Master of Technology (Biotechnology)

Programme Code: MTB

Duration – 2 Years Full Time

Programme Structure
And
Curriculum & Scheme of Examination

2010

AMITY UNIVERSITY UTTAR PRADESH
GAUTAM BUDDHA NAGAR
PREAMBLE

Amity University aims to achieve academic excellence by providing multi-faceted education to students and encourage them to reach the pinnacle of success. The University has designed a system that would provide rigorous academic programme with necessary skills to enable them to excel in their careers.

This booklet contains the Programme Structure, the Detailed Curriculum and the Scheme of Examination. The Programme Structure includes the courses (Core and Elective), arranged semester wise. The importance of each course is defined in terms of credits attached to it. The credit units attached to each course has been further defined in terms of contact hours i.e. Lecture Hours (L), Tutorial Hours (T), Practical Hours (P). Towards earning credits in terms of contact hours, 1 Lecture and 1 Tutorial per week are rated as 1 credit each and 2 Practical hours per week are rated as 1 credit. Thus, for example, an L-T-P structure of 3-0-0 will have 3 credits, 3-1-0 will have 4 credits, and 3-1-2 will have 5 credits.

The Curriculum and Scheme of Examination of each course includes the course objectives, course contents, scheme of examination and the list of text and references. The scheme of examination defines the various components of evaluation and the weightage attached to each component. The different codes used for the components of evaluation and the weightage attached to them are:

<table>
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<tr>
<th>Components</th>
<th>Codes</th>
<th>Weightage (%)</th>
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<td>Home Assignment</td>
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It is hoped that it will help the students study in a planned and a structured manner and promote effective learning. Wishing you an intellectually stimulating stay at Amity University.

July, 2010
PROGRAMME OBJECTIVE

Biotechnology is the technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use. The main objective of this programme is to provide a balanced and comprehensive knowledge of the basic as well as applied sciences related to Biotechnology that would enhance the basic aptitude of each student and prepare them to take up the challenges in the varied and multifaceted applications of Biotechnology. It will empower the students with the latest tools, techniques and awareness in biotechnology and will facilitate comprehensive learning combining the scientific and technological aspects.
# PROGRAMME STRUCTURE

## FIRST SEMESTER

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Lecture (L) Hours Per Week</th>
<th>Tutorial (T) Hours Per Week</th>
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## SECOND SEMESTER

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## SUMMER PROJECT: 8 - 10 WEEKS

## THIRD SEMESTER

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<th>Course Code</th>
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### Elective - II (any one)
- Pollution Prevention Fundamentals
- Drug Delivery Systems
- Bio-energy Engineering
- Advanced Food Technology
- Industrial Safety & Management
- Advanced Animal & Plant Cell Technology

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**TOTAL** 37

### FOURTH SEMESTER

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<td>MTB 402</td>
<td>Pharmaceutical Technology</td>
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<td>Bioprocess Plant Design</td>
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<td>MTB 460</td>
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**TOTAL** 40
Curriculum & Scheme of Examination

BIOCHEMISTRY AND METABOLIC REGULATION

Course Code: MTB 101        Credit Units: 04

Course Objective:
The objectives of the Metabolic Biochemistry course are to provide a comprehensive understanding of human metabolism in areas of enzymology and protein structure and function; energy releasing and energy consuming metabolic processes; the regulation of synthesis and breakdown of sugars, lipids, nucleic acids, and amino acids which is necessary for further work in the biochemical/biomedical and biotechnology areas.

Course Contents:

Module I
Structure of Biomolecules, Metabolism of Carbohydrates, Lipids, Proteins, Amino acids and Nucleic acids.

Module II
Photosynthesis in Microorganisms; Role of chlorophylls, carotenoids and phycobilins; Calvin cycle; Chemolithotrophy; hydrogen-iron-nitrite-oxidizing bacteria; nitrate and sulfate reduction; methanogenesis and acetogenesis; Bacterial fermentations.

Module III: Modes of Regulation
Different levels of regulation - protein synthesis/degradation, allosteric regulation, reversible covalent modification, proteolytic processing, Requirements for ATP in synthesis and degradation cycle, Reversibility of the different methods of regulation, Consequences of misregulation

Module IV: Regulation of metabolic pathways
Glycolysis/glycogenolysis, Phosphogluconate/Citric Acid Cycle, Oxidative Phosphorylation, Fatty acid oxidation, Fatty Acid Biosynthesis, Amino Acid Oxidation, Regulation of Metabolism for the production of Primary and Secondary Metabolites with case studies

Examination Scheme:

<table>
<thead>
<tr>
<th>Components</th>
<th>CT</th>
<th>Attendance</th>
<th>Assignment/Project/ Seminar/Quiz</th>
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<td>Weightage (%)</td>
<td>15</td>
<td>5</td>
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</table>

Text & References:

Text:
- Principles of Biochemistry by A. Lehninger revised by Nelson and Cox.

References:
- “Biochemistry” by White, Handler and R.B. Smith 7th Ed. 1983
- Biochemistry by Voet and Voet.
- Fundamentals of Biochemistry by Conn and Stumph.
ADVANCED MICROBIAL TECHNOLOGY

Course Objective:
An introduction to microorganisms, their morphology, reproduction, cultivation, metabolism, genetics, ecology of microorganisms and their relationships to health and environment

Course Contents:

Module I
Introduction (bacteria, fungi, algae, protozoa and viruses), Contribution of Scientists, Koch’s Postulates, methods in Microbiology - Principles of microbial nutrition, Culture media, Theory and practice of sterilization, pure culture techniques, Enrichment culture techniques and Microbial lab techniques.

Module II
Prokaryotic structure and function - Microbial nutrition and growth - Arithmatic and Geomatric Growth expression, mathematical expression of growth, growth curve, measurement of growth and growth yields, synchronous growth, continuous culture, Diauxic growth, culture collection and maintenance of cultures.

Module III
Microbial evolution, systematics and taxonomy - new approaches to bacterial taxonomy, classification including ribotyping, characteristics of primary domains, taxonomy, nomenclature and Bergey's manual, ribosomal RNA sequencing, microbial regulation of gene expression (attenuation and negative regulation with e.g. trp and lac operon), transfer of genetic material: plasmids, transposons, transduction, transformation and conjugation.

Module IV
Host-parasite relationship - Normal micro flora of skin, oral cavity, gastrointestinal tract; entry of pathogens into the host, types of toxins (Exo, endo, entro) and their mode of actions, Plant - Microbe Interactions, Microbial pathogenesis - Disease reservoirs; Epidemiological terminologies; Infectious disease transmission

Module V
Chemotherapy/antibiotics - Antimicrobial agents, sulfa drugs, antibiotics - penicillin and cephalosporins, broad spectrum antibiotics, antibiotics from prokaryotes. antifungal antibiotics; mode of action, resistance to antibiotics

Examination Scheme:

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<tr>
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<th>CT</th>
<th>Attendance</th>
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<td>Weightage (%)</td>
<td>15</td>
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<td>10</td>
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</table>

Text & References:

Text:
- Microbiology by Prescott.

References:
- General Microbiology, R.Y. Stanier, J.L. Ingraham, M.L. Wheelis and P.R. Painter, Macmillian
- Principles of Microbiology, R.M. Atlas, Wm C. Brown Publisher.
- The microbes – An Introduction to their Nature and Importance, P.V. Vandenmark and B.L. Batzing, Benjamin Cummings.
- The Microbial World, Roger Y. Stanier, Prentice Hall
- Microbiology, Tortora, Funke and Chase, Benjamin & Cummings
INSTRUMENTATION IN BIOTECHNOLOGY

Course Code: MTB 103 Credit Units: 04

Course Objective:
To demonstrate a thorough knowledge of the equipment and operating modes of instrumentation systems used in the area of biotechnology and critically discuss the limitations and biohazards of the equipment and techniques employed in biotechnology.

Course Contents:

Module I: Ultracentrifugation
Sedimentation equilibrium and sedimentation velocity methods, Analytical and Preparative centrifuges, application of density gradient and differential centrifugation.

Module II: Gel electrophoresis
Agarose and Polyacrylamide, Two-dimensional electrophoresis, Isoelectric focussing, Capillary electrophoresis, Pulse-field gel electrophoresis, Immunoelectrophoresis.

Module III
TLC gas chromatography, gel filtration, ion-exchange chromatography, affinity chromatography and HPLC, FPLC.

Module IV

Module V

Module VI
Radio tracers, GM Counter, Proportional and Scintillation Counters, Autoradiography, Radio-immunoassay.

Examination Scheme:

<table>
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<th>Components</th>
<th>CT</th>
<th>Attendance</th>
<th>Assignment/Project/Seminar/Quiz</th>
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Text & References:

Text:
- Practical Biochemistry, Principles & Techniques” by Keith Wilson and John Walker.
- Biophysical Chemistry by David Friefelder.

References:
- “Microscopic Techniques in Biotechnology” by Michael Hoppert
- “Principles & Practice of Bioanalysis” by Richard F. Venn
- “Advanced Instrumentation, Data Interpretation, and Control of Biotechnological Processes” by J.F. Van Impe, Kluwer Academic
- “Crystal Structure Analysis” by J.P. Glusker and K.N. Trueblood, Oxford University Press
- “Crystallography made Crystal Clear” by G. Rhodes, Academic Press
- “NMR Spectroscopy: Basic Principles, Concepts and Applications in Chemistry” by H. Gunter, John Wiley and Sons Ltd.
BIOINFORMATICS

Course Code:          MTB 104      Credit Units: 04

Course Objective:
The objective is to describe data models and database management systems with an emphasis on biologically important techniques to store various data on DNA sequencing structures, genetic mapping, phylogenetic analysis. Multiple sequence alignment, protein structure prediction, and comparative genome analysis.

