

and reports, students will draft business correspondence writing tasks and different proposals/ reports on topics assigned.

- Watching videos/listening to audios of business presentations, classroom activities of team and individual presentations, using PPTs, mock exercises for BEC speaking, agreeing, disagreeing politely, developing content, extended speaking in Group Discussion(s).

MODULE-2

UNIT-1

0L+0T+8P=8 Hours

READING AND COMPREHENDING BUSINESS DOCUMENTS

Reading: Reading and comprehending business documents, learning business register, regularizing the habit of reading business news, suitable vocabulary, skimming and scanning a text for effective and speedy reading and dealing with ideas from different sectors of corporate world in different business contexts.

UNIT-2

0L+0T+8P=8 Hours

IMPARTING AND PRACTICING LISTENING SKILLS

Listening: Specific information in business context, listening to telephonic conversations / messages and understanding the correct intended meaning, understanding the questions asked in interviews or in professional settings, summarizing speaker's opinion or suggestion, enable active listening.

PRACTICES:

- Hand-outs - matching the statements with texts, finding missing appropriate sentence in the text from multiple choices, using right vocabulary as per the given context and editing a paragraph.
- Working out BEC/TOEFL/IELTS listening exercises with hand-outs; matching the statements with texts, finding missing appropriate sentence in the text from multiple choice- multiple choices, using right vocabulary in context-editing a paragraph, listening to a long conversation such as an interview and answer MCQ s based upon listening.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Possess comprehensive skills in listening and reading business texts in formal context.	Apply	2	7
2	Communicate effectively both in their academic as well as professional environment.	Apply	2 and 1	10
3	Clear grasp on the register of business language.	Analyze	1	8
4	Possess the ability to write business reports and proposals clearly and precisely to succeed in their future.	Create	1	12
5	Make effective presentations and participate in formal context.	Create	2	10

TEXT BOOKS:

1. S. Schnurr, "Exploring Professional Communication: Language in Action", London: Routledge, 2013.

REFERENCE BOOKS:

1. Brook Hart Guy, "Cambridge English Business Bench Mark: Upper Intermediate", 2nd Edition: CUP, 2014.
2. Cambridge University Publication, "Cambridge: BEC VANTAGE Practice Papers", CUP, 2002.
3. J. Seely, "The Oxford Guide to Effective Writing and Speaking", Oxford University Press, 2005.

SKILLS:

- ✓ To enhance listening and spoken abilities of students needed for professional and social success in interpersonal situations, group interactions, and personal and professional presentations.
- ✓ Understand and practice specific functions and vocabulary in a business context.
- ✓ Produce short business reports, proposals and correspondence.
- ✓ Write various business documents through reading techniques.



Source : <https://mpl.loesungsfabrik.de/en/english-blog/method-validation/analytical-vs-bioanalytical-method-validation>

22BT204 BIOANALYTICAL TECHNIQUES

Hours Per Week :

L	T	P	C
3	0	2	4

PREREQUISITE KNOWLEDGE: Biochemistry and Organic Chemistry.

COURSE DESCRIPTION & OBJECTIVES:

The course provides an in-depth understanding of various scientific instruments used for analysis. The objective of this course is to understand the scope of application, advantages and limitations of the various modern analytical and separation techniques.

MODULE-1

UNIT-1

9L+0T+6P=15 Hours

TRADITIONAL AND MODERN ANALYTICAL METHODS

Microscopy – types of bright field, types of dark field and electron microscopy, Electromagnetic radiation– Breaking of bonds, Vibration and rotation in chemical bonds, Absorption spectroscopy, Beer-Lambert's law and apparent deviations, Mass determination.

UNIT-2

15L+0T+10P=25 Hours

MICROSCOPY AND SPECTROSCOPY

Fluorescent microscopy, Confocal microscopy, Phase contrast microscopy, Scanning electron microscopy and Transmission electron microscope, Flow cytometry, UV-Visible spectrophotometer, Infra-Red spectroscopy, Proton and 2D-NMR, X-ray spectroscopy, Mass spectroscopy.

PRACTICES:

- Application of array of fluorochromes to identify cells and sub-microscopic cellular components.
- Determination of lambda max using UV visible spectrophotometer.
- Estimation of Molar Extinction Co-efficient using Beer Lamberts law.
- Characterization of proteins using Fourier Transform Infrared Spectroscopy.
- Fortitude crystalline nature of biological materials using X-ray diffraction analysis (XRD).
- Measuring of materials under Scanning electron microscopy.

MODULE-2

UNIT-1

9L+0T+6P=15 Hours

BASICS IN SEPARATIONS

Centrifugation–basic & principles, RPM-RCF, Electrophoresis - principles and types, Chromatography-general principles and its applications, Liquid and gas chromatography.

UNIT-2

15L+0T+10P=25 Hours

ADVANCED TECHNIQUES IN SEPARATION

Ultra centrifugation and density gradient centrifugation, Disc electrophoresis, slab iso - electric focusing and iso tachophoresis, Ion - exchange chromatography, gel -filtration chromatography, affinity chromatography and HPLC.

PRACTICES:

- Separation of biomolecules using a density gradient centrifuge.
- Agarose gel electrophoresis for separation of DNA fragments.
- SDS-PAGE electrophoresis for determination of molecular weight of proteins.
- Purification of biological macromolecules using Ion Exchange chromatography.
- Fractionation of bioactive compounds using gel filtration chromatography.
- Characterization of bioactive compounds through HPLC.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Analyze the morphology of cells using Microscopy.	Analyze	1	1,2,4,5,9,10
2	Apply the analytical techniques for characterization of proteins.	Apply	1	1,2,3,5,9,10
3	Apply the electrophoresis techniques for separation of proteins.	Apply	2	1,2,3,5,9,10
4	Analyze the purity level of molecules using chromatographic techniques.	Analyze	2	2,3,4,5,9,10

TEXT BOOKS:

1. Keith Wilson and John Walker, "Principles and Techniques of Biochemistry and Molecular Biology", 7th edition, Cambridge University Press, 2013.
2. J. Jayaraman, "Laboratory Manual in Biochemistry", 2nd edition, New Age International, 2011.

REFERENCE BOOKS:

1. K. Wilson, K.H. Goulding, "A Biologist Guide to Principles and Techniques of Practical Biochemistry", 7th edition, Cambridge University Press, 2006.
2. Douglas A. Skoog, Donald M. West, F. James Holler and Stanley R. Crouch "Fundamentals of Analytical Chemistry", 9th edition, Cengage learning, 2013.
3. Frank A. Settle, "Hand Book of Instrumental Techniques for Analytical Chemistry", Prentice Hall, 1997.

SKILLS:

- ✓ Handling of microscope and UV Visible spectrophotometer.
- ✓ Skilled handling of chromatography techniques.
- ✓ Experience in analyze the results of XRD and FTIR.