Master of Technology (Biochemical Engineering)

Programme Code: MBE

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:

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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 STRUCTURE

## FIRST SEMESTER

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**FOURTH SEMESTER**

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Curriculums & Scheme of Examination

MICROBIOLOGICAL ENGINEERING

Course Code: MBE 101
Credit Units: 04

Course Objective:
The course material deals with kinetics of microbial growth, substrate utilization, product formation along with their mathematical modeling applicable to different modes of microbial cultures.

Course Contents:

Module I

Module II
Continuous (single and multistage), cell recycle and fed batch culture, mass and energy balance in microbial process.

Module III
Mass transfer in biological reaction, Aeration and agitation, Rheology of fermentation broth.

Module IV
Sterilization of air and medium

Examination Scheme:

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Text & References:

Text:
- Principles of Fermentation Technology, Salisbury, Whitaker and Hall, Aditya Text Pvt. Ltd.
- Bioprocess Engineering: basic concepts, Michael L. Shuler and Fikret Kargi

References:
- Biochemical Engineering S. Aiba, A.E. Humphery and N.F. Millis.
Course Objective:
The course aims in understanding different metabolic processes and role of enzyme in modulating pathways. Evaluation of different forms of bacteria, fungi, yeast, actinomycetes, protozoa and viruses constitutes the basic biotechnology.

Course Contents:
Module I
Scope and importance, Structure and function of biomolecules: carbohydrates, lipids, proteins and nucleic acids. Membrane structure and function with emphasis on membrane transport and signaling.

Module II: Microbiology
Introduction- aims and scope; Organisation and function of prokaryotic and eukaryotic cells; Structure and function of cell organelles; Distinguishing features of various groups of microorganisms: actinomycetes, bacteria, molds, yeasts and algae and their broad classification.

Module III
Isolation, identification and preservation of industrial microorganisms; Physiology and morphology of bacteria, yeast and fungi; Characteristics of viruses; Microbial nutrition and growth principles

Module IV
Growth measurement techniques; Assimilation of nitrogen and sulphur; Isolation, maintenance long term preservation and improvement of cultures; Anaerobic respiration; Role of microbes in agriculture, public health, medicine and industry.

Examination Scheme:

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Text & References:

Text:

References:
- Microbiology, Tortora, Funke and Chase, Benzamin & Cummings.
ENZYME ENGINEERING AND TECHNOLOGY

Course Code: MBE 103
Credit Units: 04

Course Objective:
The course objective covers an understanding of the principles and application of protein, secondary metabolites and enzyme biochemistry applicable to industrial bioprocesses. Process design, operation strategies of various enzyme reactors.

Course Contents:

Module I: Enzyme
Introduction and Scope, nomenclature Biosynthesis, regulation and control of enzyme in microorganisms.

Module II: Enzyme kinetics
Single and multiple substrate systems, Inhibition - substrate, product and inhibitors, effect of pH, temperature, Allosteric enzymes.

Module III
Large scale production and purification of enzyme; Cofactors and their role in enzyme activity; Immobilization of enzyme and whole cells.

Module IV
Process design and operation strategies for immobilized enzyme reactors; External and diffusional mass transfer limitation, Effectiveness factor and modulus; Stabilization of enzyme, synzyme, Immobilization of multiple enzyme system; Protein engineering; Application of enzyme - Industrial, Analytical and Medical.

Examination Scheme:

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Text & References:

Text:
- Enzyme Biochemistry, Biotechnology, Clinical Chemistry, Trevor Palmer.

References:
- Enzyme: A Practical Introduction to structure, Mechanism and data analysis, R.A. Copeland, John Wiley & Sons Inc.
Course Objective:
Objective of the course is for the acquaintance of large scale cultivation of microbes for production of industrially important products.

Course Contents:

Module I
Selection of industrially important cultures; Isolation of pure culture & genetic improvement of industrial microorganisms.