Course Contents:

Module I: Introduction and overview
The NCBI, sequence databases, sequence retrieval, sequence file formats, submitting DNA, protein sequences and sequence assembly.

Module II
Exact string matching -classical comparison based methods, semi numerical string matching, suffix trees - construction and application, Databases and rapid sequence analysis – Blast and Fasta, sequence comparison by statistical content; Dynamic programming alignment - The number of alignments, shortest and longest paths in a network, global distance and similarity alignments, Fitting one sequence onto the other, trace backs, parametric sequence comparison

Module III
Global and local alignments, scoring matrices-pam and blosum and gap penalties, filtering, position specific scoring matrices, internet resources, uses of multiple sequence alignment programs and methods pattern searching programs, family and superfamily representation & profit analysis.

Module IV
Trees-representation of sequences, tree interpretation, Distance – additive, ultrameric and nonadditive distances, tree building methods, phylogenetic analysis, parsimony, Bootstrap, maximum likelihood trees, estimating the rate of change, likelihood and trees; analysis software.

Module V
Annotation, ESTs – databases, comparative genome analysis clustering, gene discovery, protein identification, physical properties, motifs and patterns, structure, folding classes, structure classification; Structure databases–PDB and MMDB, visualizing structural information, Docking of Molecules, structure prediction in proteins, prediction of buried residues in proteins, RNA secondary structure – minimum free-energy structures, Genome analysis, genome rearrangements with inversions, gene identification, gene expression, expression analysis, gene identification and functional classification.

Examination Scheme:

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</table>

Text & References:

Text:
- Essentials of Genomics and Bioinformatics by C.W. Sensen, John Wiley and Sons
- Bioinformatics: Sequence and Genome Analysis by D.W. Mount, Cold Spring Harbor Laboratory Press.

References:
- Essentials of Genomics and Bioinformatics C.W. Sensen, John Wiley and Sons Inc.
• Introduction to Computational Biology: Maps, Sequences and Genomes by M. Waterman, Chapman and Hall
• Sequence Analysis in Molecular Biology: Treasure Trove or Trivial Pursuit by G. V. Heijne and G.V. Heijne, Academic Press
BIOCHEMISTRY LAB

Course Code: MTB 120
Credit Units: 02

Course Contents:

Module I: Proteins
Identification of protein by Biuret test, quantitation of protein by Bradford method, Separation of proteins by SDS-PAGE, Enzyme: Determination of serum alkaline phosphatase activity

Module II: Nucleic Acid
Biochemical estimation of DNA, RNA. Separation of DNA samples on Agarose gel.
Carbohydrate: Color reactions of different type of carbohydrates, Biochemical estimation of blood sugar
Lipids: Blood Cholesterol estimation.

Examination Scheme:

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Note: Minor variation could be there depending on the examiner.
Course Code: MTB 121  Credit Units: 02

Course Contents:

Module I
Preparation of culture media for cultivation of specific microorganism. Isolation of microbes from air, soil and water samples, their identification by staining techniques – simple staining, differential Gram staining, lactophenol cotton blue staining for fungi.

Module II
Biochemical test – Indole test, methyl red test, voges proskauer test, citrate utilization, starch hydrolysis, protease, catalase test and oxidase test. Identification of microbes in water samples; standard plate count, presumptive and confirmed coli form test, BOD and COD.

Examination Scheme:

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Note: Minor variation could be there depending on the examiner.
Course Objective:
To demonstrate the techniques used in the biotechnology for purification, characterization and identification of the proteins and other biotechnologically important products

Course Contents:

Module I: Cell disruption techniques
homogenization, sonication

Module II
Centrifugation – low speed and high speed.

Module III: Spectrophotometer techniques
Visible and UV spectrophotometry

Module IV
Chromatography-ion exchange, gel filtration and affinity columns, fraction collection, monitoring UV absorbance. Applications in enzyme purification.

Module V
Techniques for removal of salt/solvent from a sample - desalting, dialysis, ultrafiltration, speedvac, lyophilization etc.

Module VI
Electrophoresis –1 D (Polyacrylamide gel electrophoresis and agarose) and 2D. Isoelectric focusing.

Module VII
Polarization and fluorescence microscopy

Examination Scheme:

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Note: Minor variation could be there depending on the examiner.
BIOINFORMATICS LAB

Course Code: MTB 123       Credit Units: 01

Course Objective:
To demonstrate the techniques and soft wares used for sequence analysis, alignment, structure prediction of the proteins and other compounds and finding the phylogenetic relationships

Course Contents:

Module I
Basics of sequence analysis Retrieving a sequence-nucleic acid/Protein

Module II
Local and Global Alignment- concepts Pair wise sequence alignment, multiple sequence alignment
Dynamic Programming – Smith Watermann Algorithm Needleman Wunsch Algorithm

Module III
Motif and pattern searching, Structure prediction, Protein structure classification resources, Structure superposition tools, Energy minimization and simulated annealing

Module IV
Phylogenetic prediction and analysis

Module V
Docking small molecules/peptides in active site of protein. Use of automated docking procedures. Free energy calculation.

Module VI
Finding transcription regulatory signals

Examination Scheme:

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Note: Minor variation could be there depending on the examiner.
COMMUNICATION SKILLS – I

Course Code: MTB 141      Credit Units: 01

Course Objective:
The Course is designed to give an overview of the four broad categories of English Communication thereby enhance the learners’ communicative competence.

Course Contents:

Module I: Listening Skills
Effective Listening: Principles and Barriers
Listening Comprehension on International Standards

Module II: Speaking Skills
Pronunciation and Accent
Reading excerpts from news dailies & magazines
Narrating Incident; Story telling.
Extempore & Role Plays

Module III: Reading Skills
Vocabulary: Synonyms, antonyms, diminutives, homonyms, homophones
Idioms & phrases
Foreign words in English

Module IV: Writing Skills
Writing Paragraphs
Précis Writing
Letter writing
Coherence and structure
Essay writing

Module V: Activities
News reading
Picture reading
Movie magic
Announcements

Examination Scheme:

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</tbody>
</table>

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

Text & References:

- Working in English, Jones, Cambridge
- Business Communication, Raman – Prakash, Oxford
- Speaking Personally, Porter-Ladousse, Cambridge
- Speaking Effectively, Jermy Comfort, et.al, Cambridge
BEHAVIOURAL SCIENCE - I  
(SELF-DEVELOPMENT AND INTERPERSONAL SKILLS)

Course Code: MTB 143  
Credit Units: 01

Course Objective:  
This course aims at imparting an understanding of:  
Self and the process of self exploration  
Learning strategies for development of a healthy self esteem  
Importance of attitudes and their effect on work behaviour  
Effective management of emotions and building interpersonal competence.

Course Contents:  

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

Text & References:  
- Towers, Marc: Self Esteem, 1st Edition 1997, American Media  
• Covey, R. Stephen: Seven habits of Highly Effective People, 1992 Edition, Simon & Schuster Ltd.
• Dr. Dinkmeyer Don, Dr. Losoney Lewis, The Skills of Encouragement: St. Lucie Press.
Course Code: MTB 144  Credit Units: 02

Course Objective:  
To familiarize the students with the French language  
• with the phonetic system  
• with the syntax  
• with the manners  
• with the cultural aspects

Course Contents:  

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. futur proche

Examination Scheme:

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C – Project + Presentation  
I – Interaction/Conversation Practice

Text & References:  

• le livre à suivre : Campus: Tome 1
GERMAN - I

Course Code: MTB 145  Credit Units: 02

Course Objective:
To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Course Contents:

Module I: Introduction
Self introduction: heissen, kommen, wohnen, 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 Diphongs

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.

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</table>

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
SPANISH – I

Course Code: MTB 146      Credit Units: 02

Course Objective:
To enable students acquire the relevance of the Spanish language in today’s global context, how to greet each other. How to present / introduce each other using basic verbs and vocabulary

Course Contents:

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 llamar 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 ‘Llamar’. 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.

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C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras
Course Objective:
To enable the students to learn the basic rules of grammar and Japanese language to be used in daily life that will later help them to strengthen their language.

Course Contents:

Module I: Salutations
Self-introduction, Asking and answering to small general questions

Module II: Cardinal Numbers
Numerals, Expression of time and period, Days, months

Module III: Tenses
Present Tense, Future tense

Module IV: Prepositions
Particles, possession, Forming questions

Module V: Demonstratives
Interrogatives, pronoun and adjectives

Module VI: Description
Common phrases, Adjectives to describe a person

Module VII: Schedule
Time Table, everyday routine etc.

Module VIII: Outings
Going to see a movie, party, friend’s house etc.

Learning Outcome
➢ Students can speak the basic language describing above mentioned topics

Methods of Private study /Self help
➢ Handouts, audio-aids, and self-do assignments and role-plays will support classroom teaching

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C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

Text:
➢ Teach yourself Japanese.

References:
➢ Shin Nihongo no kiso 1
CHINESE – I

Course Objective:
There are many dialects spoken in China, but the language which will help you through wherever you go is Mandarin, or Putonghua, as it is called in Chinese. The most widely spoken forms of Chinese are Mandarin, Cantonese, Gan, Hakka, Min, Wu and Xiang. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

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.

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C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- “Elementary Chinese Reader Part I” Lesson 1-10
CELL AND MOLECULAR BIOLOGY

Course Code: MTB 201 Credit Units: 04

Course Objective:
The object of the present course is to develop basic knowledge and skills in cell and molecular biology and to understand the structure and function of the cellular and sub cellular components of cells and tissues with the help of recent techniques. This course will help students to get an understanding of cell function at the molecular level including the fundamentals of DNA. They will become aware of the complexity and harmony of the cell. Applications of cellular and molecular biology in Biotechnology will also be presented.

