Courses in B.Sc. Biotechnology to enhance Entrepreneurship/ communication skill development

BBT 309: General Course III, Elective; Option I - <u>Communication Skills and Personality Development</u> General Course III; 2 Credits		**Total 30 L**
1	Preparation of presentation –principles and presentation technique (what, how, for whom etc).	3 L
2	Nonverbal communication during presentation – how to manage stress, what to do with hands, legs …, activating the audience with nonverbal communication	3 L
3	Verbal communication –argumentation, usable and unsuitable phrases	2 L
4	Communication skills – listening, empathic reaction, how to question, stealing the show, opening door question	3 L
5	Conflict situation solving, attack from the audience – communication skills as a work experience, vicious circle of attack and defence	2 L
6	Work with audience – ice-breaking, get them in the mood, work with emotions, visualization tools, nonstandard situations	3 L
7	Improvisation and unprepared presentations	2 L
8	Paradigm of human cooperation – why there could be problems to start the communication and what to do with it	3 L
9	Defense against manipulation, how to say NO, stress management	3 L
10	Image and etiquette	2 L
11	Basics of Personality (Definationetc), Theories of Personality Development	3 L
12	Analysing Strengths & weaknesses, Body Language & Preparation of Self Introduction	3 L

BBT 608: Open Course VI, Elective; Option II - <u>Business management in Biotechnology</u> **Total 30L**

Open Course VI; 2 Credits

UNIT I

1	Natureand characteristics of Management, Scope and Functional areas of management.	**1 L**
2	Roles of Management, Levels of Management in Biotechnology	**1 L**
3	Evolution of management thought: early, contemporary and modern	**1 L**
4	Nature, purpose and importance of planning process	**2 L**
5	Types of plans and Decision making.	**2 L**
6	Importance of planning – steps in planning & planning premises.	**2 L**
7	Hierarchy of plans. Components of planning	**2 L**
8	Principles of organization, Types of organization. Departmentation Committees.	**1 L**
9	Nature and importance of staffing–Process of Recruitment and Selection.	**3 L**

UNIT II

10	Performance appraisals	**2 L**
11	Motivation and leadership	**1 L**
12	Business Communication – Meaning and importance	**1 L**
13	Sales Management Nature of product and market strategy	**1 L**
14	Packaging and advertising	**2 L**
15	After Sales Service	**1 L**
16	Pricing techniques	**2 L**
17	Financial functions and cost analysis in project planning and control	**2 L**
18	Structure of a Biotechnology Company	**2 L**
19	Start-up of Biotechnology Company	**1 L**

References

1. Entrepreneurship and Small Business Management: C.B. Gupta, S.S. Khanka, Sultan Chand & Sons.
2. Marketing Management, 14/E Philip KotlerKevin Keller
3. Principles of Management – P.C.Tripathi, P.N.Reddy – Tata McGraw Hill Management Fundamentals – Concepts, Application, Skill Development – RobersLusier – Thomson

BBT 504: Food Biotechnology **Total**
Core Course; 3 Credits **45L**

UNIT I

1 Introduction 5 L
Importance of food and dairy Micro biology – Types of microorganisms in food – Source of contamination (primary sources) – Factors influencing microbial growth in foods (extrinsic and intrinsic)

2 Food fermentations: Cheese, bread, wine, fermented vegetables – methods and organisms used. Significance of fermented foods, Starter cultures for curd preparation and fermentation of idli batter, production of mushroom, single cell protein, assessment of microbiological quality of various foods. 10 L

Unit II

3 Food spoilage and General principles of food preservation 15 L
Preservation by Heat -Blanching, Pasteurization, Sterilization, Boiling and Canning. Refrigeration & Freezing of foods– Differences between - refrigeration and freezing, Preservation by Drying: Air convection dryers, Fluidized bed drier, roller drier, vacuum drier, spray drier, Freeze – Drying.Preservation by Concentration- Methods of concentration, Types of Evaporators. Preservation by Radiations - Types of Radiations, Effects of Radiations, Dose – Determining Factors, Status of Irradiated foods in India, Microwave, Ohmic heating. Preservation by Chemicals -GRAS, Food preservation by preservatives, Food Additives

Unit III

4 Introduction to Tetrapack technology 1 L

5 Genetically modified foods – 7 L
Organic foods, Types of organic foods, identifying organic foods, organic food & preservatives.
Genetic modification in Food industry – Background, history, controversies over risks, application, future applications.