Module II
Process technology for the production of primary metabolites, Baker’s yeast, SCP, ethanol.

Module III
Biosynthesis and fermentative production of antibiotics – penicillin, semi-synthetic penicillin, streptomycin, tetracyclines, chloramphenicol; Microbial production of antifungal antibiotics; Metabolic regulations in industrial fermentation; Microbial production of amino acids – lysine, glutamic acid; microbial transformation of steroids; Microbial production of vitamins – ß-carotene, vitamin B₁₂, vitamin B₆; microbiological assay techniques for estimation of antibiotics and vitamins.

Module IV
Application of antibiotics in animal nutrition and food preservation, mycotoxins and microbial insecticides, use of microbes in mineral beneficiation; Production of biodegradable polymers, biofertilizers, microbial exopolysaccharides – xanthan, gellan.

Examination Scheme:

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Text & References:

Text:
- Principles of Fermentation Technology, Salisbury, Whitaker and Hall, Aditya Text Pvt. Ltd.

References:
- Bioprocess Engineering: basic concepts, Michael L. Shuler and Fikret Kargi
Course Code: MBE 120                       Credit Units: 02

Course Contents:

**Module I**
Determination of growth curve of a supplied microorganism and also determine substrate degradation profile and product profile.

**Module II**
Computation of specific growth rate, growth yield, generation time and maintenance coefficient.

**Module III**
Determination of thermal death point and Thermal death time of microorganism for design of a sterilizer.

**Module IV**
Comparative studied of ethanol production using different substrates by batch and fed batch culture.

**Module V**
Microbial Production of antibiotics (Penicillin)

**Examination Scheme:**

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**Note:** Minor variation could be there depending on the examiner
ENZYMEOLOGY AND ENZYME TECHNOLOGY LAB

Course Code: MBE 121                      Credit Units: 03

Course Contents:

Module I
Isolation of Enzymes from plant and microbial sources.

Module II
Enzyme assay; activity and specific activity – determination of amylase, nitrate reductase, cellulose and protease.

Module III
Purification of Enzyme by ammonium sulfate precipitation.

Module IV: Enzyme kinetics
Effect of varying substrate concentration on enzyme activity.
Effect of Temperature and pH on enzyme activity.

Module V
Production of enzyme on industrial scale using solid state fermentation.
Enzyme immobilization

Examination Scheme:

Major Experiments  40
Minor Experiments  20
Spotting            10
Viva               20
Records            10

Total:            100

Note: Minor variation could be there depending on the examiner
Course Code: MBE 122                Credit Units: 03

Course Contents:

Module I
Identification of Protein by Biuret test, Bradford method, Separation of Proteins by SDS- PAGE method

Module II
Biochemical Estimation of blood sugar

Module III
Biochemical estimation of DNA, RNA and Separation of DNA on Agarose gel

Module IV
Blood cholesterol estimation

Module V: Aseptic Techniques
Preparation of culture media for cultivation of specific microorganism.
Staining techniques – simple staining, acid fast and endospore staining, differential gram staining, lactophenol cotton blue staining for fungi.

Module VI
Biochemical test - Indole test, methyl red test, voges proskeaeur test, citrate utilization, starch hydrolysis, protease, catalase test and oxidase test.

Examination Scheme:

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<th>Component</th>
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<tr>
<td>Major Experiments</td>
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<td>Records</td>
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Total: 100

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

Course Code: MBE 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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<th>Components</th>
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<th>CT2</th>
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</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
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: MBE 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: MBE 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, wohnwn, lernen, arbeiten, trinken, etc.
All personal pronouns in relation to the verbs taught so far.
Greetings: Guten Morgen!, Guten Tag!, Gute Nacht!, Danke sehr!, Danke!, Vielen Dank!, (es tut mir Leid!),
Hallo, wie geht’s?: Danke gut!, sehr gut!, prima!, ausgezeichnet!,
Es geht!, nicht so gut!, so la la!, miserabel!