Course Contents:

Module I
Protein targeting - Chemical and physical properties of cell membranes and their major components, significance of these properties to membrane structure, integral and peripheral membrane proteins, biosynthesis of membrane and secreted proteins; targeting of proteins to membranes.

Module II
Membrane transport/Cell Cycle - Mechanisms for transport of small molecules across the membrane, including simple diffusion, facilitative diffusion, primary and secondary active transport, action of ionophores. Cell cycle and the events associated with each stage, control of the cell cycle and the proteins involved; know the role of the cyclins and cyclin-dependent kinases, cell cycle checkpoints, methods for synchronizing the cell cycle in cell populations.

Module III
Intracellular Signaling I - define growth, growth factor, growth factor receptor, mitogen, receptor, effector, second messenger, action of hormones and other biologically active agents that act via receptors in the nucleus and/or cytoplasm. Intracellular Signaling II - the intracellular signaling cascades triggered by hormone binding to these receptor, G proteins signalling, the action of Ca²⁺ and diacylglycerol as second messengers.

Module IV: Replication
Replication of DNA, Role of DNA polymerases & proteins involved in DNA replication, Compare and contrast eukaryote and prokaryote DNA replication, telomeres, telomerase and altered telomerase function in aging and disease.


Module V
Transcription - RNA transcription and the proteins required for each step, maturation of the RNA transcript derived from a eukaryotic gene, structure of prokaryote and eukaryote promoter and the function of promoter sequences, inhibitors of prokaryote and eukaryote transcription and their mechanisms of action. Concept of operon, inducer, operator and polycistronic transcript, expression of the lac operon and trp operon in E. coli, catabolite repression, leader peptide and attenuator site, enhancer and transcription factors, four common DNA-binding motifs found in transcription factors, mRNA stability and alternative splicing in gene expression.

Module VI: Translation
Genetic code and the concept of colinearity of the gene and protein, components required for translation, basic steps involved in initiation, elongation, and termination of protein translation, inhibitors of protein translation. Compare and contrast the spatial and temporal differences in prokaryotic and eukaryotic transcription and translation.

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Text & References:

Text:
- Molecular Cell Biology by Bruce Albert
- Molecular Biology by Lodish Darnell and Baltimore

References:
- Genes VIII by Benjamin Lewis
- Genetics by Ursula Goodenough
- Cytogenetics by l Garl P. Swanson, Mertz & Young
- Biochemistry by Stryer
- Genome by T.A. Brown, John Willey and Sons Inc.
RECOMBINANT DNA TECHNOLOGY

Course Code: MTB 202      Credit Units: 04

Course Objective:
A complete understanding of molecular techniques like DNA sequencing, restriction mapping, PCR for the cloning and expression of genes implication can be obtained through the course. The successful application of biotechnology largely depends on these advanced molecular techniques.

Course Contents:

Module I
Basic tools, specialized enzymes and specialized cloning vectors (e.g. Antarctic Phosphatase), Specialized cloning vectors (e.g. TOPO, TA, Gateway)

Module II: Gene isolation
Expression libraries and their screening, Techniques for analysis of genomic libraries (e.g. 3’ RACE, 5’ RACE, chromosome walking, chromosome jumping), T-DNA and transposon mediated gene traps

Module III: Heterologous gene expression (bacteria and yeast)
Advances in engineering of genes (codon optimization, translational enhancers, mRNA stabilizing factors), vectors (targeting signals, selection markers, purification and solubility tags) and hosts for overexpression and analysis

Module IV: Studying gene regulation and control
In-vitro transcription translation, run-on assays, protein-protein and protein-DNA interactions, promoter characterization, differential display. Manipulation of gene expression: Genome wide mutagenesis, gene silencing, RNAi, aptamers, constitutive and tissue specific promoters, expression enhancing elements, terminator technology

Module V: Automation and robotic advances in RDT
DNA & protein isolation (alternatives to conventional methods) and sequencing (example from Human Genome Project and other sequencing projects), PCR machines, imaging and gel documentation

Module VI: Laboratory, industrial and environmental applications of RDT
High throughput research, disease diagnosis and cure, forensics, DNA vaccines, drug discovery, maintaining genetic diversity, transgenic technology, marker-free GMOs

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Text & References:

Text:
- Recombinant DNA by J.D. Watson et al., W.H. Freeman and Company
- Recombinant DNA Technology by T. A. Brown
- Genes to Clone by Winnaker

References:
BIOPROCESS TECHNOLOGY

Course Code: MTB 203      Credit Units: 04

Course Objective:
The present course aims to aware about the requirements for large-scale cultivation of microbes for production of industrially important products with purification and characterization of these bioproducts using different techniques.

Course Contents:

Module I
Introduction to Bioprocess Technology, Microbial growth kinetics-batch, continuous, cell recycle & fed- batch.

Module II
Substrates for bioconversion processes and design of media, sterilization; Cell culture techniques; Inoculum development and aseptic transfers. Bioreactors – CSTR, CSTR in series , tower, loops, airlift bubble column & packed bed. Different types of pumps, valves, and line materials, piping convections etc. used in Biochemical Processes

Module III
Process technology for the production of primary metabolites, e.g. Baker’s yeast, ethanol, citric acid, amino acids (lysine and glutamic acid). Microbial production of industrial enzymes (glucose isomerase, cellulase, amylase, lipase, protease) and secondary metabolites (penicillins, cephalosporins and streptomycin). Biomass (SCP and mushroom) production from agro-residues.

Ethanol: production by batch, continuous and cell recycle adopted by various technologies practiced in Indian distilleries using molasses and grains computation of fermentation efficiency, distillation efficiency and overall efficiency of ethanol production, recovery, uses, glucose effect etc. power alcohol – definition , uses, merits and demerits of various technologies for its production.

Antibiotics: Classification, penicillin, tetracycline, streptomycin, cephalosporin. Various penicillin as precursor and ‘R’ – side chain, penicillinase, 6-APA, penicillin production, harvest and recovery , uses of various forms etc.

Streptomycin – chemical structure, production, harvest and recovery, use, by-product of streptomycin fermentation etc.

Amino Acid: Genetic Control of metabolic pathway.

Lysine: Indirect and direct fermentation – mechanism of ph of metabolic block in accumulation of L- lysine by inhibition and repression mechanism.

Glutamic Acid: Direct Fermentation, contribution of feed back control and regulation of cell permeability barrier for production.

Biomass: Bakers and distillers yeast production using various raw materials, “bios” factors for growth, Crabtree effect, harvesting, different forms and uses.

What are mushroom, different forms of common mushroom production from agro based raw materials and uses.

Module IV
Characteristics of bioproducts, Conditioning of broth, Mechanical separation, Filtration, Centrifugation, Cell disruption techniques, Protein precipitation and separation.

Examination Scheme:

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</table>

Text & References:

Text:
- Principles of Fermentation Technology, P.F. Stanbury and A. Whitaker, Pergamon Press.
- Bioseparations: Downstream Processing for Biotechnology, P.A. Belter et al, John Wiley and Sons Inc.

References:
- Biochemical Engineering, S. Aiba, A.E. Humphrey and N.F. Millis, University of Tokyo Press.
• Process Engineering in Biotechnology, A.T. Jackson, Prentice Hall.
• Practical Biochemistry, Principles & Techniques, Keith Wilson and John Walker.
• Chromatographic and Membrane Processes in Biotechnology, C.A. Costa and J.S. Cabral, Kluwer Academic Publisher.
• Downstream Processing, J.P. Hamel, J.B. Hunter and S.K. Sikdar, American Chemical Society
• Protein Purification, M.R. Lodisch, R.C. Wilson, C.C. Painton and S.E. Builder, American Chemical Society.
ARTIFICIAL NEURAL NETWORKS

Course Code: MTB 204      Credit Units: 04

Course Objective:
This course will enable the students to gain knowledge about a relatively newer area of science. The course is designed to model the different technical properties, applications, besides the closely related aspects of artificial neural networks.

Course Contents:

Module I
Historical background, Why is learning hard?

Module II
Memorization, generalization and function approximation, Linear Associators, Perceptrons and Capacity, Multilayer neural networks, Maximum Likelihood and Gradient Descent learning, Stochastic gradient descent for supervised learning.

Module III
The back propagation algorithm, Aspects of Learning Theory and Generalization, Bias vs. variance, Overtraining, pruning and regularization, VC dimension and how much data is enough?.

Module IV
Neural networks and analog VLSI, Selected Applications.

Examination Scheme:

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Text & References:

Text:
- Neural Networks: A Comprehensive Foundation by S. Haykin, Prentice Hall.

References:
- Neural Networks for Pattern Recognition by C. Bishop, Oxford University Press.
BIOSENSORS

Course Code: MTB 205 Credit Units: 04

Course Objective:
On completion of the module students should be able to Appreciate the basic configuration and distinction among biosensor systems, To gain an understanding of general biosensor principles and terms, To be able to design, model, simulate, fabricate, and test a biosensor, To gain an overall knowledge of biosensor types, applications, requirements, and capabilities to allow improved interaction with physicians, clinicians, and biomedical engineers, and to enable the student to conduct biomedical engineering research.

Course Contents:

Module I
Introduction to MEMS

Module II: Biosensors

Module III: Biomedical sensors
Sensors and transducers: an overview, measurement systems, Classification of Biomedical sensors and transducers, who do we need Biomedical sensors and Transducers? Important Design considerations and system calibration, the future of Biosensors and Transducers, Sensing Layer: The importance of computers in sensors and Transducer technology, Recent Engineering Solutions to Health care using Biosensors and Transducers, Modern health care solutions.

Examination Scheme:

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Text & References:

Text:
- Chemical Sensors and Biosensors by B.R. Eggins, John Wiley and Sons Inc.

