AC –24/11/2023

Item No. 6.1 (N)

As Per NEP 2020

University of Mumbai

Title of the program

A- U.G. Certificate in Biotechnology
B- U.G. Diploma in Biotechnology
C- B.Sc. (Biotechnology)
D- B.Sc. Hons. (Biotechnology)
E- B.Sc. Hons. with Research (Biotechnology)

Syllabus for

Semester – Sem I to II

Ref: GR dated 20th April, 2023 for Credit Structure of UG

(With effect from the academic year 2023-24 Progressively)

University of Mumbai

(As per NEP 2020)

Sr. No.	Heading	Particulars	
1	**Title of program** **O: _____A**	**A**	**U.G. Certificate in Biotechnology**
	O: _____B	**B**	**U.G. Diploma in Biotechnology**
	O: _____C	**C**	**B.Sc. (Biotechnology)**
	O: _____D	**D**	**B.Sc. Hons. (Biotechnology)**
	O: _____E	**E**	**B.Sc. Hons. with Research (Biotechnology)**
2	**Eligibility** **O: _____A**	**A**	(10+2) A learner must have passed H.Sc. (Science) **OR** Passed Equivalent Academic Level 4.0
	O: _____B	**B**	Under Graduate Certificate in Biotechnology **OR** passed equivalent Academic Level 4.5
	O: _____C	**C**	Under Graduate Diploma in Biotechnology **OR** passed equivalent Academic Level 5.0
	O: _____D	**D**	Bachelors of Biotechnology **OR** passed equivalent with minimum CGPA of 7.5 Academic Level 5.5
	O: _____E	**E**	Bachelors of Biotechnology **OR** passed equivalent with minimum CGPA of 7.5 Academic Level 5.5
3	**Duration of program** **R: _____**	**A**	One Year
		B	Two Years
		C	Three Years
		D	Four Years
		E	Four Years
4	**Intake Capacity** **R: _____**	**60 students per division**	

5	**Scheme of Examination** **R: _____**	NEP 40% Internal 60% External, Semester End Examination Individual Passing in Internal and External Examination	
6	**R: _____ Standards of Passing**	40%	
7	**Sem. I & II Credit Structure** **R: _____A** **R: _____B**	Attached herewith	
	Sem. III & IV Credit Structure **R: _____C** **R: _____D**		
	Sem. V & VI Credit Structure **R: _____E** **R: _____F**		
8	**Semesters**	A	Sem I & II
		B	Sem III & IV
		C	Sem V & VI
		D	Sem VII & VIII
		E	Sem VII & VIII
9	**Program Academic Level**	A	4.5
		B	5.0
		C	5.5
		D	6.0
		E	6.0
10	**Pattern**	Semester	
11	**Status**	New	
12	**To be implemented from Academic Year Progressively**	From Academic Year: 2023-24	

Sign of the BOS Chairman
Dr. Varsha Kelkar-Mane
Ad-hoc BoS (Biotechnology)

Sign of the Offg. Associate Dean
Dr. Madhav R. Rajwade
Faculty of Science & Technology

Sign of the Offg. Dean
Prof. Shivram S. Garje
Faculty of Science & Technology

Preamble

1) Introduction

Biotechnology is a multidisciplinary subject that deals with the application of biological processes for solving problems and designing eco-friendly products and processes. At Undergraduate level learners are offered various subjects that would strengthen their fundamentals in basic sciences as well as explore the fundamentals as well as applications of biotechnology. Subjects such as Chemistry, Biology and Information Technology, computer language form an integral part of the syllabus. Biotechnology plays a key role in industries such as refining, environmental remediation, agriculture and food production, healthcare, pharmacy, animal husbandry, textiles, and nutrition. Learners after completing their biotechnology course can find suitable employment in the research and development, laboratories, pharmacies etc. The syllabus herein discusses the subjects offered at undergraduate level highlighting the respective course as well as program outcomes

2) Aims and Objectives

The course aims at empowering the learners with a strong knowledge base of fundamental sciences, as well as applied sciences that would be useful in process development in various sectors of Biotechnology. On completion of the course the learner will be skilled and equipped with contemporary knowledge in Biotechnology and would be eligible for jobs in varied industrial sectors.

3) Learning Outcomes

The Undergraduate program in Biotechnology has been designed on learning outcome-based curriculum framework. The course covers the areas of Biotechnology along with fundamental Sciences with a range of core subjects in each semester. Along with providing the requisite biotechnology knowledge, the course has enough scope for inter- and multidisciplinary subjects in the form of electives. This course also caters the skill enhancement needs of the learners as well as provides opportunity for exchanges and learning from other disciplines. Every semester has a practical course for strengthening skills in designing and conducting experiments in the field of Biotechnology.

5) Credit Structure of the Program (Sem I, II, III, IV, V & VI)

Under Graduate Certificate in Biotechnology

Credit Structure (Sem. I & II)

	R:_____A								
Level	Sem	Major		Minor	OE	VSC, SEC (VSEC)	AEC, VEC ,IKS	OJT,FPCEP, CC, RP	Cum. Cr./ Sem.	Degree/ Cum. Cr.
		Mandatory	Electives							
4.5	I	6 (4T+2P) Course I 2 units Fundamentals of Biotechnology -I (2 Credits) Course II – 2 units Microbial Biotechnology (2 Credits) Practical (2 Credits)		-	4 Credits	VSC:2 Credits Lab based Select Any One Instrumentation in Biotechnology Computers in Biology SEC:2 Credits Lab Based Select Any One Microbial Techniques Clinical Biochemistry		CC:2 credits	22	UG Certificate 44
	R:_____B									
	II	6 (4T+2P) Course III – 2 units Fundamentals of biotechnology -II (2 Credits) Course IV- 2 units Molecular Biology I & Molecular Genetics (2 Credits) Practical (2 Credits)		2 Credits	4 Credits	VSC:2 Credits Lab based Select Any One Introduction to Medical Laboratory Technology Basics in R with Applications in Biotechnology SEC:2 Credits Lab Based Select Any One Physico chemical analysis of Soil & Water Food Adulteration		FP 2 Credit & CC:2 Credit	22	
	Cum Cr.	12	-	2	8	4+4	4+4 +2	4	44	
Exit option: Award of UG Certificate in Major with 40-44 credits and an additional 4 credits core NSQF course/ Internship OR Continue with Major and Minor										

Under Graduate Diploma in Biotechnology

Credit Structure (Sem. III & IV)

	R:_____C									
Level	Semester	Major		Minor	OE	VSC, SEC (VSEC)	AEC, VEC, IKS	OJT, FP, CEP, CC, RP	Cum. Cr./ Sem.	Degree /Cum Cr.
		Mandatory	Electives							
5.0	III	8(4T+4P) Course I- 2 units Immunology Course II- 2 units Molecular biology II Practical I (2 Credits) and Practical II (2 Credits)		4 credits	(2 Credits)	VSC:2, Select Any One R Programming for Data Analysis in Biology Lab Based Medical Biotechnology		FP:2 (BT) CC:2	22	UG Diploma 88
	R:_____D									
	IV	8 (4T+4P)(4+4) Course III- 2 units Biochemistry Course IV- 2 units Analytical Techniques in Biotechnology Practical I (2 Credits) and Practical II (2 Credits)		4 credits	(2 Credits)	SEC:2 Select Any One Traditional Fermentation Techniques Nutritional Analysis of Food and Food Products		CEP: 2 (BT) CC:2	22	
	Cum Cr.	28			10	12	6+6	8+4+2	8+4	88
Exit option; Award of UG Diploma in Major and Minor with 80-88 credits and an additional 4 credits core NSQF course/ Internship OR Continue with Major and Minor										

B.Sc. (Biotechnology)

Credit Structure (Sem. V & VI)

	R:_____E								
Level	Sem	Major		Minor	OE	VSC SEC (VSEC)	AEC, VEC, IKS	OJT, FP, CEP, CC, RP	Cum. Cr./ Sem.	Degree/ Cum. Cr.
		Mandatory	Electives							
5.5	V	10(6T+4P) Course I- 2 units Cell Biology Course II- 2 units Genomics and Proteomics Course III- 2 units Bioinformatics and Biostatistics Practical I (2 Credits) and Practical II (2 Credits)	4 credits Any One Food Nutrition & Nutraceuticals Environment Biotechnology Agri Biotechnology Medical Biotechnology	4 credits	-	VSC: 2 Molecular Diagnostics Food Biotechnology		FP/CEP: 2 (Research Projects)	22	UG Degree 132
	R:_____F									
	VI	10(6T+4P) Course IV- 2 units Clinical Biochemistry & Immunology Course V- 2 units Bioprocess Technology Course VI- 2 units Intellectual Property Rights Practical I (2 Credits) and Practical II (2 Credits)	4 credits Any One Marine Biotechnology Animal Biotechnology Plant Biotechnology Enzyme Biotechnology	4 credits	-	Bioenergy and biofuels/ Entrepreneurship Development Quality Control management in biotechnology Biopharmaceutical technology		OJT :4 On Job Training	22	
	Cum Cr.	48	8	18	12	8+6	8+4+2	8+6+4	132	

Exit option: Award of UG Degree in Major with 132 credits OR Continue with Major and Minor

[Abbreviation - OE – Open Electives, VSC – Vocation Skill Course, SEC – Skill Enhancement Course, (VSEC), AEC – Ability Enhancement Course, VEC – Value Education Course, IKS – Indian Knowledge System, OJT – on Job Training, FP – Field Project, CEP – Continuing Education Program, CC – Co-Curricular, RP – Research Project]

Evaluation Pattern

MAJOR:6 credits

Scheme 1:

Theory/Practical	Credits	No. of Hours	Marks
Theory: Paper 1	2	30	50
Theory: Paper 2	2	30	50
Practical	2	60	50

Evaluation Pattern:

Theory Paper

Internal Continuous Assessment: 40% (20 Marks)	Semester End Examination: 60% (30 Marks)	Duration for End semester examination
Continuous Evaluation through: Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc.	As per paper pattern	1h 30 minutes

Practicals

Internal Continuous Assessment: 40% (20 Marks)	Semester End Examination: 60% (30 Marks)	Duration for End semester examination
Viva/ assignment/ objective question test (15 Marks), Overall performance (5 Marks) = 20 Marks	One experiment (25 marks for experiment and 5 Marks for Journal = 30 Marks)	3h 30 minutes

PRACTICAL BOOK/JOURNAL

The learners are required to perform 75% of the Practical for the journal to be duly certified. The learners are required to present a duly certified journal for appearing at the practical examination, failing which they will not be allowed to appear for the examination.