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

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

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

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

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

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

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

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

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

Examination Scheme:

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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 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 llamarse and practice of it.

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

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

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

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

Examination Scheme:

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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

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
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.

Examination Scheme:

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</table>

C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:
- “Elementary Chinese Reader Part I” Lesson 1-10
BIOREACTOR DESIGN AND ANALYSIS

Course Code: MBE 201 Credit Units: 04

Course Objective:
Objective of the course are the application of basic chemical principles to understand different bioreactor configuration, design and optimum operations, process involving microbial flocks and films and scale-up of bioreactors.

Course Contents:

Module I
Thermodynamics and rate concept of biological systems; Bioreactor configuration - batch, continuous stirred-tank, tubular, plug flow, packed bed, air lift, fluidized bed.

Module II
Kinetic expression; Monod’s equation and its generalization; Bioreactor design and optimum operations – Mixing characteristics; Residence time distribution (RTD) in bioreactors and non ideality, Concentration distribution and Temperature distribution.

Module III
Analysis of multiple interacting microbial populations, Biological system parameters; Processes involving microbial flocs; Bioreactors containing microbial films.

Module IV
Basic concept of scale-up of bioreactors

Examination Scheme:

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Text & References:

Text:
- Bioprocess Engineering: basic concepts, Michael L. Shuler and Fikret Kargi
- Chemical Reaction Engineering, O. Levenspiel, John Wiley and Sons Inc.
- Principles of Fermentation Technology, Salisbury, Whitaker and Hall, Aditya Text Pvt. Ltd.

References:
Course Objective:
The course objective will help to learn the students to purify and characterize the bioproducts of biological importance by various ways of down stream processing.

Course Contents:

Module I
Different processes / methods of down stream processing viz., centrifugation, distillation, extraction, adsorption, cell disruption, extraction, chromatographic techniques, membrane process and the like.

Module II
Phase equilibria or flux data for membrane, Density, Viscosity, diffusion coefficients, Efficiency or mass transfer data, complete performance and economic evaluation, complete process design.

Module III
Introduction, Roles of separation process in Industry, Separating agents, steps common to designing and separation process (comparison of feed and product, Rate to be processed, Operating condition (pressure, temperature)

Examination Scheme:

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Text & References:

Text:
- Down stream Processing, J. P. Hamel, J. B. Hunter and S.K. Sikdar, American Chemical Society.

References:
- Protein Purification, M.R. Ladisch, R.C. Willson, C.C. Painton and S. E. Builder, American Chemical Society.
Course Objective:
To impart through knowledge of the equipments, operational modes of instrumentation systems and their control applicable in the area of bioprocessing engineering.

Course Contents:

Module I
Biochemical process variables and their measurements; Control principles and their application in bioreactors.

Module II
Theory of electrode processes and their applications; Measurement and control of pH, temperature, dissolved oxygen, aeration and agitation, redox potential, foam, etc

Module III
Introduction to biosensors; Transduction principles used in biosensors; Characteristics of biosensors; Biosensors based on amperometric, potentiometric, thermistor FET, fiber optics and bioluminescence, Microbial biosensors

Module IV
Fundamentals of digital process control; Use of computer in control and optimization of microbiological processes.

Examination Scheme:

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</table>

Text & References:

Text:

References:
- Principles of Fermentation Technology, Salisbury, Whitaker and Hall, Aditya Text Pvt. Ltd.
WASTE WATER ENGINEERING

Course Code: MBE 204     Credit Units: 04

Course Objective:
The objective of the course would help students to learn how to prevent and control pollution caused by waste water discharge into natural bodies.

Course Contents:

Module I
Definition of waste; Physical, chemical and biological characteristics of waste water.

Module II
BOD, COD and TOD - their estimation and correlation; BOD progression curve and kinetics; Determination of BOD; Effect of reaction rate constant on short term BOD; Determination of BOD rate constants.

