Donald: The Study of Human Interaction
3. Lapiere, Richard. T – Social Change
4. Rose, G.: Oxford Textbook of Public Health, Vol.4, 1985.
5. Robbins O.B.Stephen;. Organizational Behavior

AMITY UNIVERSITY
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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language -V French	FLT 501	2:0:0	1	5

A. Course Learning Outcomes (CLO)

CLO 1	Identify and express in French vocabulary and grammar norms
CLO 2	Interpret different types of texts as well as cultural ideas and themes
CLO 3	Demonstrate comprehension of nuance between script and sound in French
CLO 4	Narrate clearly ideas, themes in simple standard French

B. Syllabus

Module D: pp. 131 – 156 Unités 10,11

Contenu lexical : **Unité 10:** Prendre des décisions

1. Faire des comparaisons
2. décrire un lieu, le temps, les gens, l'ambiance
3. rédigerune carte postale

Unité 11: faire face aux problèmes

1. Exposer unproblème.
2. parler de la santé, de la maladie
3. interdire/demander/donneruneautorisation
4. connaître la vie politiquefrançaise

Contenu grammatical:

1. comparatif - comparer des qualités/ quantités/actions
2. supposition : Si + présent, futur
3. adverbe - caractériserune action
4. pronom "Y"

Examination Scheme:

Components	CT1	CT2	C	I	V	A
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- le livre à suivre : Campus: Tome 1

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language -V German	FLG 501	2:0:0	2	5

A. Course Learning Outcomes (CLO)

CLO 1	
CLO 2	
CLO 3	
CLO 4	

B. Syllabus

Module I: Genitive case

Genitive case – Explain the concept of possession in genitive

Mentioning the structure of weak nouns

Module II: Genitive prepositions

Discuss the genitive propositions and their usage: (während, wegen, statt, trotz)

Module III: Reflexive verbs

Verbs with accusative case

Verbs with dative case

Difference in usage in the two cases

Module IV: Verbs with fixed prepositions

Verbs with accusative case

Verbs with dative case

Difference in the usage of the two cases

Module V: Texts

A poem 'Maxi'

A text Rocko

Module VI: Picture Description

Firstly recognize the persons or things in the picture and identify the situation depicted in the picture;

Secondly answer questions of general meaning in context to the picture and also talk about the personal experiences which come to your mind upon seeing the picture.

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- Wolfgang Hieber, Lernziel Deutsch
- Hans-Heinrich Wangler, Sprachkurs Deutsch
- Schulz Griesbach, Deutsche Sprachlehre für Ausländer
- P.L Aneja, Deutsch Interessant- 1, 2 & 3
- Rosa-Maria Dallapiazza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language -V Spanish	FLS 501	2:0:0	1	5

A. Course Learning Outcomes (CLO)

CLO 1	Identify and express in Spanish vocabulary and grammar norms
CLO 2	Interpret different types of texts as well as cultural ideas and themes
CLO 3	Demonstrate comprehension of nuance between script and sound in Spanish
CLO 4	Narrate clearly ideas, themes in simple standard Spanish

B. Syllabus

Module I

Revision of earlier semester modules

Module II

Future Tense

Module III

Presentations in English on

Spanish speaking countries'

Culture

Sports

Food

People

Politics

Society

Geography

Module IV

Situations:

En el hospital

En la comisaria

En la estacionde autobus/tren

En el banco/cambio

Module V

General revision of Spanish language learnt so far.

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text & References:

- Español Sin Fronteras, Greenfield

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Foreign Language -V Chinese	FLC 501	2:0:0	1	5

A. Course Learning Outcomes (CLO)

CLO 1	Students will hone Basic language skills such as reading, writing, speaking, listening & interactive in the language
CLO 2	Students will be able to read and interpret small texts
CLO 3	Students will be able to communicate in small sentences in writing, self introduction, family description etc
CLO 4	Students will be able to communicate in small sentences in oral, self introduction, family description etc

B. Syllabus

Module I

Drills

Dialogue practice

Observe picture and answer the question.

Pronunciation and intonation.

Character writing and stroke order

Module II

Intonation

Chinese foods and tastes – tofu, chowmian, noodle, Beijing duck, rice, sweet, sour….etc. Learning to say phrases like – Chinese food, Western food, delicious, hot and spicy, sour, salty, tasteless, tender, nutritious, god for health, fish, shrimps, vegetables, cholesterol is not high, pizza, milk, vitamins, to be able to cook, to be used to, cook well, once a week, once a month, once a year, twice a week……

Repetition of the grammar and verbs taught in the previous module and making dialogues usingit.