VSC: 2 credits

Scheme 1: 1 practical course of 2 credits, Duration: 60 h, Total marks: 50

Internal Continuous Assessment: 40% (20 Marks)	Semester End Examination: 60% (30 Marks)	Duration for End semester examination
Continuous Evaluation through: Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc. (at least 3)	As per paper pattern	1h 30 minutes

Paper Pattern for 30 marks :

30 Marks per paper Semester End Theory Examination:

1. Duration - These examinations shall be of **Three hours** duration in laboratory

QUESTION PAPER PATTERN
(External and Internal)

Paper pattern as per scheme 1

Theory

Internal

Internal Continuous Assessment =20
Quizzes/MCQ/ Class tests- 10 marks
Project/ Assignments/ oral presentation(poster /power point)- 10 marks

External

Format of Question Paper: 30 marks			
Q. No.	Description	Module	Marks
1	Do as Directed (Any 5 of 10)	1 and 2	05
2	Answer in Brief/ Long Answer Questions/Justify/Discuss /Long answer question Any 2 of 4	1	10
3	Answer in Brief/ Long Answer Questions/Justify/Discuss /Long answer question Any 2 of 4	2	10
4	Application Based Question (Can be divided in sub questions with internal options)	1 & 2	5
		Total	30

Practical - 2 credit course

Internal

Viva/ assignment/ objective question test (15 Marks), Overall performance (5 Marks) = 20 Marks

Practical- Semester end examination

One experiment (25 marks for experiment) or 1 major experiment 15 marks and 1 minor experiment- 10 marks and 5 Marks for Journal = 30 Marks)
Duration-3 h 30 minutes

VSC

Internals

Viva/ assignment/ objective question test (15 Marks), Overall performance (5 Marks) = 20 Marks

Practical- Semester end examination

30 Marks per paper Semester End Theory Examination:

1. Duration - These examinations shall be of **Three hours** duration in laboratory

Letter Grades and Grade Points:

Semester GPA/ Programme CGPA Semester/ Programme	% of Marks	Alpha-Sign/ Letter Grade Result	Grading Point
9.00 - 10.00	90.0 -100	O (Outstanding)	10
8.00 - < 9.00	80.0 <90.0	A+ (Excellent)	9
7.00 - < 8.00	70.0 < 80.0	A (Very Good)	8
6.00 - < 7.00	60.0 < 70.0	B+ (Good)	7
5.50 - < 6.00	55.0 < 60.0	B(Above Average)	6
5.00 - < 5.50	50.0 < 55.0	C (Average)	5
4.00 - < 5.00	40.0 <50.0	P (Pass)	4
Below 4.00	Below 40.0	F (Fail)	0
Ab (Absent)	-	Ab (Absent)	0

F.Y.B.Sc. Biotechnology (USBT) Course Structure

Semester I

Ladder	Course Type	Title	Credits	Hours
Major 1	Theory	Fundamentals of Biotechnology-I	2	30
Major 2	Theory	Microbial Biotechnology	2	30
Major 3	Practical	Practical	2	60
VSC	Practical	Instrumentation in Biotechnology	2	60
OR				
VSC	Practical	Computers in Biology	2	60
SEC	Practical	Microbial Techniques	2	60
OR				
SEC	Practical	Clinical Biochemistry	2	60
OE	Theory	Nutrition, Life style diseases and their management	2	60
OE	Theory	Wine Technology	2	60

Semester II

Ladder	Course Type	Title	Credits	Hours
Major 1	Theory	Fundamentals of Biotechnology-II	2	30
Major 2	Theory	Molecular Biology & Molecular Genetics	2	30
Major 3	Practical	Practicals	2	60
Minor 1	Theory	Biotechnology and its Applications	2	30
VSC	Practical	Medical Laboratory Technology	2	60
OR				
VSC	Practical	Basics in R with Applications in Biotechnology	2	60
SEC	Practical	Physicochemical Analysis of Soil and Water	2	60
OR				
SEC	Practical	Food Adulteration	2	60
OE	Theory	Food - Preservation Techniques & Packaging	2	60
OE	Theory	Biotechnology - Industry 4.0	2	60

Semester I

Course I

Name of the Course: Fundamentals of Biotechnology-I

Sr.No.	Heading	Particulars
1	**Description the course : Including but Not limited to:**	The course aims to introduce the fundamentals of biotechnology. The learner will be able develop complete understanding of the broad spectrum of biotechnology, emphasizing its relevance, applications in diverse sectors, and ethical considerations. It explores the global demand, job prospects, and connections with other disciplines. The course also focuses on biomolecules, covering carbohydrates, lipids, amino acids, and proteins, providing a foundational understanding for their roles in industrial applications and health care.
2	**Vertical :**	Major
3	**Type :**	Theory
4	**Credits :**	2 credits
5	**Hours Allotted :**	30 Hours
6	**Marks Allotted:**	50 Marks
7	**Course Objectives(CO):** CO 1. Gain a thorough grasp of biotechnology, exploring its definition, historical context, and applications in various sectors, fostering a broad knowledge base. CO 2. Analyze the scope and significance of biotechnology globally and in India, evaluating its potential, achievements, and impact on the burgeoning biotech market, while understanding policy initiatives and trends. CO 3. Develop ethical awareness by examining legal and social-ethical issues in biotechnology CO 4. Grasp the definition, biological functions, and classification of Biomolecules.	
8	**Course Outcomes (OC):** Learner will be able to OC 1. articulate a comprehensive understanding of the diverse applications of biotechnology, including its historical context, global significance, and specific domains such as pharmaceuticals, plant and animal biotechnology. OC 2. develop the ability to analyze the scope of biotechnology in India, OC 3. apply their knowledge to identify potential areas of biotechnological research in India OC 4. classify, compare, explain biomolecules and their role in industry and health care.	
9	**Modules:-** **Module 1: What is Biotechnology**	
	1. Introduction to Biotechnology Definition; History & Introduction to Biotechnology Scope and Significance of Biotechnology in modern world **(3 Lectures)** **2. World of Biotechnology** Pharmaceutical Biotechnology, Plant Biotechnology, Industrial Biotechnology, Marine Biotechnology, Animal Biotechnology, Environmental Biotechnology. **(5 Lectures)**	

	3. Scope of Biotechnology in India Needs for future development, Global scenario, Potential and achievements of Biotechnology. Bio-business in India, booming biotech market, success story of biotech market, policy initiatives and global trends; Biotechnology research in India **(5 Lectures)** **4. Legal, Social-ethical issues (2 Lectures)**	
	Module 2: Biomolecules	
	1. **Carbohydrates:** Introduction, definition, general formula & Properties. Classification of carbohydrates, Concept of glycosidic bond, Industrial applications of carbohydrates: Fermentation, Pharmaceutical and Food industry **(6 Lectures)** 2. **Introduction to Lipid Chemistry:** Definition and Biological functions of fats and Lipids. Definition of Fatty acids. Classification of Fatty acids **(4 Lectures)** 3. **Amino acids:** General introduction, Classification and structures, properties (physical & chemical), Peptide bond, Three-dimensional Structure of proteins. **(5 Lectures)**	
10	**Text Books** 1. Dubey, R. C. (1993). A textbook of Biotechnology. S. Chand Publishing. 2. Dubey, R. C. (2014). Advanced biotechnology. S. Chand Publishing. 3. Singh, B. D., & Singh, B. D. (2007). Biotechnology expanding horizons. Kalyani publishers 4. Satyanarayana U. and Chakrapani U. (2007). Biochemistry. 3rd Edition. Books and Allied (P) Ltd.	
11	**Reference Books** 1. Cox, M. M., & Nelson, D. L. (2008). Lehninger principles of biochemistry (Vol. 5). New York: Wh Freeman. 2. Conn, E., & Stumpf, P. (2009). Outlines of biochemistry. John Wiley & Sons.	
12	**Internal Continuous Assessment: 40%**	**Semester End Examination: 60%** **(Refer format of Question paper Below)** (Refer format of Question paper)
13	**Continuous Evaluation through:** Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc.(at least 3)	

Course II

Name of the Course: Microbial Biotechnology

Sr.No.	Heading	Particulars
1	**Description the course : Including but Not limited to:**	This Course provides a foundational understanding of the microbial world, spanning history, microscopy, and cultivation, with a focus on sterilization techniques and bioprocess technology. Relevant across biology, chemistry, and engineering disciplines, these modules meet industry demands in pharmaceuticals, biotechnology, and healthcare, offering diverse job prospects in research, development, and production. The practical application of theoretical concepts ensures learners are well-prepared for dynamic roles in advancing microbial science and bioprocessing.
2	**Vertical :**	Major
3	**Type :**	Theory
4	**Credits :**	2 credits
5	**Hours Allotted :**	30 Hours
6	**Marks Allotted:**	50 Marks
7	**Course Objectives(CO):** CO 1. Develop a comprehensive understanding of microbial science by exploring the history, classification, and cultivation techniques, emphasizing the role of microorganisms in everyday life. CO 2. Acquire proficiency in microscopy principles, including optics, staining techniques, and the application of microscopes, laying the groundwork for practical applications in research and laboratory settings. CO 3. Discuss the principles and techniques of sterilization and disinfection, with a focus on dry heat, steam, radiation, chemical agents, and their applications in diverse settings. CO 4. Introduction to fundamentals of bioprocess technology, encompassing bioreactor design, microbial fermentations, and the industrial production of chemicals, antibiotics, enzymes, and beverages.	
8	**Course Outcomes (OC):** Learner will be able to OC 1. comprehend the microbial world's historical context, classification, and cultivation techniques, fostering a foundational knowledge base for future scientific endeavors. OC 2. Apply microscopy principles effectively, showcasing proficiency in optics, staining techniques, and practical applications, enhancing skills crucial for research and laboratory work. OC 3. Execute sterilization and disinfection techniques with precision, showcasing expertise in dry heat, steam, radiation, and chemical agents, ensuring a sound understanding of their applications across various fields. OC 4. Understand the basics of bioprocess technology, including the design of bioreactors and the industrial production of chemicals, antibiotics, enzymes, and beverages, preparing learners for roles in bioprocessing industries. OC 5. Evaluate and analyze the effectiveness of disinfectants, demonstrating critical thinking skills essential for selecting appropriate methods in healthcare, industry, and research settings, contributing to informed decision-making in real-world applications.	
9	**Modules:-** **Module 1: Introduction to Microbial World**	