Module III
Kinetics of nitrification and denitrification; Treatment process for waste water; Kinetics of activated sludge process (ASP); Mixing regime in ASP; Aeration system; Loading criteria; Sludge viability; Solid-liquid separation; Primary and secondary clarifier.

Module IV
Anaerobic and aerobic treatment of wastes; Kinetics of anaerobic and aerobic treatment; Sludge characteristics; Process modeling and control; Case studies.

Examination Scheme:

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Text & References:

Text:
- Metcalf and Eddy “waste water engineering”

References:
PROTEIN ENGINEERING

Course Code: MBE 205                      Credit Units: 04

Course Objective:
The aim of the course is to teach the students the basic methodology of recombinant DNA technology leading to the generation of genetically engineered proteins, protein folding and its characterization. The course would also emphasize the requirement of protein engineering technique in the generation of novel proteins for specific purposes of industrial importance.

Course Contents:

Module I
Dynamics and Structural Evolution Protein Engineering: Study of molecular interaction forces (Hydrogen, Ionic, covalent, van- der walls and others), Structure and chemical properties of the building blocks of biological materials (amino acids, sugars, nucleic acids).

Module II
Protein structure and folding; Mechanism of folding; Principles of protein secondary structures, alpha-helix, beta-helix, beta-sheet, beta-turns, random coils, coiled coils, and others and case studies with Keratin, collagen and green fluorescence protein. Methods and tools used to characterize the molecular structures of biological materials (Circular dichroism, NMR, X-ray diffraction, FTIR, scanning electron microscopy and others).

Module III
Protein dynamics, Protein Folding (1,2,3 & 4), Proteins design and engineering, Random and site directed mutagenesis; Strategies to alter catalytic efficiency; structure prediction and modeling proteins; Molecular graphics in protein engineering; Dynamics and mechanics; Signal transduction.

Module IV
Receptors and hormones; antigen-antibody relationship; Drug-protein interactions and Design applications of engineered proteins. Molecular chaperons, Heat shock protein, case study of misfolded prions; Drugs-protein interactions and Design; Protein engineering benefits in industry and medicine; Engineering of antibodies.

Examination Scheme:

<table>
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Text & References:

Text:
- Protein Engineering in Industrial Biotechnology, Lilia Alberghina (Editor), Hard wood academic Publisher.

References:
- Plant Protein Engineering: edited by Peter R Shewry and Steven Gutteridge, Press Syndicate of the University of Cambridge.
- Protein Engineering Hand book Vol, Stefan Lutz, Uwe Theo Bornscheuer.
Course Code: MBE 206 Credit Units: 04

Course Objective:
The aim of this course is to develop the understanding of relevance, business impact and protection of Intellectual Property along with the types of Intellectual Property Right; Patents, Copyrights Trademarks, Industrial designs, Geographical Indications and International Conventions, Biosafety and Bioethics.

Course Contents:

Module I

Module II

Module III
Copyright- Objectives of copyright Rights conferred by registration of copyright, Infringement of copyright.

Module IV
Trademarks- Basic Principles of Trademarks, Rights conferred by registration of Trademark, Infringement of Trademark.

Module V

Module VI
Biosafety and Bioethic management- Key to environmentally responsible use of biotechnology, Cartagena Protocol on Biosafety, Ethical implications of Biotechnological products and techniques.

Examination Scheme:

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Text & References:

Text:

References:
- Intellectual Property Right by Williams Rodelph Cornish, David Clewely.
Course Objective:
The course aims to develop competency and expertise in the application of statistical methods applied to biological data obtained experimental techniques, methodology and the safe laboratory practice.

Course Contents:

Module I: Statistics and Biostatistics

Module II: Correlation
Bivariate distribution correlation, Type of correlation, properties and Interpretation of correlation coefficient, coefficient of determination, Scatter diagram, standard error, probable error of correlation coefficient, Rank correlation
Regression: Definition, Regression lines and Regression coefficient, Properties of Regression coefficient. Probability; Random distribution Trail and Event Axiomatic definition of Probability, Multiplication theorem, Conditional Probability, Bayes’ Theorem.