References:
- Sensors and Sensing in Biology and Engineering by F.G. Barth, wt al, Springer Verlag.
- Biosensors by Minh Canh. Tran
- Biosensors: Theory and Applications by Donald G. Buerk
- Enzyme and Microbial Biosensors: Techniques and Protocols - by Kim R. Rogers, Ashok Mulchandani
- Biosensors in Environmental Monitoring - by Ursula Bilitewski, Anthony P. F. Turner.
- Biosensors: Micro electrochemical Devices - by Marc J. C. Lambrechts
- Biosensors with Fiberoptics - by Donald Lee Wise, Lemuel B. Wingard
- Biosensors and Their Applications - by That Tjien Ngo, Victor Chi-Min Yang
- Thermal Biosensors, Bioactivity, Bioaffinity -by Prakash K. Bhatia
- Novel Approaches in Biosensors and Rapid Diagnostic Assays - by Zvi Liron, Avraham Bromberg, Morly Fisher
Course Objective:
To introduce the students to regenerate clean environment using biotechnology as the key tool and provide them the insight for eco-friendly approach along with the concept of sustainable development.

Course Contents:

Module I
Environmental components, Natural resources, Ecosystem and its diversity, Environmental pollution and its major impacts, Global warming and greenhouse effect, Global Ozone Problem, Acid rain, Eutrophication, Land degradation, Biomagnification

Module II
Non-renewable and renewable energy resources, concept of clean fuel technology, Biomass energy and biofuels

Module III
Biodegradation and bioremediation of major pollutants, Biominalisation: Use of microbial technology for mining

Module IV
Waste water engineering: Treatment of municipal wastes and industrial effluents with special focus on use of biological methods, Advanced waste water treatments

Module V
Bioassessment of environmental quality: Biosensors and biomarkers, Biofertilizers, Biopesticides and Vermicomposting

Module VI
Environmental impact assessment and Environmental audit, Related case studies from Indian market

Examination Scheme:

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Text & References:

Text:
- Environmental Science, S.C. Santra
- Environmental Biotechnology, Pradipta Kumar Mohapatra

References:
- Environmental Biotechnology – Concepts and Applications” by Hans-Joachim Jordenring and Jesef Winter
- Waste Water Engineering by Metcalf and Eddy. Publisher: Tata McGraw hill
- Environmental Microbiology: Methods and Protocols by Alicia L. Ragout De Spencer, John F.T. Spencer
- Introduction to Environmental Biotechnology by Milton Wainwright
- Principles of Environmental Engineering by Gilbert Masters
AGRICULTURE BIOTECHNOLOGY

Course Code: MTB 207      Credit Units: 04

Course Objective:
This course is designed to cover key concepts in the structure and manipulation of DNA and inheritance of genes, traditional plant breeding, current impact of biotechnology on crop production and its commercial applications. Regeneration of plants through in vitro techniques offers a practical strategy for micro propagation.

Course Contents:

Module I
Sterilization; Nutrient medium; Callus & Suspension culture; canning, regulation; Micropropagation, production of virus free plants, anther culture, pollen culture; ovary culture, homozygous lines; meristem culture; somatic hybridization, somaclonal variation, germplasm conservation

Module II
Genetic engineering in plants, direct and indirect method of plant cell transformation, vectors with special reference to Ti plasmids, selectable markers, mechanism of T-DNA transfer to plants, transgenic plants, molecular maps and gene tagging, marker assisted selection

Module III
Applications of genetic engineering, insect and pest resistance, herbicide resistance, cytoplasmic male sterility in plants, molecular farming.

Module IV
Plant patents, plant variety certificates, safety regulation in transgenic plants.

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Text & References:

Text:
- Plant Biotechnology and Transgenic Plants, K.M.O. Caldenty, W.H. Barz and H.L. Wills, Marcel Dekker

References:
- An Introduction to Plant Tissue Culture, M.K. Razdan, Oxford and IBH Publishing
- Plant Tissue Culture: Theory & Practice, S.S. Bhojwani and M.K. Razdan, Elsevier Health Sciences
Course Objective:
The main objectives of the course are to demonstrate familiarity with computer, show understanding of computer hardware and software, display basic understanding of computer programming processes, develop understanding of computer file management and protection principles, explain Internet, LAN and digital media fundamentals, define information systems analysis and design concepts, identify and demonstrate use of database concepts.

Course Contents:

Module I

Module II: Introduction to programming

Module III: Data Types
Variables - Constants - Arithmetic expressions - Use of operators - program examples.

Module IV: Decision making in C
Relational operators - Logical operators - Precedence of operators - IF and IF ... ELSE statements – Looping concepts in C _ WHILE loop - DO ... WHILE and FOR loops - Programming examples.
Functions: User defined Functions - Local and Global variables - Parameters - Programming examples.

Module V: Arrays
BREAK statement - Strings and character arrays - examples.
Pointers: Concept of Pointers - The Indirection operator - Use of Pointers in arrays - Programming examples.

Module VI: Structures
The period operator - Arrays of structures - Arrays within structures - Structures within structures - Pointers to structures - The arrow operator - Programming examples.

Examination Scheme:

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Text & References:

Text:
- Fundamentals of Computers by V. Rajaraman
- C Programming” by G. Kochan

References:
- Computer Fundamentals by B. Ram.
- The Spirit of C" by Mullish Cooper.
Course Objective:
The objectives of the course are to explain the fundamental principles of IPR issues and examine information policy issues from different perspectives. Students will study and assess policy groups, intellectual property rights, access to information and research policy issues that usually include plant, animal and microbial genetic engineering products.

Course Contents:

Module I
Objectives of Intellectual Property Rights, origin and evolution of IPR, tangible and intangible property; concept and classification of intellectual property: Copyrights and related rights, Patent, Industrial Design, Trademarks and Geographical indications, Rights of traditional Knowledge and Protection of Plant varieties

Module II: IPR
National and international perspective, TRIPS and WIPO

Module III: 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 study: Basmati case, Neem controversy, Turmeric Case

Module IV: Biosafety
Definition and requirement; biosafety in relation to human health, environment, transgenic research and applications, biosafety laws, guidelines and conventions, biosafety regulation: principles and practices in microbial and biomedical labs, guidelines for research involving DNA molecule; Regulation bodies at National and International level

Module V
Legal and socioeconomy impact of the products and techniques in Biotechnology, Bioethics in plant, animal and microbial genetic engineering, Ethical issues in healthcare, Biopiracy and ethical conflicts

Examination Scheme:

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Text & References:

Text:
- American Indian Cultural & Research Journal (UCLA)

References:
- Refer to Periodicals, Industry directories, Articles and report in journals on the regulatory issues,
- “Biotechnology” series by Rehm & Reed.
Course Code: MTB 220 Credit Units: 02

Course Objective:
The laboratory experiments in Recombinant DNA Technology would certainly help to comprehend the theoretical aspects of the subject.

Course Contents:
1. Isolation of genomic DNA from prokaryotic and Eukaryotes
2. Isolation of plasmid.
3. Study of apoptosis by TUNEL method
4. Isolation of cell organelles by ultracentrifugation.
5. Study of in vitro transcription.
6. Study of DNA repair mechanism
7. Site-directed mutagenesis

Examination Scheme:

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Note: Minor variation could be there depending on the examiner.
Course Contents:

1. Preparation and Transformation of competent cells by CaCl2 method.
2. Restriction digestion
3. Legation
4. Southern hybridization
5. Western blotting
6. RFLP
7. PCR

Examination Scheme:

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Note: Minor variation could be there depending on the examiner.
Course Objective:
The present course aims to acquaint the students with lab-scale cultivation of microbes for production of industrially important products with the concept of scale up processes and to extract different bioproducts during their characterization.

Course Contents:

Module I
Isolation of industrially important microorganisms for microbial processes.

Module II
Determination of growth curve of a supplied microorganism and also determine substrate degradation profile and to compute specific growth rate and growth yield from the data obtained.

Module III
Comparative studied of ethanol production using different substrates, Production and estimation of alkaline protease, Microbial production of antibiotics (Penicillin)

Module IV
Conventional filtration and membrane based filtration, Aqueous two-phase separation, Ion exchange chromatography, Gel Permeation chromatography

Examination Scheme:

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Note: Minor variation could be there depending on the examiner.
COMMUNICATION SKILLS - II

Course Code: MTB 241      Credit Units: 01

Course Objective:
To enrich the understanding of English language and communication, structure, style, usage, and vocabulary for
global business purposes.

Course Contents:

Module I: Fundamentals of Communication
Role and purpose of communication: 7 C’s of communication
Barriers to effective communication
Enhancing listening
Forms of Communication: one-to-one, informal and formal

Module II: Verbal Communication (Written)
Business Letter
Social correspondence
Writing resume and Job applications

Module III: Speaking skills
Conversational English
Guidelines to give an effective presentation
Activities to include:
Presentations by students
Just a minute

Examination Scheme:

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</table>

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

Text & References:

- Business Communication, Raman – Prakash, Oxford
- Textbook of Business Communication, Ramaswami S, Macmillan
- Speaking Personally, Porter-Ladousse, Cambridge
Course Objective:
This course aims at imparting an understanding of:
Process of Behavioural communication
Aspects of interpersonal communication and relationship
Management of individual differences as important dimension of IPR

Course Contents:

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

Text & References:
- Julia T. Wood, Interpersonal Communication everyday encounter
- Harvard Business School, Effective Communication: United States of America
- Beebe, Beebe and Redmond; Interpersonal Communication, 1996; Allyn and Bacon Publishers.
Course Objective:
- To enable the students to overcome the fear of speaking a foreign language and take position as a foreigner speaking French.
- To make them learn the basic rules of French Grammar.