Compliment of degree "de".

Module III

Grammar the complex sentence "suiran … danshi…."

Comparison – It is colder today than it was yesterday…..etc.

The Expression "chule….yiwai". (Besides)

Names of different animals.

Talking about Great Wall of China

Short stories

Module IV

Use of "huozhe" and "haishi"

Is he/she married?

Going for a film with a friend.

Having a meal at the restaurant and ordering a meal.

Module V

Shopping – Talking abut a thing you have bought, how much money you spent on it? How many kinds were there? What did you think of others?

Talking about a day in your life using compliment of degree "de". When you get up? When do you go for class? Do you sleep early or late? How is Chinese? Do you enjoy your life in the hostel?

Making up a dialogue by asking question on the year, month, day and the days of the week and answer them.

Examination Scheme:

Components	**CT1**	**CT2**	**C**	**I**	**V**	**A**
Weightage (%)	20	20	20	20	15	5

C – Project + Presentation

I – Interaction/Conversation Practice

Text books & References

1. Professionals' Handbook For Learning Chinese Vol 1

2. ECR book-I (suggested reading)

3. Practical Chinese Grammar for foreigners (suggested reading)

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Course Name	Course Code	LTP	Credit	Semester
Anandam - V	AND 005	NTCC	2	5

A. Course Learning Outcomes (CLO)

CLO 1	Awareness and empathy regarding community issues
CLO 2	Interaction with the community and impact on society
CLO 3	Interaction with mentor and development of Student teacher relationship
CLO 4	Interaction among students, enlarge social network
CLO 5	Cooperative and Communication skills and leadership qualities
CLO 6	Critical thinking, Confidence and Efficiency

B. Syllabus

Course Objectives:

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

- apply their knowledge and skills to solve specific community problem
- learn to plan, lead, and organize community events have a sense of belonging to their college campus and community and find something they are interested in doing during their free time
- make new friends, expand social network, and boost social skills and mental health.
- be useful to society as it will protect them against stress, frustration, and depression

Course Contents:

The project report should be guided by the mentor and shall contain:

- **Synopsis**: clearly stating objectives and activities to be undertaken. Problem identifying and problem-solving projects to be taken up.
- Details of the **Mentor and the Participants are to** be given (name of mentor, name of participants, phone number/mobile no, email, and address)
- Location / community where the work was carried out

- Details of Activities performed are to be given with date
- Number of beneficiaries and impact on the society (the object should be to empower the community and make them self-reliant)
- Photographs taken for documentation of work should be submitted
- Media coverage of the projects should be attached if any
- The Group Community Service Project Report will be submitted by the Student group leader under the guidance of the mentor to the Director/HoIs of the Department.
- The Director/HoIs should get the best report (more than one if required) of the Group Community Service Project uploaded on the HTE website and on the University page
- The Director/HoIs will forward the best report of the department to the Nodal Officer of the University.
- University will forward the report to the state level committee.

GUIDELINES FOR GCSP (Group Community Service Project)

ASSIGNMENT OF ANANDAM FOR SOCIAL AWARENESS (for students)

1. Each member of the group shall write one blog about the decided topic of 500 words (minimum) along with any relevant photos/diagrams/statistical data (with reference).
2. The group member shall write his/her name at the end of the blog.
3. The blog shall be posted on Instagram and Facebook (apart from these any other website wherever the group seems necessary).
4. Print out of the blog where date of when the content is posted, number of followers, comments, name of the writer shall be visible will be taken and file will be maintained for the same.
5. In the cover page of the project mention heading **"Group Community Service Project"**, and the filled format of final project report given by Anandam Scheme.
6. For the topic chosen by the group, students are recommended to cover the following points:
    a) Current scenario (Regional, national and international level as applicable)
    b) Future predictions
    c) Duty of the government
    d) Government policies (related to the topic), if any
    e) Duty of public
    f) Conclusion

Evaluation Scheme:

Project Participation: 2 hours X 8 days (per month) X 4 months = 64 hours

- **C grade =32 hrs (Below 20 marks)**
- **B grade >32 hrs to <=44hrs (20-30 marks)**
- **A grade >44 hrs to<=54hrs (30-40 marks)**
- **O grade >54 hrs to<=64hrs (40-50 marks)**

Evaluation Criteria:

Respective Departmental Anandam mentors are requested to evaluate the project (out of 50) as per the following criteria:

1. Position and exceptions, if any, are clearly stated. The organization of the blog is completely and clearly outlined and implemented.
2. The body of the blog is coherently organized, original and the logic is easy to follow. There is no spelling or grammatical errors and terminology is clearly defined. Writing is clear, concise, and persuasive.
3. Conclusion is clearly stated. The underlying logic is explicit.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Program Name: B.Sc. (Hons.) MICROBIOLOGY

SIXTH SEMESTER

Course Code	Course Title	Category	Lectures(L) Hours per week	Tutorial (T) Hours per week	Practical (P) Hours per week	Total Credits
BSM 601	Bioanalytical Techniques & Statistics	CC	3	-	-	3
BSM 602	Food & Dairy Microbiology	CC	3	-	-	3
BSM 603	Marine Microbiology	CC	3	-	-	3
BSM 650	Educational/ Industrial Tour	NTCC	-	-	-	1
BSM 660	In House Project	CC	-	-	-	16
					TOTAL	**26**

'* One Industrial /Educational Tour can be organized in any Semester of Program and report evaluated will be in Semester VI

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Course Name	Course Code	LTP	Credit	Semester
Bioanalytical Techniques & Statistics	BSM 601	3:0:0	3	6

A. Course Learning Outcomes (CLO)

CLO 1	To enable application of the theories and laws of physics to biological structure and functioning
CLO 2	To understand the principles and working of instruments commonly used to study biological material and for human health care, basic functioning and application of instruments
CLO 3	To understand statistics concepts, theories, and formulae
CLO 4	To be able to utilize the biostatistics tools for applications in the areas of life sciences in general and human health in particular

B. Syllabus

Module I: -

Principles and Applications of Autoclave, Hot air oven, Incubator, Laminar air flow chamber / Biosafety cabinets, BOD incubator, Incinerator.

Module II: -

Principles and Applications of Centrifugation– Low speed, High speed, Ultra centrifuge, lyophilizer., Spectrometry – Colorimetry, Turbidometry, UV & Visible Spectrophotometer, IR, NMR, Mass spectrometry-GCMS, HPLC, FPLC and LCMS. Flame Photometry.

Module III: -

Chromatography – Paper, Thin layer, Column, Ion-exchange, permeation, affinity chromatography, Gas and HPLC. Electrophoresis – SDS – PAGE and Agarose gel electrophoresis, PFGE, Crystallography and X-Ray diffraction

Module IV: -

Nature and scope of statical methods and their limitation. Compilation,classification,tabulation, and application in life science.Graphical representation, measure of average and dispersion mean,medium,mode.

Module V: -

Sampling methods- simple random ,stratified, systematic and cluster sampling procedures. Sampling distribution,Probability, Tests of significancebased on T, Chisquareand F Test Designing and methodology of experiment

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1 Gedder, A. and L. E. Balser, John Wiley and Sons, Principles of applied Biomedical instrumentation.

2. Upadhyay & Upadhyay. Biophysical Chemistry. 2010 Edition. Himalaya Publishing House.

3. Dean, Willard and Merrit, Instrumental Methods of analysis Asian Ed.

4. Fritschen, L. J and L. W. Gay, Springer, Verlag, Environmental Instrumentation, 1979, New York.

5. Boyer, Rodney, F. Benjamin and Cummins, Modern Experimental Biochemistry. 2nd Edition.

6. E.Padmini., Biochemical Calculations and Biostatistics (2007) Books and Allied (P) Ltd., First Edtn.

7. Fundamentals of Biostatistics. Bernard Rosner

8. Biostatistics for medical,nursing and pharmacy students.a.indrayan and L.Satyanarayana.

9. Statistics for Biologists.Campbell.R.C

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Food and Dairy Microbiology	BSM 602	3:0:0	3	6

A. Course Learning Outcomes (CLO)

CLO 1	Introduction of food and dairy Science.
CLO 2	Discuss food & Dairy Microorganisms, food preservation and Food Borne Disease.
CLO 3	Exposure to Food Sanitation & Quality Assurance.

B. Syllabus

Module I: - Micobial Food Spoilage

Intrinsic and extrinsic factors that affect growth and survival of microbes in foods,natural flora and source of contamination of foods in general, chemical changes during food spoilage, Spoilage of vegetables, fruits, meat, eggs, milk and butter, bread, cannedfoods

Module II: - Food preservation

Principles& Methods, physical methods of food preservation: temperature (low, high, canning,drying), irradiation, hydrostatic pressure, high voltage pulse, microwave processingand aseptic packaging, chemical methods of food preservation: salt, sugar, organicacids, SO2, nitrite and nitrates, ethylene oxide, antibiotics, bioactive peptides and bacteriocins

Module III: -Fermented foods

Dairy starter cultures (primary and secondary culture), fermented dairy products: yogurt, acidophilus milk, kumiss, kefir, dahi and cheese, other fermented foods: dosa, sauerkraut, soy sauce and tampeh and probiotics, fermented meat products.