Module III: Introduction to the following Statistical terms
Parameter, statistic, Null hypothesis, Alternative hypothesis, Critical region, Type I error, Type II error, Level of significance, P-value and its application.
Test of significance for small sample: One sample t- test, paired t-test, Degree of freedom for t-test. F-test for equality of population of variance, Degree of freedom for F-test. Chi- square test: Test of goodness of fit, Test of independence of attributes, Degree of freedom for Chi- square test, Coefficient of contingency, Yates’ correlation for continuity.
Analysis of Variance: One way and Two way

Module IV
Continuous distribution, Normal distribution, Properties of Normal distribution.

Module V
Basic of computer programming

Examination Scheme:

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Text & References:

- Fundamental of statistics, S. C. Gupta, Publisher S. Chand & Co.
- Let us C, Y. Kanethkar
r- DNA TECHNOLOGY

Course Code: MBE 208 Credit Units: 04

Course Objective:
A complete understanding of molecular techniques can be obtained through the course. The successful application of biotechnology largely depends on these advanced molecular techniques.

Course Contents:

Module I: Introduction to r-DNA Technology; Vectors
Definition and types; Construction and properties of plasmid, bacteriophage (Lambda and M13), cosmids and phagemid vectors, artificial chromosome (YAC, BAC)

Module II
Restriction enzymes, methyltransferase, ligase, polymerase, kinase, phosphatase, nuclease, transferase, reverse transcriptase, linkers, adapters, DNA, RNA and protein markers.

Module III
Overview of expression vectors (Bacteria and yeast), Vector engineering (fusion tags, antibiotic markers), codon optimization, host engineering.
Purpose of constructing DNA libraries, Construction of cDNA libraries and genomic libraries.

Module IV
Primer extension mapping, S1 mapping, RNase protection assay, two and three hybrid system, subtractive hybridization, gel retardation assay, DNase footprinting, in vitro transcription and translation, phage display, DNA sequencing (Maxam Gilbert, Sanger’s and automated), Protein sequencing.

Examination Scheme:

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<th>Components</th>
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</table>

Text & References:

Text:
- Recombinant DNA, J.D. Watson et al, W.H. Freeman and company.

References:
DOWN STREAM PROCESSING LAB

Course Code: MBE 220  Credit Units: 03

Course Contents:

Module I
Cell disruptions techniques, conventional filtration

Module II
Protein precipitation

Module III
Aqueous two-phase extraction

Module IV
Ion exchange chromatography, Gel filtration

Module V
Membrane based filtration i.e. Micro filtration and cross filtration in cross flow Modules

Examination Scheme:

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Note: Minor variation could be there depending on the examiner
BIOPROCESS INSTRUMENTATION LAB

Course Code: MBE 221                    Credit Units: 03

Course Contents:

**Module I**
Centrifugation- low speed and high speed.

**Module II**
Spectrophotometer techniques.

**Module III**
Light microscopy and Electron.

**Module IV**
Different parts of Bioreactor.

**Module V**
HPLC and Gas chromatography

Examination Scheme:

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

Course Code: MBE 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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<th>Components</th>
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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
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 Code: MBE 244
Credit Units: 02

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

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

Examination Scheme:

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C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:
- le livre à suivre : Campus: Tome 1
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 propositions with their use
Both theoretical and figurative use

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

Examination Scheme:

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

Examination Scheme:

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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.

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
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
TERM PAPER - I

Course Code: MBE 230 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 theses/ 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.)
IMMUNOLOGY AND IMMUNOTECHNOLOGY

Course Code: MBE 301  Credit Units: 04

Course Objective:
Role of antibody engineering in biomedical applications and the importance of immuno genetics 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 immune system
Hematopoeisis 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, Vaccine: General consideration, ideotype network hypothesis, synthetic vaccine.