Course Contents:

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’informier**
  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

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C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- le livre à suivre : Campus: Tome 1
GERMAN – II

Course Code: MTB 245      Credit Units: 02

Course Objective:
To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany
Introduction to Grammar to consolidate the language base learnt in Semester I

Course Contents:

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 prepositions with their use
Both theoretical and figurative use

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

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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 Dallapienza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs
SPANISH – II

Course Code: MTB 246      Credit Units: 02

Course Objective:
To enable students acquire more vocabulary, grammar, Verbal Phrases to understand simple texts and start describing any person or object in Simple Present Tense.

Course Contents:

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

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C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras
Course Objective:
To enable the students to converse in the language with the help of basic particles and be able to define the situations and people using different adjectives.

Course Contents:

Module I: Verbs
Transitive verbs, intransitive verbs

Module II: More prepositions
More particles, articles and likes and dislikes.

Module III: Terms used for instructions
No parking, no smoking etc.

Module IV: Adverbs
Different adverbial expression.

Module V: Invitations and celebrations
Giving and receiving presents,
Inviting somebody for lunch, dinner, movie and how to accept and refuse in different ways

Module VI: Comprehension’s
Short essay on Family, Friend etc.

Module VII: Conversations
Situational conversations like asking the way, At a post office, family

Module VIII: Illness
Going to the doctor, hospital etc.

Learning Outcome
➢ Students can speak the language describing above-mentioned topics.

Methods of Private study /Self help
➢ Handouts, audio-aids, and self-do assignments.
➢ Use of library, visiting and watching movies in Japan and culture center every Friday at 6pm.

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Text & References:

Text:
➢ Teach yourself Japanese

References:
➢ Shin Nihongo no kiso 1
Course Objective:
Chinese is a tonal language where each syllable in isolation has its definite tone (flat, falling, rising and rising/falling), and same syllables with different tones mean different things. When you say, “ma” with a third tone, it mean horse and “ma” with the first tone is Mother. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

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 much it 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:**

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C – Project + Presentation  
I – Interaction/Conversation Practice

**Text & References:**

- “Elementary Chinese Reader Part I” Lesson 11-20
Course Objective:
Role of antibody engineering in biomedical applications and the importance of immunogenetics in disease processes, tissue transplantation and immune regulation are some of the areas of attributes of this course which can help the students to understand the biotechnology related to human kind.

Course Contents:

Module I

Module II: Cells of the immune system
Hematopoiesis and differentiation, antigen processing and presentation, activation of B and T lymphocytes, cytokines and their role in immune regulation, T cell regulation and MHC restriction, immunological tolerance.

Module III
Cell mediated toxicity, Hypersensitivity, Autoimmunity, Vaccines: General considerations, ideotype network hypothesis

Module IV
Tumor immunology, Transplantation immunology, Immunotheropy.

Module V
Immunodiffusion, immuno-electrophoresis, ELISA, RIA, fluorescence activated cell sortor, (FACS) Hybridoma technology and its application

Examination Scheme:

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Text & References:

Text:
- Immunology by J. Kubey Fence Creek Publishing (Blackwell).
- Immunology by Ivan Riott

References:
- Basic Immunology, A.K. Abbas and A.H. Lichtman, Saunders W.B. Company
- Fundamentals of Immunology, W. Paul, Lippincott Williams and Wilkins
- Immunology, W.L. Anderson, Fence Creek Publishing (Blackwell).
- Immunology: A Short Course, E. Benjamin, R. Coico and G. Sunshine, Wiley-Leiss Inc.
- Immunology, Roitt, Mosby – Yearbook Inc.
ENZYMATOLOGY AND ENZYME TECHNOLOGY

Course Code: MTB 302      Credit Units: 04

Course Objective:
The course aims to provide an understanding of the principles and application of proteins, secondary metabolites and enzyme biochemistry in therapeutic applications and clinical diagnosis. The theoretical understanding of biochemical systems would certainly help to interpret the results of laboratory experiments.

Course Contents:

Module I: Enzymes
General characteristics of enzymes, Mechanism of action of few enzymes: lysozyme, ribozymes, chymotrypsin and alcohol dehydrogenase.

Module II: Enzyme Kinetics
Single substrate steady state kinetics; Multisubstrate systems, Enzyme Inhibitors as therapeutic agents, active site, Isozyme and multi-enzyme complex.

Module III: Applications of enzymes
Clinical and Industrial, Enzyme Immobilization and its applications.

Module IV: Enzyme Reactors
Reactors for batch/continuous enzymatic processing, Choice of reactor type: idealized enzyme reactor systems; Mass Transfer in Enzyme Reactors: Steady state analysis of mass transfer and biochemical reaction in enzyme reactors.

Module V: Bio-process Design
Physical parameters, reactor operational stability; Immobilized cells.

Module VI: Challenges and future trends
Catalytic antibodies, Thermostable enzymes with special references to amylases, lipases and proteases.

Examination Scheme:

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</table>

Text & References:

Text:
- Enzyme Technology by M.F. Chaplin and C. Bucke, Cambridge University Press.

References:
- Enzymes: A Practical Introduction to Structure, Mechanism and Data Analysis by R.A. Copeland, John Wiley and Sons Inc.
- Enzymes Biochemistry, Biotechnology, Clinical Chemistry by Trevor Palmer
- Industrial Enzymes & their applications by H. Uhlig, John Wiley and Sons Inc.
DRUG DESIGN AND DEVELOPMENT

Course Code: MTB 303
Credit Units: 04

Course Objective:
The aim of the course is to identify and design drugs that could be potentially useful in the identification of the candidate drugs, which have efficacy in cell culture or animal models, and thus the most effective compounds could be employed based on the above results for being moved through preclinical studies to clinical trials.

Course Contents:

Module I: Drug targets classification
DNA, RNA, Protein modifications/events, post-translational, processing enzymes, G protein coupled receptors (monomeric transmembrane proteins), small molecule receptors, neuropeptide receptors, ion channels (monomeric multi-transmembrane) proteins, ligand-gated ion channels (oligomeric transmembrane proteins), transporters (multi-transmembrane proteins).

Module II
Introduction to drug discovery and development, target discovery and validation strategies: Genomics (new target discovery), biological activity directed and other types of screening, natural products, combinatorial chemistry. Pharmacokinetics and Toxicological considerations.

Module III
Computer aided drug design, Structure-based design: ‘de novo’ design methodologies: docking.

Module IV
Design and development of combinatorial libraries for new lead generation: The molecular diversity problem, drug characterization – principles of equilibria, diffusion and kinetics, preformulation: pKa, partition coefficient, solubility, dissolution, chemical stability, and permeability, optimization of ADME characteristics, physico-chemical properties calculation, Linear Free energy, Hanseh equation, Hammet equation, chemometrics in drug design.

Module V: QSAR
Statistical techniques behind QSAR, classical QSAR, molecular descriptors 3D QSAR and COMFA, drug design to discovery and development

Examination Scheme:

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</table>

Text & References:

Text:
- Introduction to Biophysical Methods for Protein and Nucleic Acid Research by J.A. Glasel and M.P. Deutscher, Academic Press

References:
- Principles of Medicinal Chemistry” by W.O. Foye, T.L. Lemke, and D.A. Williams, Williams and Wilkins.
- Side Effects and Drug Design by E.J. Lien, Marcel Dekker
POLLUTION PREVENTION FUNDAMENTALS

Course Code: MTB 304
Credit Units: 04

Course Objective:
To develop an understanding of the methods and impacts of waste minimization including waste pollution prevention and recycling, obtain an overview of relevant environmental laws and regulations governing waste management, understand the phenomena and environmental impact of green-house gases and alternative energy sources to reduce the effect of global warming.

Course Contents:

Module I: Pollution Prevention in Industries
Environment friendly chemical processes-Properties and fates of environmental contaminants- Regulations for clean environment and implications for industries – Improved Manufacturing Operations.

Module II: Life Cycle Assessment and Environmental Audit
Life cycle assessment and pollution prevention economics-Hazard and risk Analysis - Pollution prevention planning - Design for the environment.

Module III: Conservation of Materials and Energy

Module IV: Total Quality Environment Management and Ems 14000

Module V: Hierarchy of Environment Management Practices

Examination Scheme:

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Text & References:

Text:

References:
- Chemical Technology for better Environment by T.K. Roy, (Editor), Allied publishers Ltd, Chennai
Course Objective:
The course is to help the students in developing a detailed understanding of drug delivery system. After the completion of this course, the students are expected to be completely familiar with the different drug related aspects of a living body.

Course Contents:

Module I: Basic concepts of Drug Delivery

Module II: Advanced Drug Delivery and Targeting
Basic terminologies in drug delivery and drug targeting, Drug release, Drug targeting, Doses forms, Various routes of administration of drugs (just introduction), Strategies for enhanced therapeutic efficacies (Basic principles).

Module III: Drug administration

Module IV: Delivery of Genetic material
Basic principles of gene expression, Viral and nonviral vectors in gene delivery, Clinical applications of gene therapy and antisense therapy.

Module V: New generation technologies in Drug delivery and targeting
Nanotechnology / Nanobiotechnology, Use of biosensors and challenge of chronopharmacology, Microchips and controlled drug delivery, genetically engineered cell implants in drug delivery.

Examination Scheme:

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Text & References:

Text:
- Drug Delivery and Targeting by A.M. Hillery, A.W. Lloyd and J. Swarbrick, Harwood Academic Publisher.
- Drug Delivery: Engineering Principles for Drug Therapy (Topics in Chemical Engineering), by W.M. Saltzman, Oxford University Press.