Module IV Food borne diseases

Food intoxications: *Staphylococcus aureus*, *Clostridium botulinum* and mycotoxins;

Food infections: *Bacillus cereus*, *Vibrio parahaemolyticus*, *Escherichia coli*, Salmonellosis, Shigellosis, *Yersinia enterocolitica*, *Listeria monocytogenes* and *Campylobacter jejuni*

Module V: - Food sanitation and control

Treatment and safety of drinking (potable) water, methods to detect potability of water samples: (a) standard qualitative procedure: presumptive test/MPN test, confirmed and completed tests for faecal coliforms (b) Membrane filter technique and (c) Presence/absence tests

HACCP, Indices of food sanitary quality and sanitizers, CODEX, FSSAI guidelines

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1 Adams MR and Moss MO. (1995). *Food Microbiology*. 4th edition, New AgeInternational (P) Limited Publishers, New Delhi, India.

2. Banwart JM. (1987). *Basic Food Microbiology*. 1st edition. CBS Publishers andDistributors, Delhi, India.

3. Davidson PM and Brannen AL. (1993). *Antimicrobials in Foods*. Marcel Dekker,New York.

4. Dillion VM and Board RG. (1996). *Natural Antimicrobial Systems and FoodPreservation*. CAB International, Wallingford, Oxon.

5. Frazier WC and Westhoff DC. (1992). *Food Microbiology*. 3rd edition. TataMcGraw-Hill Publishing Company Ltd, New Delhi, India.

6. Gould GW. (1995). *New Methods of Food Preservation*. Blackie Academic andProfessional, London.

7. Jay JM, Loessner MJ and Golden DA. (2005). *Modern Food Microbiology*. 7thedition, CBS Publishers and Distributors, Delhi, India.

8. Lund BM, Baird Parker AC, and Gould GW. (2000). *The Microbiological Safetyand Quality of Foods*. Vol. 1-2, ASPEN Publication, Gaithersberg, MD.

9. Tortora GJ, Funke BR, and Case CL. (2008). *Microbiology: An Introduction*. 9thedition. Pearson Education.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Marine Microbiology	BSM 603	3:0:0	3	6

A. Course Learning Outcomes (CLO)

CLO 1	Know the basic biology of marine microorganisms and their activities
CLO 2	Understanding the ecological role of marine microorganisms and marine microbial communities
CLO 3	Know the main techniques of modern use necessary for the characterization and study of marine microbes
CLO 4	Apply the principles of marine microbiology to understand the biological phenomena occurring in marine environments.

B. Syllabus

Module I: - Marine Environment

World's oceans & Seas, Physico – Chemical properties of marine water, marine microbial habitat: water column, sediments, costal ecosystems, mangroves salt marshes. Bio-films& Microbial mats. Microbial life at surface of living &non living systems and microbial interactions.

Module II: - Methods in Marine Microbiology

Sampling methods of different habitat of oceans and screening by CLSM & FCM. Importance of Culturable & non Culturable microorganisms. Molecular tools to study marine diversity.

Module III: - Role of Microbes in ocean processes

Bio-Energetics, Carbon & Nitrogen cycling in ocean, Photosynthesis and Primary productivity. Eutrophication of coastal areas. Microbial loop in ocean food web. Microbial processes and climate change. Bio – fouling & bio – deterioration, indicator organisms and pollution control. Symbiosis of microalgae with animals : Chemoautotrophic prokaryotes with animals. Symbionts of sponges, mixotrophy in protists. Metabolic consortia and mutualism between prokaryotes.