Module IV
Tumor immunology, Transplantation immunology, immunotherapy.

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

Examination Scheme:

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</table>

Text & References:

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

References:
- Immunology, Roitt, Mosby- Yearbook Inc.
- Immunology, W.L. Anderson, Fence Creek Publishing (Blackwell).
Course Objective:
The Objective of this paper is to include not only application of chemical engineering principles/unit operation to bioprocess system but also to include 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; Flow sheeting; Piping and instrumentation.

Module II
Materials of construction for bioprocess plants; Mechanical design of process equipment; Vessels for biotechnology application.

Module III
Design of bioreactors; Design considerations for maintaining sterility of process streams processing equipment; Selection and specification of equipment for handling fluids and solids; Selection, specification design of heat and mass transfer equipment used in bioprocess industries

Module IV
Design of facilities for cleaning of process equipment used in biochemical industries; Utilities for biotechnology production plants; Process economics; Bioprocess validation; Safety Considerations; Case studies.

Examination Scheme:

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Text & References:

Text:
- Process Plan Layout and Piping Design, E. Bausbacher, R. Hunt, Prentice Hall PTR.

References:
- Chemical Engineers Handbook, R.H. Perry and D.W. Green, McGraw- Hill.
- Plant Design and Economics for Chemical Engineers, M. Peters and K. Timmerhaus.
Course Objective:
Environment constitutes one of the most important ingredients because of the global problems. Thus, it is imperative to understand the Bioremediation of different components of environment. The present course will make them competent academically to envisage the different problems.

Course Contents:

Module I
Ecology and Ecosystem. Water, soil, air, noise and thermal pollution, their sources and effects.

Module II
Waste water treatment aerobic and anaerobic treatment, conventional and advanced treatment technology, methanogenesis, methanogenic, acetogenic, and fermentative bacteria-technical process and conditions, emerging biotechnological process in waste water treatment.

Module III: Solid waste management
Landfill, composting, earthworm treatment, recycling and processing of organic residues.
**Biodegradation:** Biodegradation of xenobiotic compounds, organisms involved in degradation of chlorinated hydrocarbons, substituted aromatic compounds, polyaromatic hydrocarbons, pesticides, surfactants and microbial treatment of oil pollution.

Module IV: Microbial leaching and mining
Extraction of metals from ores; recovery of metals from solutions; Microbes in petroleum extraction; Microbial desulfurization of coal.

Module V: Wasteland
Use and management, bioremediation and biorestoration of contaminated lands.
**Hazardous wastes:** source management and safety.

Examination Scheme:

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Text & References:

**Text:**
- Environmental Biotechnology by PK Mohapatra.

**References:**
Course Objective:
This course is designed to develop a fundamentals understanding about biochemical reaction and the directed improvement of cellular properties in order to achieve certain industrial and medical goals. This is an interdisciplinary field at the interface of chemical engineering, biochemistry, molecular and cell biology, and the computational sciences. The aim of this course is to provide an introduction to the principles and methodology of metabolic engineering. The course will cover experimental and mathematical techniques for the quantitative description, modeling, control and design of metabolic pathways.

Course Contents:

Module I
Overview of molecular biology and cellular metabolism, different models for cellular reactions, Metabolic regulation network at enzyme level and whole cell level. Basic concepts of Metabolic Engineering.

Module II
Modeling of metabolic networks- stoichiometry, kinetics, mass balance for steady state, mass balance for transient case.

Module III
Metabolic flux analysis- linear programming, cell capability analysis, Genome Scale Flux analysis. Methods for experimental determination of metabolic fluxes- isotope labeling.

Module IV
Metabolic control analysis- nonlinear programming.

Module V
Synthesis and design of metabolic networks - interger programming, mixed-interger nonlinear programming, Case studies – ethanol production, amino acid biosynthesis, metabolism in bacteria and yeast.