References:
- Handbook of Biodegradable Polymers (Drug Targeting and Delivery), by A.J. Domb, J. Kost and D.M. Wiseman, Dunitz Martin Ltd.
- Pharmaceutical Dosage Forms and Drug Delivery System by H.C. Ansel, L.V. Allen and N.G. Popovich, Lippincott Williams and Wilkins Publisher.
BIO-ENERGY ENGINEERING

Course Code: MTB 306      Credit Units: 04

Course Objective:
The goal is to introduce students to biotechnology and tools that enable engineers and process scientists to connect innovations in industrial microorganisms and bioprocess unit operations to the engineering fundamentals, fundamentals of systems biology, and biological tools for design, modeling and evaluation of manufacturing facilities for the production of biofuels, bioproducts and biotherapeutics using a case study approach combined with computer modeling.

Course Contents:

Module I: Biomass Sources, Characteristics & Preparation
Biomass Sources and Classification. – Chemical composition and properties of different biomass materials and bio-fuels – Sugar cane molasses and other sources for fermentation ethanol-Sources and processing of oils and fats for liquid fuels- Energy plantations
-Preparation of woody biomass: Size reduction, Briquetting of loose biomass, Drying, Storage and Handling of Biomass.

Module II: Biogas, Technology
Feedstock for biogas production, Aqueous wastes containing biodegradable organic matter, animal residues- Microbial and biochemical aspects- Operating parameters for biogas production Kinetics and mechanism - Dry and wet fermentation. Digesters for rural application-High rate digesters for industrial waste water treatment.

Module III: Bio-Ethanol and Bio-Diesel Technology
Production of Fuel Ethanol by Fermentation of Sugars. Gasohol as a Substitute for Leaded Petrol. - Trans-Esterification of Oils to Produce Bio-Diesel.

Module IV: Pyrolysis and Gasification of Biomass

Module V: Combustion of Biomass and Cogeneration Systems

Examination Scheme:

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Text & References:

Text:
- Fuels from Biomass and Wastes by D.L. Klass and G.M. Emert, Ann Arbor Science pub. Inc. Michigan,
- Biotechnology and Alternative Technologies for Utilization of Biomass or Agricultural Wastes by A. Chakraverthy, Oxford & IBH publishing Co., New Delhi,

References:
ADVANCED FOOD TECHNOLOGY

Course Code: MTB 307          Credit Units: 04

Course Objective:
The purpose of the Food Technology major is to produce professionals with a wide range of pertinent knowledge and skills in food chemistry, food microbiology and safety, quantitative skills, engineering and processing, marketing and consumer research

Course Contents:

Module I
Processing and preservation technologies used in the food industry: heating, drying and baking, irradiation (infrared, microwave and radio frequency), concentration, freezing, chemical preservation, chilling, fermentation, a combination of those technologies

Module II
Micro-organisms and their metabolites for food, feed and fuel, development and application of food enzymes: fungal amylases, alpha-amylase, pectinase, amylglucosidase and catalase. Technology for improvement of the quality of fruit juice through enzymatic treatment, Food spoilage and food poisoning micro-organisms

Module III
Pre- and post-harvest technologies for extension of storage life and better handling and transportation of fresh fruits and vegetables, to sustain freshness and reduce spoilage

Module IV
Development of environment-friendly packaging materials based on product characteristics and performance properties of packaging materials, and finished package forms, process schedules for thermal processing of foods in cans, glass, tin-free steel and aluminium containers, and retortable pouches based on heat penetration studies and sterilization value

Module V
Food Safety in food service Establishment and other food areas

Examination Scheme:

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Text & References:

Text:
- Food Technology by Fraziar
- Food Microbiology, 2nd edition by Adams and Moss.

References:
- International Journal of Food Science & Technology, Blackwell synergy publication
- Bioterrorism and Food Safety by Rasco and Bledsoe.
INDUSTRIAL SAFETY AND MANAGEMENT

Course Code: MTB 308      Credit Units: 04

Course Objective:
Course addresses management and engineering design concepts required for process safety in chemical and biotechnology systems, with pharmaceutical manufacturing applications. Content focuses on sound engineering principles and practices as they apply to industrial situations, project design, risk mitigation, process and equipment integrity, and engineering codes and standards.

Course Contents:

Module I: Hazards
Chemical hazards classification. Radiation hazards and control of exposure to radiation. Types of fire and fire prevention methods. Mechanical hazards. Electrical hazards

Module II: Psychology and Hygiene

Module III: Occupational diseases and control

Module IV: Management

Module V: Laws

Examination Scheme:

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Text & References:

Text:
- Safety and Accident Prevention in Chemical Operation 2nd Edn., H.H. Fawcett & W.S. Wood Wiley Interscience,

References:
- Industrial Safety and Laws by Indian School of Labour Education, Madras.
ADVANCED ANIMAL AND PLANT CELL TECHNOLOGY

Course Code: MTB 309
Credit Units: 04

Course Objective:
The application of Plant Biotechnology covers major areas related to commercial applications. Regeneration of plants through in vitro techniques offers a practical strategy for micro propagation. Importance will also be given to areas like in vitro fertilization, animal cell and tissue culture, hormone vaccine and important enzyme production through animal biotechnology.

Course Contents:

ADVANCED ANIMAL CELL TECHNOLOGY

Module I
Brief history of animal cell and organ culture, Cultivation of animal cell en masse in bioreactor, methods for scale-up, immobilized cell culture, insect cell culture, somatic cell culture, organ culture, and embryo culture.

Module II
Valuable products from cell culture, Production of recombinant tissue-plasminogen-activator, blood factor VIII, erythropoietin, insulin, somatostatin, somatotropin.

Module III
Hybridoma technology, Monoclonal antibodies- production and application, Stem cell technology, custom made animals and tissue engineering

ADVANCED PLANT CELL TECHNOLOGY

Module IV
Brief introduction to various tissue culture techniques,
Cell Cultures, regeneration and preservation: Plant regeneration through meristem, callus (somatic embryogenesis) and anthers. Protoplast culture and somatic hybridization. Production, preservation and use of somatic embryos. Artificial Seeds and Cybrids.

Module V
Induction & utilization of somatic variants; Secondary metabolite production through cell cultures. Principles and the technology, pharmaceutical, secondary metabolites & beverage production; Commercialization of tissue culture technology (Micropropagation). Plant cell reactors. Immobilized plant cell reactors

Module VI
Engineering of Chloroplast and mitochondrial genomes and their applications, Biotransformation by plant cells.

Examination Scheme:

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Text & References:

Text:
- Culture of Animal Cells, R.I Freshney, Wiley-Leiss

References:
- An Introduction to Plant Tissue Culture, M.K. Razdan, Oxford and IBH Publishing
- Plant Biotechnology and Transgenic Plants, K.M.O. Caldenty, W.H. Barz and H.L. Wills, Marcel Dekker
- Plant Cell & Tissue Culture for the Production of Food Ingredients, T-J Fu, G. Singh and W.R. Curtis, Kluwer Academic/Plenum Press
- Plant Tissue Culture: Theory & Practice, S.S. Bhojwani and M.K. Razdan, Elsevier Health Sciences
- Animal Cell Culture Techniques, M. Clynns, Springer Verlag
- Cell Culture LabFAX, M. Butler and M. Dawson, Bios scientific Publications Ltd.
- Cell Growth and Division – A Practical approach, R. Basega, IRL Press
- Comprehensive Biotechnology, Moo-Young, Alan T. Bullm Howard Dalton, Panima Publication
IMMUNOLOGY AND IMMUNOTECHNOLOGY LAB

Course Code: MTB 320      Credit Units: 02

Course Objective:
The objectives of the course is to understand the principles of immune function and immunization and to provide advanced training in modern cellular and molecular immunology, with emphasis on the interface between the basic and clinical aspects of the subject.

Course Contents:

Module I

Module II
Lymphoid organs and their microscopic organization.

Module III
WIDAL Test, Radial Immuno Diffusion Test, Ouchterlony Double diffusion Test, ELISA:- DOT, SANDWICH

Module IV
Purification of IgG through affinity chromatography

Module V
Immunohistochemistry

Examination Scheme:

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Note: Minor variation could be there depending on the examiner.
Course Objective:
To integrate the practical aspects of enzymology with the kinetic theories to provide a mechanistic overview of enzyme activity and regulation in cells

Course Contents:

Module I
Isolation of Enzymes from plant and microbial sources.

Module II
Enzyme assay; activity and specific activity – determination of amylase, acid phosphatase, cellulase, protease.

Module III
Production of enzyme on industrial scale using solid and liquid-state fermentation.

Module IV
Purification of enzyme by ammonium sulphate fractionation, ion-exchange, gel permeation chromatography.

Module V
Enzyme Kinetics: Determination of Michaelis-Menten constant (Km) and Maximum Velocity (Vmax), Temperature optima and pH optima of an enzyme.

Module VI
Enzyme immobilization and its effect on enzyme activity

Examination Scheme:

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Note: Minor variation could be there depending on the examiner.
TERM PAPER

Course Code: MTB 330  Credit Units: 03

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:
   a) summary of question posed
   b) summary of findings
   c) summary of main limitations of the study at hand
   d) 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

Edited volumes
[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

Journal articles

Electronic book

Electronic journal articles

Other websites

Unpublished papers
Unpublished thesis/ dissertations

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.)
COMMUNICATION SKILLS - III

Course Code: MTB 341      Credit Units: 01

Course Objective:
To initiate the learners with the basic mechanics of writing skills and facilitate them with the core skills required for communication in the professional world.