Module IV: - Recent trends in Marine Microbiology

Biodegradation and Bioremediation of marine pollutants (oil, Organic comp. etc.). Recently identified microorganisms of marine ecosystem, there applications in present and future industries

Examination Scheme:

Components	CT	Assignment	Project	Case Study	Attendance	EE
Weightage (%)	15	10	10	10	5	50

Suggested Readings

1 1. Munn, C. 2011. Marine Microbiology: Ecology and Applications. GS Publications. PP- 648

2. Sekwon Kim. 2013. Marine Microbiology: Bioactive compounds and Biotechnological applications. Wiley VCH.

3. Paul, J. 2001. Marine Microbiology. Academic Press. PP-666.

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AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
Industrial Tour/Educational Tour	BSM 650	NTCC	1	6

A. Course Learning Outcomes (CLO)

CLO 1	To expose the students for industrial functioning
CLO 2	To understand the process of quality control and quality assurance
CLO 3	To understand the process of product research

B. Syllabus

The tour report comprises the day wise report and learning outcome

Course objectives

A term (or research) paper is primarily a record of intelligent reading in several sources on a particular subject.

The students will choose the topic at the beginning of the session in consultation with the faculty assigned. The progress of the paper will be monitored regularly by the faculty. At the end of the semester the detailed paper on the topic will be submitted to the faculty assigned. The evaluation will be done by Board of examiners comprising of the faculties.

GUIDELINES FOR TERM PAPER

The procedure for writing a term paper may consist of the following steps:

7. Choosing a subject
8. Finding sources of materials
9. Collecting the notes
10. Outlining the paper
11. Writing the first draft
12. Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

d) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.

e) Begin by making a list of subject-headings under which you might expect the subject to be listed.

f) The sources could be books and magazine articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

d) Get facts, not just opinions. Compare the facts with author's conclusion.

e) In research studies, notice the methods and procedures, results & conclusions.

f) Check cross references.

4. Outlining the paper

c) Review notes to find main sub-divisions of the subject.

d) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose

b) main body of the paper

c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main idea.

6. Editing &preparing the final Paper

g) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of

a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.

h) Read the paper to ensure that the language is not awkward, and that it "flows" properly.

i) Check for proper spelling, phrasing and sentence construction.

j) Check for proper form on footnotes, quotes, and punctuation.

k) Check to see that quotations serve one of the following purposes:

(iv) Show evidence of what an author has said.

(v) Avoid misrepresentation through restatement.

(vi) Save unnecessary writing when ideas have been well expressed by the original author.

l) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

8) Title page
9) Table of contents
10) Introduction
11) Review
12) Discussion&Conclusion
13) References
14) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

5. summary of question posed
6. summary of findings

7. summary of main limitations of the study at hand
8. details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.

The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited volumes

Gass, S./ Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.

[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic journal articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment [HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished theses/ dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation	**40%**
(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)	
Final Evaluation	**60%**
(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the	

research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)

AMITY UNIVERSITY
RAJASTHAN

AMITY INSTITUTE OF MICROBIAL TECHNOLOGY (AIMT)

Course Name	Course Code	LTP	Credit	Semester
In-House project/Dissertation	BSM 660	CC	16	6

A. Course Learning Outcomes (CLO)

CLO 1	To perform the project work in assigned laboratory
CLO 2	To understand the importance of the scientific ethics
CLO 3	To study the statistical tools and techniques

B. Syllabus

The planning, execution, observations and preparation of scientific report leading to the viva voce.

GUIDELINES FOR PROJECT REPORT

The procedure for writing a term paper may consist of the following steps:

13. Choosing a subject
14. Finding sources of materials
15. Collecting the notes
16. Outlining the paper
17. Writing the first draft
18. Editing & preparing the final paper

1. Choosing a Subject

The subject chosen should not be too general.

2. Finding Sources of materials

g) The material sources should be not more than 10 years old unless the nature of the paper is such that it involves examining older writings from a historical point of view.

h) Begin by making a list of subject-headings under which you might expect the subject to be listed.

i) The sources could be books and magazine articles, news stories, periodicals, scientific journals etc.

3. Collecting the notes

Skim through sources, locating the useful material, then make good notes of it, including quotes and information for footnotes.

g) Get facts, not just opinions. Compare the facts with author's conclusion.

h) In research studies, notice the methods and procedures, results & conclusions.

i) Check cross references.

4. Outlining the paper

e) Review notes to find main sub-divisions of the subject.

f) Sort the collected material again under each main division to find sub-sections for outline so that it begins to look more coherent and takes on a definite structure. If it does not, try going back and sorting again for main divisions, to see if another general pattern is possible.

5. Writing the first draft

Write the paper around the outline, being sure that you indicate in the first part of the paper what its purpose is. You may follow the following:

a) statement of purpose

b) main body of the paper

c) statement of summary and conclusion

Avoid short, bumpy sentences and long straggling sentences with more than one main idea.