	1. **History:** Discovery of Microorganisms, Role of microorganisms in everyday life. Groups of Microorganisms. **(2 Lectures)** 2. **Microscopy:** General principles of optics; various parts and their functions - objectives – numerical aperture, resolving power, depth of focus, working distance, aberrations; oculars; condensers. Applications of microscopes.Dark Field Microscope; Phase Contrast Microscope and Fluorescent Microscope **(7 Lectures)** 3. **Stains and Staining Solutions**- Definition of Dye and Chromogen; acidic and basic dyes; functions and types of chromophore and auxochrome groups. Theories to explain staining. Definition and function of stain; mordant, intensifiers and fixative. **(3 Lectures)** Natural and Synthetic Dyes. **(1 Lectures)** Simple Staining, Differential Staining – Gram staining and Acid Fast Staining with specific examples **(2 Lectures)**	
	Module 2: Sterilisation Techniques & Bioprocess Technology	
	1. **Introduction:** Definition and concept of Sterilization and Disinfection. **(1 Lectures)** **Types and Applications:** Dry Heat, Steam under pressure Gases, Radiation and Filtration **(2 Lectures)** **Chemical Agents and their Mode of Action:** Aldehydes, Halogens, Quaternary Ammonium Compounds, Phenol and Phenolic Compounds, Heavy Metals, Alcohol, Dyes, and Detergents. **(2 Lectures)** **Disinfectant:** Ideal Disinfectant. Examples of Disinfectants and Evaluation of Disinfectant **(2 Lectures)** 2. **Cultivation:**Nutritional categories of microorganisms, Design and Types of Culture Media, Concept of Pure culture, Methods of isolation,growth kinetics **(3 Lectures)** 3. **BioprocessTechnology:** Definition, Design of Bioreactor, Applications of Bioprocess Technology **(2 Lectures)** 4. **Microbial Fermentations**: Overview of Industrial Production of Chemicals using suitable examples, Antibiotics, Enzymes and Beverages **(3 Lectures)**	
10	**Text Books** 1. Pelczar., Microbiology. (1993). India: McGraw-Hill Education. 2. Ananthanarayan, R., Paniker, C. J. (2006). Ananthanarayan and Paniker's Textbook of Microbiology. India: Orient Longman. 3. Salle, A. J., & Salle, A. J. (1954). Fundamental principles of bacteriology McGraw-Hill. 4. Industrial Microbiology- A. H. Patel 5. A Handbook of Elementary Microbiology- H A Modi	
11	**Reference Books** **1.** Prescott, L. M. (2002). Microbiology 5th Edition. 2. Frobisher M. Fundamentals of Microbiology (9th Ed) 3. Industrial Microbiology- L. E. Casida- John Wiley & Sons	
12	**Internal Continuous Assessment: 40%**	**Semester End Examination: 60%** **(Refer format of the Question paper)**
13	**Continuous Evaluation through:** Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc.(at least 3)	

Course III

Name of the Course: Practicals

Sr.No.	Heading	Particulars
1	**Description the course : Including but Not limited to:**	This course aims to give hands-on training in to gain laboratory skills and expertise in recent biotechnological advancements through experiments, case studies, demonstrations, and virtual visits, thus linking theory with practical insights. Acquire essential skills in microscopy, staining, sterilization, isolation, and identification, meeting industry demands for qualified professionals. Enhance employability with hands-on experience in diverse biotech applications, positioning for a dynamic and evolving industry.
2	**Vertical :**	Major
3	**Type :**	Practical
4	**Credits :**	2 credits
5	**Hours Allotted :**	60 Hours
6	**Marks Allotted:**	50 Marks
7	**Course Objectives(CO):** CO 1. Analyze and report on recent biotech applications to demonstrate understanding and application of theoretical knowledge. CO 2. Acquire proficiency in microscopy, staining, and sterilization for effective handling of biotechnological processes. CO 3. Conduct virtual visits to research institutes, fostering skills in navigating and extracting valuable information from scientific resources. CO 4. Apply Bergey's manual and colony characteristics to identify microorganisms, enhancing practical knowledge in microbial biology. CO 5. Gain hands-on experience in isolation techniques, microbial enumeration, and antibiotic screening, preparing for diverse roles in the biotech industry.	
8	**Course Outcomes (OC):** Learners will be able to OC 1. apply biotechnological concepts to analyze and report on recent applications in the field. OC 2. gain hands-on experience in essential lab techniques, including microscopy, staining, and sterilization, ensuring competence in practical biotech skills. OC 3. develop the ability to navigate and extract valuable information from national and international research institutes through virtual visits. OC 4. demonstrate competence in isolation, identifying microorganisms and analyzing colony characteristics using SOP's and Manuals.	
9	**Module**	
	1. Study of Microscope – Compound Microscope (Including Handling and storage) 2. Observation of microorganisms using bright field microscope - Protozoa, Molds and Yeasts, Algae – from natural habitat/permanent slides. 3. Monochrome staining using any suitable material. (Bacteria/Plant/Animal tissue) Differential staining – Gram staining, Acid fast staining, Romanowsky 4. Fungal staining – wet mount (Lactophenol cotton blue/Methylene Blue) 5. Preparation of media- Nutrient broth and Agar, MacConkey Agar, Sabouraud's Agar 6. Sterilization of Laboratory Glassware and Media using Autoclave and Hot air oven 7. Aseptic transfer of media. 8. Isolation techniques: T-streak, polygon method	

	9. Colony Characteristics of Microorganisms. 10. Use of Bergey's manual to help identify any one isolate. **(Demo)** 11. Isolation of Yeasts from the natural environment. 12. Study of morphology and colony characteristics of yeasts. 13. Enumeration of microorganisms by Serial Dilution-Pour plate, Spread plate method 14. Growth Curve of *E.coli* 15. Primary screening of antibiotic producers microorganisms from soil by crowded plate technique. 16. Qualitative estimation of carbohydrates 17. Qualitative estimation of Lipids 18. Qualitative estimation of Amino Acids/ Proteins 19. Paper Chromatography of amino acid 20. Analyse a case-study and write a report on any one recent application of Biotechnology (Not older than past 5 years) (Assignment) 21. Summarization & presentation of selected review paper not older than 5 years (under mentoring) (Assignment) 22. Field visit to National/ International research institutes for research in biotechnology (Assignment) 23. Exploring web resources of National/ International research institutes for research in biotechnology (Assignment)
10	**Text Books /Laboratory Manual** **1.** Basic Practical Microbiology - A Manual by Microbiology Society (23cbf9c5-f8c8-4f91-b092a4ad819e6357.pdf) 2. Practical Microbiology: based on the Hungarian practical notes entitled "Mikrobiológiai Laboratóriumi Gyakorlatok" by Erika M. Tóth, Andrea K. Borsodi, Tamás Felföldi, Balázs Vajna, Rita Sipos and Károly Márialigeti
11	**Reference Books** 1. Practical handbook of microbiology, 2nd Edition Eds. Emanuel Goldman, Lorrence H. Green, CRC Press, Taylor & Francis Group 2012 2. Practical Microbiology by R.C.Dubey and D.K.Maheshwari S. Chand Pub 2002 3. An Introduction to Practical Biochemistry.3rd Edition, (2001), David Plummer, Tata McGraw Hill Edu.Pvt.Ltd. New Delhi, India

12	**Internal Continuous Assessment: 40%**	**Semester End Examination: 60%** **(Refer format of the Question paper)**
13	**Continuous Evaluation through:** Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc.(at least 3)	

AC – 20.04.2024
Item No. – 5.4 (N) Sem I (7b)

As Per NEP 2020

University of Mumbai

Syllabus for Basket of OE	
Board of Studies in Psychology	
UG First Year Programme	
Semester	**I**
Title of Paper	**Credits 2/ 4**
I) Stress Management II	**2**
From the Academic Year	**2024-25**

OE2: Stress Management II

Sr. No.	Heading	Particulars
1	**Description the course:** **Including but Not limited to:**	The course is designed to understand stress, response to stress, coping and various coping mechanisms that people in general use in various settings in life. It introduces to a important connection between stress and stress management with physical and mental health. The course provides a guideline for managing stress in work, family and personal life. It also tries to bring upon aspects of Indian life and its association with stress and its management. Various interventions discussed are useful for people in general and psychologist and in particular. The four units include stress and stress psychophysiology and Stress and Illness/Disease and Intervention; Intrapersonal and interpersonal life-situation Interventions and Relaxation techniques; Exercise and strategies for decreasing stressful behaviors and Occupational Stress; Stress: Family and Elderly
2	**Vertical :**	~~Major/Minor~~/ Open Elective /~~Skill Enhancement / Ability Enhancement/Indian Knowledge System~~
3	**Type :**	Theory
4	**Credit**:	2 credits (1 credit = 15 Hours for Theory or 30 Hours of Practical work in a semester)
5	**Hours Allotted :**	30 Hours
6	**Marks Allotted**:	50 Marks
7	**Course Objectives**: 1) To make the students aware of the practical applications of the various concepts in Stress Management in daily life, in the Indian context 2) Understand role of Exercise and strategies for decreasing stressful 3) To learn about psychophysiology and Stress and Illness/Disease 4) To understand the concept of Exercise and strategies for decreasing stressful behaviors and Occupational Stress 5) To learn about the impact of stress on family and elderly and role of family.	

8	**Course Outcomes**: 1) Students describe various types of occupational stress and its impact. 2) Students can demonstrate various techniques to deal with the occupational stress. 3) Students can compare different types of stressors and contrast to them to different kind of situations. 4) Students can evaluate role of family and elderly with reference to stress. Students can describe different interventions for family, an interview with reference to stress.

9	**Modules**:-
	Module 1: Exercise and strategies for decreasing stressful behaviors and Occupational Stress (15 Hours)
	1. Exercise and Health, the Healthy Way to Exercise, Principles of Exercise, Assessing Cardio-respiratory Fitness, Starting an Exercise Program, Choosing an Exercise Program, Exercise and the elderly, Where to get more information, Exercise – keep it going 2. Strategies for decreasing stressful behaviors: Health and lifestyle behaviours, health-behaviour assessment, selected lifestyle behaviours, barriers to action, locus of control, various methods for decreasing stressful behaviours, application of behaviour change techniques 3. Occupational Stress Cycle, What is occupational stress, Why is occupational stress of concern, Gender and occupational stress, Disease and Occupational Stress, Occupational Stressors 4. The Workaholic, Burnout, Women and Work Outside the Home, Sexual Harassment at Work, Working in the Home. Interventions. Managing Occupational Stress
	Module 2: Stress: Family and Elderly (15 Hours)
	1. The Family, Marriage, Cohabitation, Divorce, Single-Parent Families, Nuclear and Joint families. Urban and Rural families. Gay and lesbian families. Family Stressors 2. A Model of Family Stress, Interventions for family. 3. The Elderly: A Description, Test of Knowledge About the Elderly, Adjustment in the Later Years, Exercise and the elderly 4. Retirement, Care-giving; Death, Dying and Grief. Interventions for elderly and family.
10	**Text Books:** Greenberg, J. S. (2008). Comprehensive Stress Management. (10th ed). New York: McGraw Hill publications.