Course Contents:

Module I: Mechanics and Semantics of Sentences
Writing effective sentences
Style and Structure

Module II: Developing writing skills
Inter - office communication: Business Letter; E mails; Netiquette
Intra – office communication: Memos, Notices, Circulars, Minutes
Report Writing

Module III: Business Presentations
Planning, design and layout of presentation
Information Packaging
Audience analysis
Audio visual aids
Speaking with confidence
Case Studies

Examination Scheme:

<table>
<thead>
<tr>
<th>Components</th>
<th>CT1</th>
<th>CT2</th>
<th>CAF</th>
<th>V</th>
<th>GD</th>
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</tbody>
</table>

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

Text & References:
- Krishnaswamy, N, Creative English for Communication, Macmillan
Course Objective:
This course aims to enable students to:
Understand the concept and building of teams
Manage conflict and stress within team
Facilitate better team management and organizational effectiveness through universal human values.

Course Contents:

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

Text & References:

- Organizational Behaviour, Davis, K.
- LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
FRENCH - III

Course Code: MTB 344      Credit Units: 02

Course Objective:
To provide the students with the know-how
• To master the current social communication skills in oral and in written.
• To enrich the formulations, the linguistic tools and vary the sentence construction without repetition.

Course Contents:

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 restaurant
3. parler des différentes occasions de faire la fête

Unité 7: Cultiver ses relations
1. maîtriser les actes de la communication sociale courante (Salutations, présentations, invitations, remerciements)
2. 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:

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C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:
• le livre à suivre : Campus: Tome 1
GERMAN - III

Course Code: MTB 345 Credit Units: 02

Course Objective:
To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany

Course Contents:

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:

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</table>

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
Course Objective:
To enable students acquire knowledge of the Set/definite expressions (idiomatic expressions) in Spanish language and to handle some Spanish situations with ease.

Course Contents:

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:

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C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español, En Directo I A
- Español Sin Fronteras -Nivel Elemental
Course Objective:
To enable the students to converse in the language with the help of basic verbs and to express themselves effectively and narrate their everyday short encounters. Students are also given projects on Japan and Japanese culture to widen their horizon further.
Note: The Japanese script is introduced in this semester.

Course Contents:

Module I: Verbs
Different forms of verbs: present continuos verbs etc

Module II
More Adverbs and adverbial expressions

Module III: Counters
Learning to count different shaped objects,

Module IV: Tenses
Past tense, Past continuous tense.

Module V: Comparison
Comparative and Superlative degree

Module VI: Wishes and desires
Expressing desire to buy, hold, possess. Usage in negative sentences as well.
Comparative degree, Superlative degree.

Module VII: Appointment
Over phone, formal and informal etc.

Learning Outcome
➢ Students can speak the language and can describe themselves and situations effectively
➢ They also gain great knowledge in terms of Japanese lifestyle and culture, which help them at the time of placements.

Methods of Private study /Self help
➢ Handouts, audio-aids, and self-do assignments.
➢ Use of library, visiting and watching movies in Japan and culture center every Friday at 6pm.

Examination Scheme:

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C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

Text:
➢ Teach yourself Japanese.

References:
➢ Shin Nihongo no kiso 1
CHINESE – III

Course Code: MTB 348      Credit Units: 02

Course Objective:
Foreign words are usually imported by translating the concept into Chinese, the emphasis is on the meaning rather than the sound. But the system runs into a problem because the underlying name of personal name is often obscure so they are almost always transcribed according to their pronunciation alone. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

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.
**Examination Scheme:**

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</table>

C – Project + Presentation  
I – Interaction/Conversation Practice

**Text & References:**

- “Elementary Chinese Reader Part I, Part-2” Lesson 21-30
GUIDELINES FOR PROJECT FILE

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

**In general, the File should be comprehensive and include:**

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

**Report Layout**

The report should contain the following components:

- **Title or Cover Page.**
  The title page should contain the following information: Project Title; Student’s Name; Course; Year; Supervisor’s Name.

- **Acknowledgements** (optional)
  Acknowledgment to any advisory or financial assistance received in the course of work may be given.

- **Abstract**
  A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project.

- **Table of Contents**
  Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**
  Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**
  This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Results and Discussion**
  Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in "point" form.
> **Conclusion**
A conclusion should be the final section in which the outcome of the work is mentioned briefly.

> **Future prospects**

> **Appendices**
The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

> **References**
This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

**Examples:**
For research article:

For book:

**ASSESSMENT OF THE PROJECT FILE**
Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.
Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.
Project execution is concerned with assessing how much work has been put in.
The File should fulfill the following assessment objectives:

**Range of Research Methods used to obtain information**

**Execution of Research**

**Data Analysis**
Analyse Quantitative/ Qualitative information
Control Quality

**Draw Conclusions**

**Examination Scheme:**

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<table>
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<td>Viva Voce:</td>
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<td><strong>Total:</strong></td>
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Course Objective:
The course helps in developing a detailed understanding of eukaryotic genome complexity and organization. Current research on the molecular basis of the control of gene expression in eukaryotic has developed a detailed understanding of techniques of gene diagnostics and DNA profile to acquire the fundamental of genomics and bioinformatics, it is desirable to have in depth study on these lines.

Course Contents:

GENOMICS

Module I: Introduction to Genomics
Anatomy of prokaryotic and eukaryotic genome. Contents of genomes, Repetitive DNA. Bioinformatics for the analysis of sequence data.

Module II: Transcriptomes
Genome expression; RNA Contents, genetic mapping, Microsatellite DNA markers, RFLP, DNA sequencing, PCR, Micro array: DNA micro array marker, random primers, computational methods.

Module III
Strategies for large-scale sequencing projects. The structure, function and evolution of the human genome. The human genome project. Human disease genes.

PROTEOMICS

Module IV

Module V
Fundamental methods used in proteomics, Relationship between protein structure and function. Post translational protein modifications. Protein – protein interaction.

Module VI
Use of computer simulations and knowledge-based methods in the design process. De-novo design; making use of databases of sequence and structure.

Examination Scheme:

<table>
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<th>CT</th>
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Text & References:

Text:
- Genomes II, T.A. Brown
- Recombinant DNA (Second Edition), James D. Watson and Mark Zoller

References:
- A Primer of Genome Science, Greg Gibson and Spencer V. Muse
- Database Annotation in Molecular Biology: Principles and Practice, Arthur M. Lesk
- Gene Cloning and DNA Analysis – An introduction (Fourth Edition), T.A. Brown
- Genes & Genomes, Maxine Singer and Paul Berg
- DNA : Structure and Function, Richard R. Sinden
- www.panimaText.com
PHARMACEUTICAL TECHNOLOGY

Course Code: MTB 402  Credit Units: 04

Course Objective:
The main objectives are to cover representative pharmaceutical dosage forms, and general issues of formulation, production, quality requirements, validation and uses and to gain an understanding of the challenges associated with quality pharmaceutical manufacturing.

Course Contents:

Module I
Introduction to Physical Pharmaceutics - Metrology and Calculations,

Module II
Molecular structure, properties and States of Matter, Solutions, Phase Equilibria, Micromeritic and Powder Rheology, Surface and Interfacial Phenomena, Dispersion Systems, Diffusion & Dissolution, Kinetics and drug stability, Viscosity & Rheology

Module III
Polymer Science and Applications, Formulations and Development, Packaging

Module IV
Introduction to Industrial Processing, Transport Phenomena (Fluid Flow, Heat Transfer and Mass Transfer)

Module V
Particulate Technology (Particle Size, Size reduction, Size Separation, Powder Flow and Compaction), Unit Operations (Mixing, Evaporation, Filtration, Centrifugation, Extraction, Distillation, and Drying)

Module VI
Materials of Pharmaceutical Plant Construction, Good Manufacturing Practice (GMP’s) Guidelines

Examination Scheme:

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Text & References:

Text:
- Bentley's Pharmaceutics by E A Rawlins
- Pharmaceutical Sciences by Remington

References:
- Physical Pharmacy by Alfred Martin.
- Cooper and Gunn's Tutorial Pharmacy
BIOPROCESS PLANT DESIGN

Course Code: MTB 403      Credit Units: 03

Course Objective:
The objective of this paper is to include the application of chemical engineering principles/unit operations to bioprocess systems and the principles of disciplines of mechanical, electrical and industrial engineering to design a completely economically optimal process using living or subcomponent of cells.

Course Contents:

Module I
Introduction; general design information; Mass and energy balance.

Module II
Flow sheeting; Piping and instrumentation; Materials of construction for bioprocess plants; Mechanical design of process equipment.

Module III
Vessels for biotechnology application; Design of fermenters; Design considerations for maintaining sterility of process streams processing equipment.

Module IV
Selection and specification of equipment for handling fluids and solids; Selection, specification, design of heat and mass transfer equipment used in bioprocess industries.

Module V
Design of facilities for cleaning of process equipment used in biochemical industries.

Module VI
Utilities of biotechnology production plants; Process economics; Bioprocess validation; Safety considerations; Case studies.

Examination Scheme:

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Text & References:

Text:

References:
- Chemical Engineers Handbook by R.H. Perry and D.W. Green, McGraw-Hill
- Manufacturing Facilities Design and Material Handling by F.E. Meyers and M.P. Stephens, Prentice Hall
- Plant Design and Economics for Chemical Engineers by M. Peters and K. Timmerhaus, McGraw-Hill
- Process Plant Layout and Piping Design by E. Bausbacher and R. Hunt, Prentice Hall PTR.
ADVANCED BIOSTATISTICS FOR BIOLOGISTS

Course Code: MTB 404      Credit Units: 04

Course Objective:
The course aims to develop competency and expertise in the application of statistical methods applied to biological data obtained in experimental techniques.

Course Contents:

Module I: Descriptive statistics
Measures of Central Tendency (Mean, Median, Mode), Measures of dispersion (Range, Mean Deviation, Standard Deviation, Quartile Deviation), combined mean and variance, covariance, Graphs (Bar Chart, Pie Chart, Box Plot, Histogram, Ogive, scatter plot)

Module II
Probability (Addition and Multiplication Theorem), Binomial, Poisson and Normal distribution. Correlation and linear regression.