6 Industrial awareness: Quality control and quality assurance in food industry, concept of current good manufacturing practices (Hazard Analysis and Critical Control Points) 7 L

References

1. Food Microbiology, Frazier &Westhoff, 4th edition, (2008) Tata

BBT 602: Bioprocess Technology and Quality Control **Total**
Core Course - Theory; 3 Credits **45L**

UNIT I

1	Isolation & preservation of industrially important micro-organisms	5 L
2	Selection of the desired characteristics, Screening methods, different methods of culture preservation,improvement of industrial micro-organisms	5 L
3	Media formulation: media ingredients, objectives and cost effectiveness	5 L

UNIT II

4	Types of fermentation, design of typical bioreactor and its various parts	5 L
5	Types of bioreactors: continuous stirred tank reactors (CSTR), packed bed reactors, fluidized bed reactors, air lift fermenter	5 L
6	Online monitoring and computer control of fermentation process	3 L

UNIT III

7	Downstream processing**:** General steps, recovery of products, extraction and purification	08L
8	Quality control in pharmaceutical industry: Evolution of quality concepts: Quality, Quality control, Quality Assurance, GMP Quality Assurance concepts & tools: Process approach, System approach, Statistical Quality control , Documentation Input control: Contamination, Cross contamination, Raw Material/ Packaging material, Building, premises and Location, Utilities, Human resource, Process control: Validation- Equipment/Instruments, process, Operators, Utilities, Materials, IPQC and Final quality testing and release of product Good Documentation Practices	09L

References

1) Principles of Fermentation Technology, Stanbury, P. F., Whitaker, A. and Hall, S. J., Butterworth-Heinemann, Burlington, MA, USA (2005)
2) Biotechnology – A textbook of industrial microbiology by WulfCrueger, AnnelieseCrueger ,Panima Publishing

BBT 508: Open Course V, Elective,Option I - Biotechnology for forensics **Total 30 L**

Open Course V; 2 Credits

Unit I

1	Collection and storage of biological evidence	2L
2	Chemical and microscopic analysis of biological stains	3 L
3	Screening evidence for biological stains in forensic casework	3L
4	Species of origin and serology separation techniques	5L
5	ABO Grouping and secretor status	2 L

Unit II

6	Biological markers of forensic significance	3L
7	Introduction to blood spatter	3 L
8	Introduction to DNA analysis	6 L
9	Court room testimony	3 L

References

1) **Forensic Science: An Introduction to Scientific and Investigative Techniques, Third Edition**
   Author: Stuart H. James, Jon J. Nordby Ph.D.
   Publisher: CRC; 3 edition (February 20, 2009) CRC Press, Taylor & Francis Group LLC, Routledge , 6000 Broken Sound Pkwy, NW, Suite 300,Boca Raton FL 33487
   United States of America
2) **Criminalistics: An Introduction to Scientific and Investigative Techniques,**
   Author: Richard Saferstein
   Publisher: Prentice Hall College Div;
   10th Edition (1/13/2010)

BBT 408: Open Course IV, Elective; Option II – Biofertilizer Technology **Total**
Open Course IV; 2 Credits **30L**

UNIT I

1	Soil microorganisms, composition and types of soil.	3 L
2	Rhizospheremicroflora and its role in the rhizosphere	3 L
3	Role of microorganisms in composting and humus formation; Bioinoculants and their agricultural importance	3 L
4	Biochemistry of symbiotic and non- symbiotic nitrogen fixation	3 L
5	Phosphate solubilization and Potassium mobilization	3 L

UNIT II

6	Methods of application (liquid and carrier based)	3 L
7	Comparison of bioinoculants with chemical fertilizers	3 L
8	Methods of preparation – liquid and carrier based	3 L
9	Endomycorrhizae and Ectomycorrizae – Non symbiotic microbes – Azotobacter – Associative Symbiosis - Azospirillum – Cyanobacteria (Nostoc. Gloeocapsa)	3 L
10	AzolaAnabena System. Microbial inoculants.	3 L

References:

1. Food Microbiology by Adams, M.R. and Moss, M.O.1995. The Royal Society of Chemistry, Cambridge.
2. Food Microbiology by Frazier, W.C. and Westhoff,D.C.1988. TATA McGraw Hill
Publishing company ltd., New Delhi. 8
3. Modern Food Microbiology by Jay, J.M.1987. CBS Publishers and distributors, New Delhi.
6. Basic Food Microbiology by Banwart, G.J.1989. Chapman & Hall New York.
7. A Modern Introduction to Food Microbiology by Board, R.C.1983. Blackwell Scientific Publications, Oxford.
8. Dairy Microbiology by Robinson, R.K.1990. Elsevier Applied Science, London.
9. Food Poisoning and Food Hygiene, Hobbs, B.C. andRoberts, D.1993. Edward Arnold. London

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