11	**Reference Books:** 1) Olpin, M. & Hesson, M. (2021). Stress Management for Life: A Research-Based Experiential Approach. 5th Edition 2) Bam, B. P. (2008). Winning Habits: Techniques for Excellence in Sports. New Delhi: Pearson Power, Dorling Kindersley India pvt ltd. 3) Hariharan, M., & Rath, R. (2008). Coping with Life Stress: The Indian Experience. New Delhi: Sage publications India pvt ltd. 4) Rice, P.L. (1999). Stress and Health. (3rd ed). Brooks/Cole publishing co.	
12	**Internal Continuous Assessment: 40%** **20 Marks**	**External, Semester End Examination 60%** **Individual Passing in Internal and External Examination** **30 Marks**
13	**Continuous Evaluation through: (20 marks)** **a) Question Paper Pattern for Class Test Examination (10 Marks)** **1.** Fill in the Blanks/ match pairs/ MCQ/True False (All are compulsory): **5 Marks** **2.** Short Notes (Any Three out of Five) **5 Marks** **b) Completion of following activities as a part of CIE (10 Marks)** Classroom Presentations/ Assignments /Movie Review / Essay Submission/ Book review/ Field Visit Report / Educational Activity Report/ Presentation / Role play/ creative writing assignment: **10 Marks**	
14	**(B) External / Semester End Examination Marks: 30 Time: 1 Hours** **Each question is for 15 marks. Two out of Three questions to be attempted.** Q.1 Fill in the blanks (Based on all units). Marks 15 Q.2 Essay Type Questions (Based on Unit I). Marks 15 Q.3 Essay Type Questions (Based on Unit II). Marks 15	

Sign of the BOS Chairman
Name of the Chairman
Name of the BOS

Sign of the Offg. Associate Dean
Name of the Associate Dean
Name of the Faculty

Sign of the Offg. Dean
Name of the Offg. Dean
Name of the Faculty

AC – 20/04/2024
Item No. – 7.7 Sem. I (1b)

As Per NEP 2020

University of Mumbai

Syllabus for Basket of OE	
Board of Studies in Commerce	
UG First Year Programme	
Semester	**I**
Title of Paper	**Credits 2**
I) Entrepreneurship Management	**Credits 2**
2)	
From the Academic Year	**2024-25**

OE Sem 1

ENTREPRENEURSHIP MANAGEMENT

PROGRAM	**B.COM**
SEMESTER	**I**
COURSE TITLE	**ENTREPRENEURSHIP MANAGEMENT**
VERTICLE /CATEGORY	**OE**
COURSE LEVEL	**4.5**
COURSE CODE	
COURSE CREDIT	**2**
HOURS PER WEEK THEORY	**2**
HOURS PER WEEK PRACTICAL/TUTORIAL	NA

COURSE OBJECTIVE
This course provides an overview of the business, understanding and significance of the business in economy.
COURSE OUTCOME
CO1: Learners will recognize the fundamental components of the business
CO2: Evaluate the impact of traditional and modern business activities
CO3: Learners will be able to apply theoretical knowledge to real world scenarios within the business sector.
CO4: To create comprehensive understanding of the risks and challenges associated with business world

ORGANISATION OF THE COURSE

UNIT NO	COURSE UNITS AT A GLANCE	TOTAL HOURS
1	Introduction to Entrepreneurship	15
2	Entrepreneurship Management	15
	TOTAL HOURS	30

COURSE DESIGN

Unit 1 : Introduction to Entrepreneurship (15)

- Introduction: Concept and importance of entrepreneurship, factors Contributing to Growth of Entrepreneurship, Entrepreneur and Manager, Entrepreneur and Intrapreneur, Types of Entrepreneurs
- Competencies of an Entrepreneur, Entrepreneurship Training and Development centers in India. Incentives to Entrepreneurs in India. Options available to entrepreneurs- franchising and outsourcing. Cases on takeover, mergers and acquisitions in India and at global level. Women Entrepreneurs: Problems and Promotion. Social Entrepreneurship-Definition, importance

PEDAGOGICAL APPROACH: Lecture Method. Case studies, assignment

Unit 2: ENTREPRENEURSHIP MANAGEMENT (15)

- Idea generation – sources and methods Identification and classification of ideas. Environmental Scanning and SWOT analysis Preparation of project plan – Components of an ideal business plan – market plan, financial plans, operational plan, and HR plan. Project formulation – project report significance and content
- Meaning and definition (evolution) Role and importance, Policies governing SMEs Organizational structure Steps in setting up a small unit,

PEDAGOGICAL APPROACH: Lecture Method, Assignments and Visits

REFERENCES:-

1. Small scale industries and entrepreneurship, Dr. Vasant Desai, Himalayan Publishing House
2. Management of small scale industries, Dr. Vasant Desai, Himalayan Publishing House
3. Management of small scale industries, J.C. Saboo Megha Biyani, Himalayan Publishing House
4. Dynamics of entrepreneurial development and Management, Dr. Vasant Desai, Himalayan Publishing
5. Entrepreneurship development, Moharanas and Dash C.R., RBSA Publishing, Jaipur
6. Beyond entrepreneurship, Collins and Lazier W, Prentice Hall, New Jersey, 1992
7. Entrepreneurship, Hisrich Peters Shephard, Tata McGraw Hill
8. Fundamentals of entrepreneurship, S.K. Mohanty, Prentice Hall of India
9. A Guide to Entrepreneurship, David Oates, Jaico Publishing House, Mumbai, Edn 2009

Total 50 Marks: with 2 Credits
30 Marks External and 20 Marks Internal

30 Marks External

DURATION: 1 Hour MARKS: 30

Any 2 out of 3

Q. 1 Answer the following a. b.	(15 Marks)
Q. 2 Answer the following a. b.	(15 Marks)
Q. 3 Answer the following a. b.	(15 Marks)

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20 Marks Internal

1) Class Test	(05 Marks)
2) Assignment	(05 Marks)
3) Presentation	(05 Marks)
4) Group Discussion	(05 Marks)
5) Quiz	(05 Marks)
6) Case Study	(05 Marks)

Note: 1) Any Four out of the above can be taken for the internal Assessment.
2) The internal Assessment shall be conducted throughout the Semester.

Sign of the BOS Chairperson **Prof. Dr. Kishori Bhagat** **BOS in Commerce**	**Sign of the Offg. Associate Dean** **Dr. Ravikant Balkrishna Sangurde** **Faculty of Commerce & Management**	**Sign of the Offg. Associate Dean** **Prof. Dr. Kishori Bhagat** **Faculty of Commerce & Management**	**Sign of the Offg. Dean** **Prof. Kavita Laghate** **Faculty of Commerce & Management**

VSC

VSC-1

Name of the Course: <u>Instrumentation in Biotechnology</u>

Sr.No.	Heading	Particulars
1	**Description the course : Including but Not limited to:**	The course is an elementary course in instrumentation used in Biotechnology that forms the foundation of analytical techniques. The knowledge and handling of instruments is necessary in academics, research work and industry.
2	**Vertical :**	VSC
3	**Type :**	Practical
4	**Credits :**	2 credits
5	**Hours Allotted :**	60 hours
6	**Marks Allotted:**	50 Marks
7	**Course Objectives(CO):** CO1 :Enable the learners to understand the principles of laboratory instruments. CO2 :Provide the practical basis for instrumentation handling and operations. CO3 :Equip the learners with the understanding of applications of the instrumentation.	
8	**Course Outcomes (OC):** Learners will be able to OC 1. understand the use and operations of basic laboratory instruments in Biotechnology OC 2. explain principle, instrumentation and applications of spectroscopic instruments. OC 3. develop skills in operating basic lab instruments	
9	**Module : Practicals 60 hr (2 credits)**	
	1. Operations, cleaning and calibration of various laboratory equipments i) Autoclave ii) Hot air oven iii) Incubator iv) shaker 2. Preparation of Normal, Molar and percentage solution (%W/W, %V/V, %W/V) 3. Calibration and accuracy of glass pipettes /micropipettes 4. Calibration of Weighing Balance, percentage error calculation 5. Preparation of standard buffers and standardization of pH meter Measurement of pH of any two samples 6. Methods of extraction and calculation of extractive yield- any 2 methods 7. Determination of Lambda max using colorimeter/spectrophotometer 8. Verification of Beer Lamberts law 9. Paper chromatography using suitable plant material 10. Paper chromatography of amino acids using ninhydrin 11. Thin layer chromatography with suitable material 12. Principle, working and applications of Centrifuge	

10	**Text Books** 1. Biophysical chemistry: Principles and Techniques (2016) Himalaya Publishing House 2. College Physical and Analytical Chemistry,(2014)K.B.Baliga, S.A.Zaveri,Himalaya Publishing House.	
11	**Reference Books** 1. Fundamentals of Analytical Chemistry(2022)10th edition -Douglas Skoog, Donald West, Cengage Technology Edition 2. Biophysical chemistry: Principles and Techniques (2016) Himalaya Publishing House 3. A practical book on calibration of Analytical Instruments (2019), Dr. Suresh Jain, Dr. Vipin Saini, Dr. Naitikkumar Trivedi, Nirali Prakashan	
12	**Internal Continuous Assessment: 40%**	**Semester End Examination: 60% (Refer format of Question paper)**
13	**Continuous Evaluation through:** Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc.(at least 3)	

SEC-2

Name of the Course: Clinical Biochemistry

Sr.No.	Heading	Particulars
1	**Description the course : Including but Not limited to:**	The practical syllabus covers tests for diabetes, cholesterol, liver and kidney function, and urine analysis. It is essential for healthcare professionals, offering skills in interpreting test results for patient care. With high industry demand, it enhances job prospects in diagnostic labs and clinical settings.
2	**Vertical :**	Skill Enhancement
3	**Type :**	Practical
4	**Credits :**	2 credits
5	**Hours Allotted :**	60 Hours
6	**Marks Allotted:**	100 Marks
7	**Course Objectives(CO):** (List the course objectives) CO 1. Understand proper techniques for collecting and handling serum and urine samples to maintain their integrity. CO 2. Emphasize safety protocols and procedures specific to handling serum and urine samples, including the use of personal protective equipment. CO 3. Familiarize learners with the laboratory equipment used for analyzing serum and urine samples, such as spectrophotometers CO 4. Develop proficiency in basic laboratory techniques for processing serum and urine samples, including centrifugation, pipetting, and dilution. CO 5. Learn methods for analyzing biochemical components in serum, including tests for glucose, cholesterol, enzymes, and electrolytes. CO 6. Implement and understand quality control measures to ensure the accuracy and reliability of results in serum and urine analysis. CO 7. Develop skills in interpreting results obtained from serum and urine analyses, considering normal reference ranges and clinical significance.	
8	**Course Outcomes (OC):** (List the course outcomes) Upon completion of this course, learner will be able to OC 1. Exhibit adherence to safety protocols when handling blood and urine samples, emphasizing the importance of protecting both the laboratory personnel and the samples. OC 2. Accurately conduct analysis of biological samples OC 3. Execute fundamental laboratory techniques including centrifugation, pipetting,etc OC 4. Demonstrate the ability to interpret and analyze laboratory results, considering normal reference ranges and clinical implications for both blood and urine samples.	
9	**Modules:-Clinical Biochemistry** **Module 1:**	
	1. Determination of blood glucose for detection of diabetes mellitus. 2. Determination of serum cholesterol (total HDL and LDL ratio). 3. Determination of lactate dehydrogenase (LDH) activity in blood serum. 4. Liver function tests: (SGPT, SGOT)	