Examination Scheme:

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Text & References:

Text:

References:
- Understanding the control of Metabolism by David Fell (1997) Portland Press.
ANIMAL AND PLANT CELL BIOTECHNOLOGY

Course Code: MBE 305  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:

ANIMAL CELL BIOTECHNOLOGY

Module I
Brief history of animal cell and organ culture, cultivation of animal cell 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-plaminogen-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.

PLANT CELL BIOTECHNOLOGY

Module IV
Brief introduction to various tissue culture techniques, cell culture, regeneration and preservation: Plants regeneration through meristem, callus (somatic embryogenesis) and anther, 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.
- Comprehensive Biotechnology, Moo-Young, Alna T. Bullm Howard Dalton, Panima Publication.
- Cell Growth and Division – A Practical approach, R. Basega, IRL Press.
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 model and thus the most effective compounds could be employed on the above result for being moved through preclinical studies to clinical trails.

Course Contents:

Module I: Drug target classification
DNA, RNA, Protein modification/ events, post-translational, processing enzymes, G protein coupled receptors (monomeric transmembrane proteins), small molecule receptor, neuropeptide receptors, ion channel (monomeric multi transmembrane proteins), ligand-gated ion channels (oligomeric transmembrane proteins), transporter (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. Pharmakinetics and Toxicological consideration.

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, formulation: pKa, partition coefficient, solubility, dissolution, chemical stability, and permeability, optimization of ADME characteristics, physico-chemical properties calculations, Linear free energy, Hanseh equation, Hammett 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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Text & References:

Text:
- Introduction to Biophysical Methods for protein and Nucleic acid research by J.A. Glasel and M.P. Deutscher, Academic press.

References:
- Side effects and Drug design by E.J. Lien, Marcel Dekker.
- Principles of Medicinal Chemistry by W.O. Foye, T.L. Lemke and D.A. Williams.
Course Objective:
Course addresses management and engineering design concepts required for process safety in chemical and biotechnology system, 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

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:

References:
- Industrial Safety and Laws by Indian School of Labour education, Madras
Course Code: MBE 320
Credit Units: 02

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 Code: MBE 320
Credit Units: 02

Course Contents:

Module I: Air Quality
Sampling, SPM determination using filter paper method.

Module II: Water Quality
Chemical analysis of water, Biological analysis of water: Total microbial count, Coliform test, BOD, COD.

Module III: Soil Analysis
Chemical and microbial characterization of contaminated soil, isolation of microbes from contaminated soil and to test their bioremediation efficiency.

Module IV
Vermicomposting

Module V
Production of Biofertilizers.

Examination Scheme:

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Total: 100

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

Course Code: MBE 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:

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</table>

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

Text & References:

- Krishnaswamy, N, Creative English for Communication, Macmillan
BEHAVIOURAL SCIENCE - III
(LEADING THROUGH TEAMS)

Course Code: MBE 343      Credit Units: 01

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.
• Hoover, Judith D. Effective Small Group and Team Communication, 2002, Harcourt College Publishers
• LaFasto and Larson: When Teams Work Best, 2001, Response Books (Sage), New Delhi
Course Code: MBE 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
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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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 Code: MBE 346
Credit Units: 02

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
JAPANESE - III

Course Code: MBE 347 Credit Units: 02

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: MBE 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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C – Project + Presentation  
I – Interaction/Conversation Practice

Text & References:

- “Elementary Chinese Reader Part I, Part-2” Lesson 21-30
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:

Choosing a subject
Finding sources of materials
Collecting the notes
Outlining the paper
Writing the first draft
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.
   Get facts, not just opinions. Compare the facts with author's conclusion.
   In research studies, notice the methods and procedures, results & conclusions.
   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:
      (iv) Show evidence of what an author has said.
      (v) Avoid misrepresentation through restatement.
      (vi) Save unnecessary writing when ideas have been well expressed by the original author.
   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 theses/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.)
Course Objective:
The course helps in developing a detailed understanding of eukaryotic 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, Microarray: DNA micro array marker, random primers, and 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: Introduction to proteomics

Module V
Fundamental methods used in proteomics, Relationship between protein structure and function. Post translational protein modification. 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:

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</table>

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.
TRANSPORT PHENOMENA IN MICROBIAL SYSTEM

Course Code: MBE 402       Credit Units: 04

Course Objective:
The course material deals with mass, energy and momentum transfer pertaining to newtonian and non-
newtonian fluids of bioprocess.