6. Editing &preparing the final Paper

m) Before writing a term paper, you should ensure you have a question which you attempt to answer in your paper. This question should be kept in mind throughout the paper. Include only information/ details/ analyses of relevance to the question at hand. Sometimes, the relevance of a particular section may be clear to you but not to your readers. To avoid this, ensure you briefly explain the relevance of every section.

n) Read the paper to ensure that the language is not awkward, and that it "flows" properly.

o) Check for proper spelling, phrasing and sentence construction.

p) Check for proper form on footnotes, quotes, and punctuation.

q) Check to see that quotations serve one of the following purposes:

(vii) Show evidence of what an author has said.

(viii) Avoid misrepresentation through restatement.

(ix) Save unnecessary writing when ideas have been well expressed by the original author.

r) Check for proper form on tables and graphs. Be certain that any table or graph is self-explanatory.

Term papers should be composed of the following sections:

15) Title page
16) Table of contents
17) Introduction
18) Review
19) Discussion&Conclusion
20) References
21) Appendix

Generally, the introduction, discussion, conclusion and bibliography part should account for a third of the paper and the review part should be two thirds of the paper.

Discussion

The discussion section either follows the results or may alternatively be integrated in the results section. The section should consist of a discussion of the results of the study focusing on the question posed in the research paper.

Conclusion

The conclusion is often thought of as the easiest part of the paper but should by no means be disregarded. There are a number of key components which should not be omitted. These include:

9. summary of question posed
10. summary of findings
11. summary of main limitations of the study at hand
12. details of possibilities for related future research

References

From the very beginning of a research project, you should be careful to note all details of articles gathered.

The bibliography should contain ALL references included in the paper. References not included in the text in any form should NOT be included in the bibliography.
The key to a good bibliography is consistency. Choose a particular convention and stick to this.

Conventions

Monographs

Crystal, D. (2001), Language and the internet. Cambridge: Cambridge University Press.

Edited volumes

Gass, S./ Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter.
[(eds.) is used when there is more than one editor; and (ed.) where there is only one editor. In German the abbreviation used is (Hrsg.) for Herausgeber].

Edited articles

Schmidt, R./Shimura, A./Wang, Z./Jeong, H. (1996), Suggestions to buy: Television commercials from the U.S., Japan, China, and Korea. In: Gass, S./Neu, J. (eds.) (1996), Speech acts across cultures. Challenges to communication in a second language. Berlin/ NY: Mouton de Gruyter: 285-316.

Journal articles

McQuarrie, E.F./Mick, D.G. (1992), On resonance: A critical pluralistic inquiry into advertising rhetoric. Journal of consumer research 19, 180-197.

Electronic book

Chandler, D. (1994), Semiotics for beginners [HTML document]. Retrieved [5.10.'01] from the World Wide Web, http://www.aber.ac.uk/media/Documents/S4B/.

Electronic journal articles

Watts, S. (2000) Teaching talk: Should students learn 'real German'? [HTML document]. German as a Foreign Language Journal [online] 1. Retrieved [12.09.'00] from the World Wide Web, http://www.gfl-journal.com/.

Other websites

Verterhus, S.A. (n.y.), Anglicisms in German car advertising. The problem of gender assignment

[HTML document]. Retrieved [13.10.'01] from the World Wide Web, http://olaf.hiof.no/~sverrev/eng.html.

Unpublished papers

Takahashi, S./DuFon, M.A. (1989), Cross-linguistic influence in indirectness: The case of English directives performed by native Japanese speakers. Unpublished paper, Department of English as a Second Language, University of Hawai'i at Manoa, Honolulu.

Unpublished theses/ dissertations

Möhl, S. (1996), Alltagssituationen im interkulturellen Vergleich: Realisierung von Kritik und Ablehnung im Deutschen und Englischen. Unpublished MA thesis, University of Hamburg.

Walsh, R. (1995), Language development and the year abroad: A study of oral grammatical accuracy amongst adult learners of German as a foreign language. Unpublished PhD dissertation, University College Dublin.

Appendix

The appendix should be used for data collected (e.g. questionnaires, transcripts, ...) and for tables and graphs not included in the main text due to their subsidiary nature or to space constraints in the main text.

Assessment Scheme:

Continuous Evaluation	**40%**
(Based on abstract writing, interim draft, general approach, research orientation, readings undertaken etc.)	
Final Evaluation	**60%**
(Based on the organization of the paper, objectives/ problem profile/ issue outlining, comprehensiveness of the research, flow of the idea/ ideas, relevance of material used/ presented, outcomes vs. objectives, presentation/ viva etc.)	