	5. Kidney function test: (Urea from serum) 6. Estimation of uric acid and creatinine in urine. 7. Quantitative detection of ketone body in urine. 8. Detection of glucose in urine (Benedict &Fehling's Test) 9. Analysis of urine for normal inorganic constituents (chlorides/phosphates/sulfates/ammonia)	
10	**Text Books** **1. Textbook of Medical Laboratory technology, Praful B. Godkar and Darshan P. Godkar,Bhalani Publishing House,2003 ISBN, 8185578583, 9788185578583** **2. Textbook of Biochemistry with clinical correlations,7th Edition, Thomas M.Delvin. 2010** **3. A manual of laboratory and diagnostic tests. Authors: Frances Talaska Fischbach, Marshall Barnett Dunning.** **4. Laboratory Reference by Jane Roskams and Linda Rodger, published by Cold Spring Harbor Laboratory Press.** **5. Medical Laboratory Technology-Volume I, Kanai Mukherjee** **6. Medical Laboratory Technology-Volume II, Kanai Mukherjee** **7. Medical Laboratory Technology-Volume III, Kanai Mukherjee**	
11	**Reference Books** **1. Practical Biochemistry & clinical Pathology, S.R.Kale,R.R.Kale,Nirali Prakashan,2020,29th Edition** **2. Biochemical Methods S. Sadashivam, A.Manickam (1995),New age International Publishers**	
12	**Internal Continuous Assessment: 50%**	**Semester End Examination: 50%**
13	**Continuous Evaluation through:** Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc.(at least 3)	
14	**Format of Question Paper:**	

AC –20.04.2024
Item No. –5.6 (N) Sem I (1a)

As Per NEP 2020

University of Mumbai

Syllabus for Basket of AEC	
Board of Studies in English	
UG First Year Programme B.Sc	
Semester	**I**
Title of Paper	**Credits**
Introduction to Communication **Skills in English I**	**2**
From the Academic Year	**2024-2025**

Sr. No.	Heading	Particulars
1	**Description of the course: Including but Not limited to:**	**Introduction to Communication Skills in English I** Effective academic communication skills are essential for success in scholarly pursuits. In the academic realm, proficiency extends beyond verbal articulation to encompass precise and coherent written expression. Students are not only required to engage in thoughtful discussions and articulate complex ideas verbally but must also demonstrate their understanding through well-crafted written assignments, and presentations. Academic communication involves the mastery of scholarly conventions, such as adherence to academic writing styles, and the ability to engage in dialogue with peers and scholars. It encompasses the skillful navigation of academic discourse, fostering an environment where ideas are shared, challenged, and refined. Developing strong academic communication skills empower individuals to contribute meaningfully to intellectual conversations, enriching both their academic journey and the broader scholarly community. This course with its 30:20 pattern will also help in accomplishing this goal. The course is aimed at honing their cognitive, analytical, linguistic and creative skills. It is hoped that by the end of the academic year, the learners will have developed confidence in using the English language both for oral and written communication as well as develop interest in enhancing these skills later on.
2	**Vertical:**	AEC (Ability Enhancement Course)
3	**Type:**	Theory
4	**Credit**:	2 credits (1credit=15 Hours for Theory in a semester)
5	**Hours Allotted:**	30Hours
6	**Marks Allotted**:	50Marks
7	**Course Objectives:** 1. To cultivate a comprehensive understanding of communication skills 2. To enhance reading proficiency with a diverse range of written texts with different genres and styles of written communication. 3. To develop proficiency in grammatical accuracy with specific focus on common grammatical errors and provide targeted exercises for improvement. 4. To equip learners with proficient presentation and conversation skills by integrating practical exercises for public speaking and interpersonal communication. 5. To provide practical experience in formal writing, including Statement of Purpose (SoP) preparation.	

8	**Course Outcomes**: At the end of the course, learners will: • Demonstrate an understanding of essential aspects of communication skills • Exhibit the ability to Read a variety of written text using subskills such as skimming and scanning. • Identify and rectify common grammatical errors in English. • Show competence in delivering compelling presentations and engage in articulate and effective conversations in English across different contexts. • Display advanced formal writing skills in crafting job application letters, CVs, and Statements of Purpose.

9	**Modules**: -
	Module1: (15 Lectures)
	A) Introduction to Communication Skills • The Seven Cs of Effective Communication • Verbal and Non-Verbal Communication • Cross-cultural communication • Technology-enabled Business Communication • Features of Effective Written Communication • Characteristics of an Effective Speech • Effective Listening Skills **B) Reading Skills:** • Scanning a text for information • Skimming a passage to look for main ideas, understanding text type • Guessing meaning of an expression (word/phrase/clause) • Building inference skills Passages from academic, professional, and literary domains around 200- 250 words, could be chosen in this section. **C) Grammar** • Subject Verb Agreement • Tenses • Question Tag • Change the Voice • Framing Interrogative sentence • Synonyms and Antonyms • Misplaced modifiers Grammar should be taught with a remedial approach so as to enable learners to avoid common errors in their written and spoken communication.

Module 2: (15 Lectures)

A) Speaking Skills in English

Conversation skills

- Opening a conversation
- Introducing oneself in various contexts
- Introducing others formally and informally

Presentation Skills

- Introduction: Essentials of Presentation skills
- Analysis of model Presentations
- Planning and Delivering the Presentation
- Developing & Displaying Visual Aids
- Handling Questions from the Audience

B) Formal Writing Skills:

- Interpreting and describing different types of visual information
- Job applications with bio data (solicited and unsolicited)
- Statement of Purpose

10 **Text Books: N.A.**

11 **References:**

- Bellare, Nirmala. *Reading & Study Strategies*. Books. 1 and 2. Oxford University Press, 1997, 1998
- Bellare, Nirmala. *Easy Steps to Summary Writing and Note-Making.* Amazon Kindle Edition, 2020
- Comfort, Jeremy, et al. *Speaking Effectively: Developing Speaking Skills for Business English*. Cambridge University Press, 1994.
- Das, Bikram K., et. al. *An Introduction to Professional English and Soft Skills.* Cambridge University Press India Pvt. Ltd., 2010
- Das, Yadjnaseni & R. Saha (eds.) *English for Careers*. Pearson Education India, 2012.
- Dimond-Bayir, Stephanie. *Unlock Level 2 Listening and Speaking Skills* Student's Book and Online Workbook: Listening and Speaking Skills Student's Book+ Online Workbook. Cambridge University Press, 2014.
- Doff, Adrian and Christopher Jones. *Language in Use* (Intermediate and Upper Intermediate). CUP, 2004.
- Glendinning, Eric H. and Beverley Holmstrom. Second edition. *Study Reading: A Course in Reading Skills for Academic Purposes*. CUP, 2004
- Goodale, Malcolm. P*rofessional Presentations Video Pack: A Video Based Course*. Cambridge University Press, 1998.
- Grellet, F. *Developing Reading Skills.* Cambridge: Cambridge University Press, 1981
- Grussendorf, Marion. *English for Presentations.* Oxford University Press, 2007.

- Hamp- Lyons, Liz and Ben Heasiey. Second edition. *Study Writing: A Course in Writing Skills for Academic Purposes*. CUP, 2006
- Labade, Sachin, Katre Deepa et al. *Communication Skills in English*. Orient Blackswan, Pvt Ltd, 2021.
- Lewis, N. *How to Read Better & Faster*. New Delhi, Goyal Publishers & Distributors Pvt. Ltd, 2006.
- McCarthy, Michael and Felicity O'Dell. English *Vocabulary in Use*. Cambridge: Cambridge University Press, 2001.
- Mohan, RC Sharma Krishna. *Business Correspondence and Report Writing*. Third edition. Tata McGraw-Hill Education, 2002.
- Murphy, Raymond, et al. *Grammar in use: Intermediate*. Cambridge University Press, 2000
- Raman, Meenakshi, and Singh, Prakash. *Business Communication*. India, Oxford University Press, 2006.
- Richards, Jack C., and Chuck Sandy. *Passages* Level 2 Student's Book. Cambridge University Press, 2014.
- Sadanand, Kamlesh & S. Punitha. *Spoken English: A Foundation Course*. (Part 1 & 2). Orient Blackswan. 2009.
- Sasikumar, V., et al. *A Course in Listening & Speaking I*. 2005. Cambridge University Press India Pvt. Ltd. (under the Foundation Books Imprint), 2010
- Savage, Alice, et al *Effective Academic Writing*. Oxford: OUP, 2005
- Sethi, J. *Standard English and Indian usage: Vocabulary and grammar*. PHI Learning Pvt. Ltd., 2011.
- Taylor, Grant. *English Conversation Practice*. 1967. Tata McGraw-Hill, 2013
- Turton, Nigel D. *A B C of Common Grammatical Errors*. 1995. Macmillan India Ltd., 1996
- Vas, Gratian. *English Grammar for Everyone*. Mumbai, Shree Book Centre, 2015
- Watson, T. *Reading Comprehension Skills and Strategies*: Level 6. Saddleback Educational Publishing, 2002

Web link Resources:

- A conversation about household appliances: https://youtu.be/rAPl0fSborU 13. Video on psychology: Why do we dream? https://youtu.be/2W85Dwxx218
- Video on social media: What is a social media influencer? https://youtu.be/39A3og7enz8
- Tips on communication (TED Talk): The Secrets of Learning a New Language https://youtu.be/o_XVt5rdpFY
- Expressing opinions: If Cinderella Were a Guy: https://youtu.be/p4OyCNctKXg
- Video on the English language: Where did English come from? https://youtu.be/YEaSxhcns7Y

12	**Internal Continuous Assessment: 40%**	**Semester End Examination: 60%**
13	**Continuous Evaluation through:** • Participation in an activity based on Presentation Skills and Conversation skills each (Module 2 A) (10 marks) The class may be divided into batches by creating formal schedule for the same before the semester End Examination. • Participation in two classroom activities involving skills other than presentation and conversation skills (05 marks) • Overall attendance (05 marks) (Percentage of learners' attendance in class to be considered) **Suggested Activities:** ▪ Listening to audio clips/ books to enhance listening skills ▪ Reading aloud from newspapers, magazines, stories, non-fiction followed by classroom discussion on these to enhance reading and speaking skills	
14	**Format of Question Paper:** for the final examination Q.1. Short notes (2 out of 4) – On Module 1 (A) 10 marks Q.2. A. Unseen Passage (200-250 words) (Module 1 B) 06 marks B. Questions on grammar (Module 1 C) 04 marks Q. 3. Writing Skills (1 out of 2) on Module 2 (B) 10 marks	