Course Contents:

Module I
Unified theory of momentum, energy and mass transfer.

Module II
Flow and mixing of Newtonian and non-Newtonian fluids.

Module III
Gas-liquid mass transfer in microbial systems; Oxygen transfer rates; Single and multiple bubble aeration.

Module IV
Design of spargers and aeration equipment, Mass transfer across free surface as well as freely rising or falling
bodies.

Module V
Basic concept of oxygen transfer coefficient (K_a) and its measurement; Correlation of K_a with other operating
variables; Factors affecting the K_a.

Examination Scheme:

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</table>

Text & References:

Text:
- Bioprocess Engineering: basic concepts, Michael L. Shuler and Fikret Kargi

References:
- Principles of Fermentation Technology, Salisbury, Whitaker and Hall, Aditya Text Pvt. Ltd.
- Biochemical Engineering S. Aiba, A.E. Humphery and N.F. Millis.
FOOD BIOTECHNOLOGY

Course Code: MBE 403      Credit Units: 04

Course Objective:
The purpose of the food biotechnology major is to produce professional 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 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
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 III
Development of environment - friendly packaging materials based on product characteristic and performance properties packaging materials, and finished package forms, process schedules for thermal processing of foods in cans, glass, tin-free steel and aluminum containers, and retortable pouches based on heat penetration studies and sterilization value.

Module IV
Starter culture, prebiotics, probiotics - their use as flavor enhancer and diseases/ infection combats, application in production of cheese, butter, ice-cream, yoghurt, application in biomedical research, e.g. recombinant LABs as vaccine; modified milk proteins.

Module V
Production of SCP (Single cell protein), baker’s yeast, brewing industry, application of transgenic plants in food production, transgenic fish, transgenic poultry.

Examination Scheme:

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Text & References:

Text:
- Food technology by Frazier.
- Food Microbiology, 2nd edition by Adams and Moss.

References:
GENOMICS AND PROTEOMICS LAB

Course Code:  MBE 420      Credit Units:  02

Course Contents:

Module I
Three dimensional structures – in silico study- large molecular complexes RNA polymerase II, ribosome.

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:

Major Experiments  40
Minor Experiments  20
Spotting          10
Viva             20
Records          10

Total:           100

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

Course Code: MBE 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:

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</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 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: MBE 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
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.

Examination Scheme:

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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 Dallapiiazza et al, Tangram Aktuell A1/1.2
- Braun, Nieder, Schmöe, Deutsch als Fremdsprache 1A, Grundkurs
SPANISH - IV

Course Code: MBE 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

Examination Scheme:

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C – Project + Presentation
I – Interaction/Conversation Practice

Text & References:

- Español Sin Fronteras (Nivel – Elemental)
Course Code: MBE 447  Credit Units: 02

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.

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
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 educated 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 actin “zhengzai” Also the use if “zhe” with it.
To welcome someone and to see off someone … I cant go the airport to see you off… etc.

Module IV
Shipment. Is this the place to checking luggage?
Basic dialogue on – Where do u work?
Basic dialogue on – This is my address
Basic dialogue on – I understand Chinese
Basic dialogue on – What job do u do?
Basic dialogue on – What time is it now?

Module V
Basic dialogue on – What day (date) is it today?
Basic dialogue on – What is the weather like here.
Basic dialogue on – Do u like Chinese food?
Basic dialogue on – I am planning to go to China.

Examination Scheme:

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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
Analyse 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)