Module III: Inferential statistics
Formulation of Hypothesis (One-tailed & Two-tailed), Type I and Type II errors, power of a test, Significance of a test, P-value testing, Hypothesis Testing (students T-test, Z-test, Chi-square test). Analysis of variance (ANOVA)

Module IV
Applications of statistical methods using statistical software

Examination Scheme:

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Text & References:

Text:
- Biostatistics: A foundation for analysis in the Health Sciences, W.W Daniel. Publisher: John Wiley and Sons.

References:
- Introduction to Biostatistics, Ronald N. Forthfer and Eun Sun Lee. Publisher: Elsevier.
- Biostatistics: A foundation for analysis in the Health Sciences, W.W Daniel. Publisher: John Wiley and Sons.
- Statistical Methodology, S.P Gupta. Publisher: S. Chand & Co.
- Statistical Analysis, Kaushal, T.L. Publisher: Kalyani Publishers.
- Statistical Methods, Potri, D. Kalyani Publishers.
- Mathematical Statistics by H.C. Saxena and V.K. Kapoor. Publisher: S. Chand & Co
STATISTICS

Course Code:  MTB 405  Credit Units: 04
Course Objective:
The course will serve to introduce students to the materials and methods of DNA and protein analysis and the computational tools developed for genomics and proteomics in a variety of species.

Course Contents:

Module I
Three dimensional Structures – In silico study – large molecular complexes RNA polymerase II, ribosome, unstructured proteins

Module II
DNA sequencing methods, gene finding tools and Genome annotation

Module III
Comparison of two given genomes, Analysis of 2D – IEF data

Module IV
Micro array and Micro array data analysis, Inference of protein function from structure

Module V
Two-hybrid methods

Examination Scheme:

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<td>Mid Term Viva</td>
<td>Attendance</td>
<td>Major Experiment</td>
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Note: Minor variation could be there depending on the examiner.
COMMUNICATION SKILLS - IV

Course Code: MTB 441      Credit Units: 01

Course Objective:
To facilitate the learner with Academic Language Proficiency and make them effective users of functional language to excel in their profession.

Course Contents:

Module I: Introduction to Speaking Skills
Business Conversation
Effective Public Speaking
Art of Persuasion

Module II: Speaking for Employment
Types of Interview
Styles of Interview
Facing Interviews-Fundamentals and Practice Session
Conducting Interviews- Fundamentals and Practice Session
Question Answer on Various Dimensions

Module III: Basic Telephony Skills
Guidelines for Making a Call
Guidelines for Answering a Call
Telephone Word Groups
Answering Systems and Voice-Mail

Module IV: Work Place Speaking
Team Briefing
Conflict Management
Negotiations
Participation in Meetings
Keynote Speeches

Examination Scheme:

<table>
<thead>
<tr>
<th>Components</th>
<th>CT1</th>
<th>CT2</th>
<th>CAF</th>
<th>V</th>
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</tbody>
</table>

CAF – Communication Assessment File
GD – Group Discussion
GP – Group Presentation

Text & References:

- Jermy Comfort, Speaking Effectively, et.al, Cambridge
- Krishnaswamy, N, Creative English for Communication, Macmillan
- Taylor, Conversation in Practice.
Course Code: MTB 443      Credit Units: 01

Course Objective:
This course aims at imparting an understanding of:
Build and leverage your professional reputation
Maintain focus in pressure situations
Make a balanced choice between professional and personal commitments

Course Contents:

Module I: Individual, Society and Nation
Individual Differences and Dimensions of Personality
Socialization Process
Relating to the Nation: Values, Culture, Religion
Sense of pride and Patriotism
Managing Diversity

Module II: Components of Excellence
Personal Excellence:
Identifying long-term choices and goals
Uncovering the talent, strength & style
Analyzing choke points in your personal processes by analysis in area of placements, events, seminars, conference, extracurricular activities, projects etc.
Developing professional power: Goal-setting, time management, handling criticism, interruptions and time wasters

Module III: Career Planning
Knowing one’s Interest and Aptitude
Identifying available Resources
Setting goals to maintain focus:
Developing Positive attributes in personality
Self-reliance and Employability skills

Module IV: Stress Management for Healthy Living
Meaning and Nature of Stress
Stages of stress
Causes and Consequences of stress: Personal, Organizational and Environmental
Personal Styles and strategies of coping

Module V: Professional Success
Building independence & interdependence
Reducing resistance to change
Continued reflection (Placements, events, seminars, conferences, projects extracurricular Activities 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

Text & References:
Course Code: MTB 444  Credit Units: 02

Course Objective:
To enable students:
• To develop strategies of comprehension of texts of different origin
• To present facts, projects, plans with precision

Course Contents:

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:

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C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:
• le livre à suivre : Campus: Tome 1
GERMAN - IV

Course Code: MTB 445 Credit Units: 02

Course Objective:
To enable the students to converse, read and write in the language with the help of the basic rules of grammar, which will later help them to strengthen their language.
To give the students an insight into the culture, geography, political situation and economic opportunities available in Germany.
Introduction to Advanced Grammar Language and Professional Jargon

Course Contents:

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.

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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 Dallapianza et al, Tangram Aktuell A1/1,2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs
SPANISH - IV

Course Code: MTB 446      Credit Units: 02

Course Objective:
To enable students acquire working knowledge of the language; to give them vocabulary, grammar, voice modulations/intonations to handle everyday Spanish situations with ease.

Course Contents:

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

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C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español Sin Fronteras (Nivel – Elemental)
Course Objective:
To enable the students to comfortably interact using basic Japanese.
Note: Teaching is done in roman as well as Japanese script, students will be taught katankana (another form of script) in this semester i.e. to be able to write all the foreign words in Japanese.

Course Contents:

Module I
Comparison using adjectives, Making requests

Module II
Seeking permission

Module III
Practice of conversations on:
Visiting people, Party, Meetings, After work, At a ticket vending machine etc

Module IV
Essays, writing formal letters

Learning Outcome
➢ Students can speak the language describing above-mentioned topics.

Methods of Private study /Self help
➢ Handouts, audio-aids, and self-do assignments, role-plays.
➢ Students are also encouraged to attend Japanese film festival and other such fairs and workshops organized in the capital from time to time.

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C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

Text:
• Teach yourself Japanese

References:
• Shin Nihongo no kiso 1
CHINESE – IV

Course Code: MTB 448      Credit Units: 02

Course Objective:
How many characters are there? The early Qing dynasty dictionary included nearly 50,000 characters the vast majority of which were rare accumulated characters over the centuries. An educate person in China can probably recognize around 6000 characters. The course aims at familiarizing the student with the basic aspects of speaking ability of Mandarin, the language of Mainland China. The course aims at training students in practical skills and nurturing them to interact with a Chinese person.

Course Contents:

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 action “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.

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C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:
• “Elementary Chinese Reader, Part-2” Lesson 31-38
GUIDELINES FOR PROJECT FILE

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage. The File is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include:

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.

Report Layout

The report should contain the following components:

- **Title or Cover Page**
  The title page should contain the following information: Project Title; Student’s Name; Course; Year; Supervisor’s Name.

- **Acknowledgements** (optional)
  Acknowledgment to any advisory or financial assistance received in the course of work may be given.

- **Abstract**
  A good "Abstract" should be straight to the point; not too descriptive but fully informative. First paragraph should state what was accomplished with regard to the objectives. The abstract does not have to be an entire summary of the project, but rather a concise summary of the scope and results of the project

- **Table of Contents**
  Titles and subtitles are to correspond exactly with those in the text.

- **Introduction**
  Here a brief introduction to the problem that is central to the project and an outline of the structure of the rest of the report should be provided. The introduction should aim to catch the imagination of the reader, so excessive details should be avoided.

- **Materials and Methods**
  This section should aim at experimental designs, materials used. Methodology should be mentioned in details including modifications if any.

- **Results and Discussion**
  Present results, discuss and compare these with those from other workers, etc. In writing these section, emphasis should be given on what has been performed and achieved in the course of the work, rather than discuss in detail what is readily available in text books. Avoid abrupt changes in contents from section to section and maintain a lucid flow throughout the thesis. An opening and closing paragraph in every chapter could be included to aid in smooth flow.

Note that in writing the various sections, all figures and tables should as far as possible be next to the associated text, in the same orientation as the main text, numbered, and given appropriate titles or captions. All major equations should also be numbered and unless it is really necessary never write in “point” form.
Conclusion
A conclusion should be the final section in which the outcome of the work is mentioned briefly.

Future prospects

Appendices
The Appendix contains material which is of interest to the reader but not an integral part of the thesis and any problem that have arisen that may be useful to document for future reference.

References
This should include papers and books referred to in the body of the report. These should be ordered alphabetically on the author's surname. The titles of journals preferably should not be abbreviated; if they are, abbreviations must comply with an internationally recognised system.

Examples
For research article

For Book

ASSESSMENT OF THE PROJECT FILE

Essentially, marking will be based on the following criteria: the quality of the report, the technical merit of the project and the project execution.
Technical merit attempts to assess the quality and depth of the intellectual efforts put into the project.
Project execution is concerned with assessing how much work has been put in.
The File should fulfill the following assessment objectives:

Range of Research Methods used to obtain information

Execution of Research

Data Analysis
Analyze Quantitative/ Qualitative information
Control Quality

Draw Conclusions

Assessment Scheme:

Continuous Evaluation: 40% (Based on punctuality, regularity of work, adherence to plan and methodology, refinements/ mid-course corrections etc. as reflected in the Project File.)

Final Evaluation: 60% (Based on the Documentation in the file, Final report layout, analysis and results, achievement of objectives, presentation/ viva)