Sign of BOS Chairman **Prof. Dr. Shivaji Sargar** **Board of Studies in English**	**Sign of the Offg. Associate Dean** **Dr. Suchitra Naik** **Faculty of Humanities**	**Sign of the Offg. Associate Dean** **Dr. Manisha Karne** **Faculty of Humanities**	**Sign of the Dean** **Prof. Dr. Anil Singh** **Faculty of Humanities**

AC –
Item No. –

As Per NEP 2020

University of Mumbai

Syllabus for Basket of VES	
Board of Studies in Value Education	
UG First Year Programme	
Semester	**I**
Title of Paper	**Credits 2**
I) Environmental Management & Sustainable Development -I	
From the Academic Year	**2024-25**

Name of the Course: Environmental Management & Sustainable Development -I

Sr. No.	Heading	Particulars
1	Description the course : Including but Not limited to :	Environmental awareness transcends academic boundaries. This course transcends academic boundaries, equipping you with a foundational understanding of ecosystems, biodiversity, and the human impact on natural resources and climate. Students will learn about critical issues like pollution and explore solutions for a sustainable future. The knowledge you gain here connects with diverse fields such as biology, economics, and even engineering. It is a foundation for further exploration in environmental science, conservation biology, and environmental policy. This course ignites your interest in environmental issues and opens doors to exciting careers in environmental management, conservation, and sustainable development – fields with growing demand across industries. Prepare for an interactive learning experience through engaging lectures, stimulating group discussions, and insightful case studies examining real-world environmental challenges and solutions.
2	Vertical :	Open Elective
3	Type :	Theory
4	Credit:	2 credits / (1 credit = 15 Hours for Theory or 30 Hours of Practical work in a semester)
5	Hours Allotted :	30 Hours
6	Marks Allotted:	50 Marks
7	**Course Objectives:** 1. To create and disseminate knowledge to the students about environmental problems at local, regional and global scale. 2. To introduce about ecosystems, biodiversity and to make aware for the need of conservation. 3. To sensitize students towards environmental concerns, issues, and impacts of	

	human population. 4. To prepare students for successful career in environmental departments, research institutes, industries, consultancy, and NGOs, etc.
8	**Course Outcomes:** 1. Use principles of Environmental Science for explaining sustainable development and its related ethical concerns 2. Display scientific perspective for issues confronting our present day environment. 3. Analyze the national and global environmental issues relating air, water, soil, and land use, biodiversity, and pollution. 4. Explain the Role of an individual in relation to human population and environmental pollution.
9	**Modules:-**
	Unit I: Ecosystems, Biodiversity and Conservation (8 lectures)
	Introduction, structure, and function of ecosystems; Energy flow: food chains, food webs and ecological succession. Case studies of the following: a) Forest ecosystem b) Grassland ecosystem c) Desert ecosystem d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) 1. Levels of biological diversity : genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns 2. India as a mega-biodiversity nation; Endangered and endemic species of India 3. Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. 4. Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.
	Unit II: Natural Resources and Sustainable Development (7 lectures)
	Overview of natural resources: Definition of resource; Classification of natural resources- biotic and abiotic, renewable and non-renewable. Biotic resources: Major type of biotic resources- forests, grasslands, wetlands, wildlife and aquatic (fresh water and marine); Microbes as a resource; Status and challenges. Water resources: Types of water resources- fresh water and marine resources; Availability and use of water resources; Environmental impact of over-exploitation, issues and challenges; Water scarcity and stress; Conflicts over water. Soil and mineral resources: Important minerals; Mineral exploitation; Environmental problems due to extraction of minerals and use; Soil as a resource and its degradation. Energy resources: Sources of energy and their classification, renewable and non-renewable sources of energy; Conventional energy sources- coal, oil, natural gas, nuclear energy;

	Non-conventional energy sources- solar, wind, tidal, hydro, wave, ocean thermal, geothermal, biomass, hydrogen and fuel cells; Implications of energy use on the environment. Introduction to sustainable development: Sustainable Development Goals (SDGs)-

	targets and indicators, challenges and strategies for SDGs.
	Unit III: **Human Communities and the Environment (8 lectures)**
	1. Human population growth: Impacts on environment, human health and welfare. 2. Resettlement and rehabilitation of project affected persons; case studies. 3. Disaster management: floods, earthquake, cyclones and landslides. 4. Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan. 5. Environmental ethics: Role of Indian and other religions and cultures in environmental conservation. 6. Environmental communication and public awareness, case studies (e.g. CNG vehicles in Delhi).
	Unit IV: Environmental Issues; Local, Regional, and Global (7 lectures)
	Environmental issues and scales: Concepts of micro-, meso-, synoptic and planetary scales; Temporal and spatial extents of local, regional, and global phenomena. Pollution: Impact of sectoral processes on Environment, Types of Pollution- air, noise, water, soil, municipal solid waste, hazardous waste; Transboundary air pollution; Acid rain; Smog. Land use and Land cover change: land degradation, deforestation, desertification, urbanization. Biodiversity loss: past and current trends, impact. Global change: Ozone layer depletion; Climate change.
10	**Text Books** 1. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. Principles of Conservation Biology. Sunderland: Sinauer Associates, 2006. 2. Odum, E.P., Odum, H.T. & Andrews, J. 1971. Fundamentals of Ecology. Philadelphia: Saunders. 3. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi. 4. Chiras, D. D and Reganold, J. P. (2010). Natural Resource Conservation: Management for a Sustainable Future.10th edition, Upper Saddle River, N. J. Benjamin/Cummins/Pearson. 5. John W. Twidell and Anthony D. (2015). Renewable Energy Sources, 3rd Edition, Weir Publisher (ELBS) 6. Singh, J.S., Singh, S.P. & Gupta, S.R. 2006. Ecology, Environment and Resource Conservation. Anamaya Publications https://sdgs.un.org/goals 7. Down to Earth, Centre of Science and Environment ®. 8. Hawkins R. E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay ®. 9. Harper, Charles L. (2017) Environment and Society, Human Perspectives on Environmental Issues 6th Edition. Routledge. 10. Rajagopalan, R. (2011). Environmental Studies: From Crisis to Cure. India: Oxford University Press. 11. Harris, Frances (2012) Global Environmental Issues, 2nd Edition. Wiley-Blackwell.

11	**Reference Books** 1. Carson, R. 2002. Silent Spring. Houghton Mifflin Harcourt. 2. Gadgil, M., & Guha, R. 1993. This Fissured Land: An Ecological History of India. Univ. of California Press. 3. Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge. 4. Gleick, P. H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.

	5. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. Conservation Biology: Voices from the Tropics. John Wiley & Sons. 6. Thapar, V. 1998. Land of the Tiger: A Natural History of the Indian Subcontinent. 7. Warren, C. E. 1971. Biology and Water Pollution Control. WB Saunders. 8. Wilson, E. O. 2006. The Creation: An appeal to save life on earth. New York: Norton. 9. World Commission on Environment and Development. 1987. Our Common Future. Oxford University Press.	
12	**Internal Continuous Assessment: 40%**	**Semester End Examination: 60%**
13	**Continuous Evaluation through:** Quizzes, Class Tests, presentation, project, role play, creative writing, Visits, assignment etc. (at least 4)	
14	**Format of Question Paper:** for the final examination For OE: External - 30 Marks (2 Credits) Internal - 20 Marks Question Paper Format for 30 Marks Format of Question Paper: 30 Marks per paper Semester End Theory Examination: 1. Duration - These examinations shall be of one hour duration. 2. Theory question paper pattern: a. There shall be 04 questions each of 10 marks out of which students will attempt ANY THREE	

Signature:
Prof. Kavita Laghate
Chairman of Board of Studies in Value Education

AC – 28.06.2024
Item No. – 8.1 (N)

As Per NEP 2020

University of Mumbai

Syllabus for Indian Knowledge System	
Board of Studies in Indian Knowledge System	
UG First Year Programme	
Semester	**I OR II**
Title of Paper	**Credits 2 for either I or II Semester**
I) Indian Knowledge System	
From the Academic Year	**2024-2025**

Sr. No.	Heading	Particulars
1	**Description the course :** **Including but Not limited to :**	Introduction, relevance, Usefulness, Application, interest, connection with other courses, demand in the industry, job prospects etc.
2	**Vertical :**	Major/Minor/Open Elective /Skill Enhancement / Ability Enhancement/Indian Knowledge System (Choose By √)
3	**Type :**	Theory / Practical
4	**Credit**:	2 credits (1 credit = 15 Hours for Theory or 30 Hours of Practical work in a semester)
5	**Hours Allotted :**	30 Hours
6	**Marks Allotted**:	50 Marks
7	**Course Objectives**: (List some of the course objectives) 1. To sensitize the students about context in which they are embedded i.e. Indian culture and civilisation including its Knowledge System and Tradition. 2. To help student to understand the knowledge, art and creative practices, skills and values in ancient Indian system. 3. To help to study the enriched scientific Indian heritage. 4. To introduce the contribution from Ancient Indian system & tradition to modern science & Technology.	
8	**Course Outcomes**: (List some of the course outcomes) 1. Learner will understand and appreciate the rich Indian Knowledge Tradition 2. Lerner will understand the contribution of Indians in various fields 3. Lerner will experience increase subject-awareness and self-esteem 4. Lerner will develop a comprehensive understanding of how all knowledge is ultimately intertwined	
9	**Modules**:-	
	Module 1: (10 Hours)	
	1. Introduction to IKS (What is knowledge System, Characteristic Features of Indian Knowledge System) **2.** Why IKS? (Macaulay's Education Policy and its impact, Need of revisiting Ancient Indian Traditions) **3.** Scope of IKS (The Universality of IKS (from Micro to Macro), development form Earliest times to 18th Century CE) **4.** Tradition of IKS (Ancient Indian Education System: Home, Gurukul, Pathashala, Universities and ancient educational centres) **5**. Relevant sites in the vicinity of the Institute (Water Management System at Kanheri, Temple Management of Ambarnath, etc.)	

	Module 2: (10 Hours)	
	1. Medicine (Ayurveda) **2.** Alchemy **3**. Mathematics **4.** Logic **5.** Art of Governance (Arthashastra)	
	Module 3: **(10 Hours) (Select Any FIVE out of the following)**	
	1. Aesthetics **2.** Town Planning **3**. Strategic Studies **4.** Krishi Shastra **5.** Vyakaran & Lexicography **6**. Natyashastra **7**. Ancient Sports **8**. Astronomy	**9**. Yoga and Wellbeing **10.** Linguistics **11.** Chitrasutra **12.** Architecture **13.** Taxation **14.** Banking **15.** Trade and Commerce
10	**Reference Books** **1.** Concise history of science in India- D.M. Bose, S.N Sen, B.V. Subbarayappa. **2.** Positive sciences of the Ancient Hindus- Brajendranatha seal, Motilal Banrasidas, Delhi 1958. **3.** History of Chemistry in Ancient India & Medieval India, P.Ray- Indian Chemicals Society, Calcutta 1956 **4.** Charaka Samhita- a scientific synopsis, P. Ray & H.N Gupta National Institute of Sciences of India, New Delhi 1965. **5.** MacDonnell A.A- History of Sanskrit literature **6.** Winternitz M- History of Indian Literature Vol. I, II & III **7.** Dasgupta S.N & De S.K- History of Sanskrit literature Vol. I. **8.** Ramkrishna Mission- cultural heritage of India Vol. I, II & III. **9.** Majumdar R. C & Pushalkar A.D- History & culture of the Indian people, Vol. I, II & III. **10.** Keith A.B- History of Sanskrit literature. **11.** Varadachari V- History of Sanskrit literature Chaitanya Krishna- A new History of Sanskrit	
11	**Continuous Internal Assessment: 20 Marks**	**Semester End Examination : 30 Marks**
12	**Continuous Evaluation through:** Assignment/ Presentations/ Projects (Group/Individual) / Field Visit Report **10 Marks,** class Test / MCQ Test **5 Marks,** Overall Conduct and Class Participation **5 Marks**	
13	**Format of Question Paper:** for the final examination Q1. Attempt any TWO Questions out of FIVE. **6 Marks** Q2. Attempt any THREE Questions out of SIX 1**2 Marks** Q3. Attempt any THREE Questions out of SIX. 1**2 Marks**	

Sign of the BOS Chairman
Name of the Chairman
Name of the BOS

Sign of the Offg. Associate Dean
Name of the Associate Dean
Faculty of Interdisciplinary Studies
Name of the Faculty

Sign of the Offg. Dean
Name of the Offg. Dean
Faculty of Interdisciplinary Studies
Name of the Faculty

AC –28/06/204

Item No. – 5.6 (N)

University of Mumbai

Syllabus for Extension Work in Vertical VI - CC	
Board of Studies in Extension Work	
UG First Year Program	
Semester	**I**
Title of Paper	**Credit**
Extension Work	**2**
From the Academic Year	**2024-25**

Introduction

The National Education Policy (NEP) 2020 is a comprehensive framework introduced by the Government of India to revamp the country's education system. It has replaced the previous National Policy on Education, which has aim to ensure universal access to quality education from preschool to higher education, including vocational education. NEP 2020 emphasizes a more holistic, multidisciplinary, and flexible curriculum which lays emphasis on conceptual understanding rather than rote learning allowing students to choose subjects across disciplines without strict boundaries.

The National Education Policy (NEP) 2020 of India addresses the role of higher education institutions in fostering community engagement and extension work. It highlights the social responsibility of higher education institutions towards their communities. It encourages institutions to engage with local communities, address societal challenges, and contribute to sustainable development. The policy promotes the implementation of outreach programs by higher education institutions to disseminate knowledge, provide services, and support community development. These programs may include literacy campaigns, career development programs, social issues awareness programs, health and hygiene initiatives, skill development workshops, and technology-oriented activities. The policy suggests integrating extension work into the curriculum of higher education programs. This allows learners to gain practical experience, develop leadership skills, and contribute to community development while pursuing their studies. It recognizes incentives to encourage active engagement in community service and extension activities.

Overall, NEP 2020 recognizes the significant role of higher education institutions in promoting community engagement, social responsibility, and sustainable development through extension work. By integrating extension activities into their mission and operations, institutions can contribute to building inclusive and resilient societies.

Extension work in the context of education refers to the activities and programs conducted by educational institutions to engage with communities, address societal needs, and promote social development.

Aim of Extension Work under NEP:

- Extension work aims to identify and address the specific needs and challenges faced by communities. NEP 2020 encourages higher education institutions to engage with local communities and contribute to their development by offering programs and services that

address social needs, such as literacy programs, health awareness campaigns, and vocational training.

- Extension work aims to empower communities by providing them with the knowledge, skills, and resources they need to address their own requirements and improve their quality of life.

Key objectives of Extension Work under NEP:

- To ensure equal access to quality education and educational opportunities to aspirants.
- To support the government initiatives in achieving universal foundational literacy and numeracy as per sustainable development program.
- To organize remedial programs to address the learning breaches among the youth and provide unending education opportunities.
- To offer more holistic, multidisciplinary, and flexible curricular activities with an emphasis on conceptual understanding and personality development.
- To offer a wide range of activities & promote critical thinking, creativity, and innovation.
- To provide aspirants with multiple pathways for skill development and employment.
- To implement outreach programs to disseminate knowledge, provide services, and support community development.

Extension Work Activities:

Extension Work activities introduced by DLLE are a crucial aspect of the educational environment, offering multifaceted benefits that extend beyond academic learning. Many extension activities focus on social issues, sustainability, and environmental conservation. These activities educate the communities on sustainable practices which promote inclusivity and social justice. These activities focus especially on training women in various skills, including entrepreneurship and digital literacy through various vocational skill-oriented projects offered by the department. These activities have significantly contributed to skill development among community members, leading to improved employment opportunities and personality development. Learners participate in extension work activities as part of their curriculum, to gain practical experience and to contribute to community development. Thus, engaging in extension work fosters a sense of social responsibility and civic engagement among the learners and facilitators.

THE EXTENSION DIMENSION (Reach to Unreached)

The college students are enrolled for extension work and perform various activities for the **social awareness based on various issues / problems in the society such as Save Girl Child, Pollution, Aids, Global Warming, Environment, Tree Plantation, Importance of Education, Illiteracy, Child Labour, Dowry Deaths, Malnutrition, Watershed Management and so many.** The students are creating awareness about these social problems / issues through various activities such as Street Play, Exhibition, Poster Making, Songs, Speech, Survey, Elocution, and participation in Seminar & Conferences. For this purpose, students are going to remote areas and involve the community and make them aware of our role in eradicating social problems faced by the society and trying to convince the people human duties as an ideal citizen.

To facilitate the sensitization of the student to the socio-cultural realities, the Department offers extension work projects encompassing social issues for the student. There are many Extension Work Projects being offered by the department under the two different units for enhancing the employability and IT skills of the student. The projects are given below, for which the details are available on DLLE website at www.mudlle.ac.in.

I) Vocational Career Oriented Projects

1. Career Project [CP]
2. Industry Orientation Project [IOP]
3. Anna Poorna Yojana [APY]
4. Skill Development (SD)

II) Community Oriented Projects

1. Population Education Club (PEC)
2. Survey Research
3. Education for All (EFA- NIOS, IDOL)
4. Environment Education
5. Civic Sense (CS)
6. Consumer Guidance

Given below are the activities / programs to be conducted by the colleges as a part of Extension Work Syllabus as enlisted. The learner will participate in the following activities during Semester I in this academic year.

ACTIVITIES FOR SEMESTER I = TOTAL 2 Credits

Sr. No.	Unit / Activities	No. of Lectures
1	Exhibit your talent (Talent Search Program) **Talent Search: Need, Aim and Objectives, Nurturing Talent. Usefulness in Extension Work.** Organizing Talent Search Program**.** **The Extension Work Teacher will orient the learners and organize such program during lecture hours.** A talent search program is a critical component of modern human resource management that compel sensitization of self-awareness. By systematically identifying, attracting, and nurturing talent, the colleges can build a workforce that is capable, diverse, and aligned with their strategic goals to achieve objectives of extension work. The following talents / skills are expected from learners to conduct training, extension work and field outreach activities. (Organization, Crowd control, Storytelling, Stage performance (singing, acting, musical instrument playing), Script writing, Poetry composition, Drawing & painting, Collage, Drafting and writing report, PPT presentation and Video Making.	Total 8 Lectures including guidance for preparations and actual conduct of program.
2	Organizing & Participation in Training Session and Note Making Every learner should attend the training session organized by their college for orientation of annual extension work program. Attendance is compulsory. **In this session the learners will be oriented about all the extension work topics / activities as enlisted followed by question-and-answer session.** The learner must read resource material and guidelines carefully	

	and understand the structure of Extension Work under NEP 2020 and accordingly plan for participation in various programs, college level and field outreach activities as given below. Documentation of the activity and report preparation needs to be completed by the learners.	
3	Self- Introductory Video / Stage Performance **All learners enrolled in Extension Work subject can make self-introductory video or stage performance (3-4 minutes duration)** stating his / her name, college, areas of interest, reason to join Extension Work, goals, why did he / she choose the particular topic /activity, how will he/she perform & achieve his/ her objectives etc. followed by 2-page report writing to be submitted to college. Report writing proforma to be prepared by college. **In this session the learners will be oriented about making self-introductory video/ stage performance, prior preparations, grooming styles and presentation skills, practice sessions and other requirements.**	
4	Participation in Activities /Programs as given below. - Organize and participate in activities / programs related to five enlisted social issues / government policies. **The Learners will be oriented to following activities and motivated to participate in:** 1. Seminar /conferences, discussion sessions, debate, rallies 2. Competitions (essay/creative writing, elocution, poster/ video/ rangoli making etc.- Minimum 2 competitions) 3. Extension Work group activities of other groups in the college. 4. Prepare your PPT, design your posters / charts. 5. Survey / short term academic courses / innovative programs. **Learners should perform and participate in above activities (Minimum 3) related to enlisted topics and strictly follow the guidelines. All the activities / programs must be related to extension work topics to fulfil the DLLE objectives.**	20 Lectures including guidance for practice session, preparations and actual conduct of program.

	The learners will be oriented about <u>any 5 Topics</u> selected by college for awareness under Extension Work. The college may select more than 5 topics if the enrolment of learners is more than 200. The learners will participate in above activities based on these topics selected by college.) 1. Maharashtra Policy for women. 2. Status of women in India. / Women achievers of modern India 3. Banking procedures. 4. Legal procedures. 5. Violence against women / Laws protecting women/ Inheritance laws. 6. Child Labour. 7. Environment- pollution and its effect / Save Trees and Natural Resources 8. Water Harvesting. 9. Pollution (Noise pollution / industrial pollution etc.) 10. Issues related to LGBT. 11. HIV –AIDS / Covid 19 etc. 12. Consumer Awareness (Act 2019), Need and Importance 13. E-waste management 14. Stress and Harassment. 15. Global warming 16. Importance of Ethics and Values 17. Old Age Homes / Status of Senior Citizens 18. Distance Education Opportunities 19. First Aid Awareness 20. Election Literacy / Voting rights / Human Rights	
5	<u>Report Writing and Final submission of assignment / report</u> T**he learners will be oriented to prepare final assignment / report of the activities to the college.** Present report during the college program. Proforma of Report to be prepared by college. - College will organize a program in the hall / classroom for all learners and give them opportunity to present their assignment	2 Lectures

	/ report with PPT presentation followed by question answer session / test / interview by the college.	

Evaluation Pattern

Internal Assessment

Sr. No.	Assessment Criteria	Maximum Marks
1	Attendance, punctuality, completion of hours, participation in programs, presentations and feedback.	10
2	Proficiency in required skill sets, overall performance, submission of written report / assignments and expected development.	10
	Total	20 Marks

External Assessment

(Based on Extension Work guidelines and five enlisted topics chosen by the college.)

Question Paper Pattern

Time: 1.00 Hours **Total Marks 30**

Instructions: 1. All questions are compulsory.

2. Figures to the right indicate maximum marks.

Q.1. Rewrite the following statement by choosing correct alternative given below. - 06 Marks (6 statements. One mark each)

Q.2. Write short Notes On (Any Two out of Four) - 06 Marks

Q.3. Answer the following questions. (Any Three out of Five) - 18 Marks

References:

- Guidelines for Extension Work published by Department of Lifelong Learning and Extension, University of Mumbai.
- Agricultural Extension: Principles and Methods" by "Ray V. Herren (2008)
- Agricultural Extension by G. S. R. Murthy (2010)
- Introduction to Agricultural Extension by S. S. Acharya (2015)
- Agricultural Extension in Developing Countries by R. W. Snapp (2012)
- Extension Communication and Management by B. M. Panda (2016)

Sign of BOS Chairman **Prof. Kunal Jadhav** **Ad-hoc Board of Studies in Extension Work**	**Sign of the Offg. Associate Dean** **Dr. Suchitra Naik** **Faculty of Humanities**	**Sign of the Offg. Associate Dean** **Dr. Manisha Karne** **Faculty of Humanities**	**Sign of the Dean** **Prof. Dr. Anil Singh** **Faculty of Humanities**

Semester II

Course I:

Name of the Course: Fundamentals of biotechnology-II

Sr.No.	Heading	Particulars
1	**Description the course : Including but Not limited to:**	This Course Aims to introduce genetic engineering essentials, covering cloning, enzymes, vectors, and host cells. The course also explores biotechnology applications in agriculture, animal and human welfare, and environmental solutions. This will develop learners to gain competencies in the vast field of gene manipulation and helps understand the approach to designing solutions.
2	**Vertical :**	Major
3	**Type :**	Theory
4	**Credits :**	2 credits
5	**Hours Allotted :**	30 Hours
6	**Marks Allotted:**	50 Marks
7	**Course Objectives(CO):** CO 1. Understand the basic steps in gene cloning techniques. CO 2. Explore diverse biotechnological applications, from GM fruits to environmental pollution abatement, gaining practical insights. CO 3. Develop skills in identifying recombinant clones and introducing vectors into both prokaryotic and eukaryotic host cells. CO 4. Understand the role of biotechnology in agriculture, animal science, and human welfare, emphasizing real-world applications.	
8	**Course Outcomes (OC):** Learner will be able to OC 1. grasp the principles of gene cloning, showcasing a conceptual understanding of genetic material manipulation. OC 2. analyze the conceptual frameworks of biotechnology, applying theoretical knowledge to address challenges in agriculture, health, and the environment. OC 3. comprehend identifying and characterizing recombinant clones, emphasizing the conceptual foundations of genetic engineering. OC 4. acquire an understanding of the theoretical underpinnings of biotechnology's role in shaping agricultural practices, animal science, and human health.	
9	**Modules:-** **Module 1:Introduction to Genetic Engineering** **1. What is Genetic engineering:** Definition and developments, gene cloning, Steps for cloning **(2 Lectures)** **2. Enzymes in genetic engineering:** Restriction endonuclease; DNA ligase; Enzymes to modify ends of DNA molecules - exonuclease; endonuclease; S1 nuclease; alkaline phosphatase; polynucleotide kinase; DNA polymerase and klenow fragment; reverse transcriptase; terminal deoxynucleotidyl transferase **(3 Lectures)** **3. Vectors:** Role as agents of transfer, Features of plasmid vectors, Plasmid vectors - pBR322, pUC etc. **(4 Lectures)** **4. Host cells:** E. coli; Bacillus subtilis; Saccharomyces cerevisiae; Xenopus oocytes; Mammalian fertilized egg cell **(3 Lectures)** **5. Introducing vector into host:** Prokaryote, Eukaryote, Identification of recombinant clones. **(3 Lectures)**	

	Module 2: Applications of biotechnology **1. Agriculture:** GM fruits- GM papaya, GM tomato, Insect resistant transgenic plants – Bt cotton, Bt brinjal, Modifications in nutrient quality – starch, oilseed protein, golden rice **(4 Lectures)** **2. Animal Biotechnology:** Growth, disease resistance, product quality, pharmaceuticals and nutritional supplements, industrial applications **(4 Lectures)** **3. Human welfare:** Cloned genes for production of -Insulin; recombinant vaccine for Hepatitis B virus. Molecular farming, Edible vaccines and their advantages **(5 Lectures)** **4. Environment Pollution:** Role of Biotechnology in control of pollution **(2 Lectures)**	
10	**Text Books** 1. Dubey, R. C. (1993). A textbook of Biotechnology. S. Chand Publishing. 2. Dubey, R. C. (2014). Advanced biotechnology. S. Chand Publishing. 3. Singh, B. D., & Singh, B. D. (2007). Biotechnology expanding horizons. Kalyani publishers.	
11	**Reference Books** 1. Nicholl, D. S. T. (2002). An Introduction to Genetic Engineering (Studies in Biology). India: Cambridge University Press. 2. Brown, T. A. (2013). Gene Cloning and DNA Analysis: An Introduction. Germany: Wiley. 3. Genetic Engineering: Principles and Practice. (n.d.). India: McGraw-Hill Education. 4. Principles of Gene Manipulation and Genomics - Richard M Twyman and S. B. Primrose 5. Molecular Biotechnology - Principles and Applications of Recombinant DNA - Bernard R. Glick, Jack J. Pasternak	
12	**Internal Continuous Assessment: 40%**	**Semester End Examination: 60%** **(Refer format of the Question paper Below)**
13	**Continuous Evaluation through:** Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc.(at least 3)	

Course II

Name of the Course: Molecular Biology & Molecular Genetics

Sr.No.	Heading	Particulars
1	**Description the course : Including but Not limited to:**	This course aims to develop insights in the field of molecular biology and molecular genetics to match with the pace of evolving molecular studies in biological systems. This course will enable learners to comprehend and apply tools in molecular biology and genetics. Both modules molecular biology and genetics will offer understanding of valuable skills to learners and make them competent for industries seeking professionals and develop interest in research and development in biotechnology.
2	**Vertical :**	Major
3	**Type :**	Theory
4	**Credits :**	2 credits
5	**Hours Allotted :**	30 Hours
6	**Marks Allotted:**	50 Marks
7	**Course Objectives(CO):** CO 1. Understand the structure and function of DNA and RNA, along with chromosomal organization, to grasp fundamental genetic principles. CO 2. Explore deviations from Mendelian genetic principles, environmental influences on gene expression, and analyze human genetic traits through pedigree analysis. CO 3. Comprehend models of DNA replication, including evidence of semi-conservative replication and the role of enzymes in both prokaryotic and eukaryotic systems. CO 4. Apply knowledge of genetic concepts to interpret and analyze experimental evidence, such as Messelhson and Stahl's experiment, and understand the bidirectional and rolling circle replication mechanisms.	
8	**Course Outcomes (OC):** Learners will be able to OC 1. describe the structure of DNA and RNA, explaining their roles in genetic processes. OC 2. analyze genetic deviations, understand environmental impacts on gene expression, and interpret human pedigrees. OC 3. demonstrate knowledge of DNA replication models, including semi-conservative replication and the role of enzymes. OC 4. apply genetic concepts to analyze experimental evidence, connecting theory with practical understanding.	
9	**Modules:-** **Module 1:Nucleic acid, Chromosome and Genetics** **1. The Composition and structure of DNA and RNA** Nucleotide and nucleoside, Structure of nucleotides, Structure of DNA, DNA double helix, Watson and Crick's model, Structure of RNA, Types of RNA **(3 Lectures)** **2.** Prokaryotic and Eukaryotic Chromosome, Euchromatin and Heterochromatin **(2 Lectures)** **3. Extensions of and Deviations from Mendelian Genetic Principles:** Multiple Alleles, Incomplete Dominance and Codominance Essential Genes and Lethal Alleles. Effects of the environment on Gene expression **(5 Lectures)** **4. Gene Interactions and Modified Mendelian Ratios:** Epistatic and non-epistatic interactions **(3 Lectures)** **5. Mendelian Genetics in Humans:** Pedigree Analysis Examples of Human Genetic Traits **(2 Lectures)**	

	Module 2: Replication of DNA **1. Models of DNA Replication (1 Lectures)** **2. DNA Replication in Prokaryotes (3 Lectures)** Evidence of Semi-conservative DNA replication- Messelhson and stahl's experiment **(2 Lectures)** DNA Polymerases and its role**, (1 Lectures)** E.coli Chromosome Replication**, (1 Lectures)** semi discontinuous replication, pulse chase experiment by R Okazaki **(1 Lectures)** Bidirectional Replication of Circular DNA molecules, Rolling Circle Replication, theta model of replication **(2 Lectures)** **3. DNA Replication in Eukaryotes-detail steps and role of telomerases (2 Lectures)** **4. Enzymes and proteins involved in DNA replication (2 Lectures)**	
10	**Text Books** 1. iGenetics – A molecular approach Peter J Russell 3rd edition 2. Cell and Molecular Biology 5th edition by Gerald Karp Karp (John Wiley and sons publications) 3. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology (2005) – P.S. Verma and Agarwal- S.Chand Publications 4. Principles of Genetics. E J Gardner, M J Simmons & D PeterSnustad. 8th edition. 1991. 5. Biochemistry - U Satyanarayana U. Chakrapani, (2013) 4th edition.	
11	**Reference Books** 1. Molecular Biology and Biotechnology (PB) by Shaily Goyal, S Chand Publishing 2. Elements Of Genetics- Veerbala Rastogi, Publisher: KEDAR NATH RAM NATH 3. Fundamentals of Genetics- B. D. Singh, KALYANI PUBLISHER 4. Molecular Biology of the Gene- By James D. Watson · 2004, Pearsons/ Benjamin Cummings	
12	**Internal Continuous Assessment: 40%**	**Semester End Examination: 60%** **(Refer format of the Question paper Below)**
13	**Continuous Evaluation through:** Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc.(at least 3)	

Course III

Name of the Course: Practicals

Sr.No.	Heading	Particulars
1	**Description the course : Including but Not limited to:**	This course intends to develop essential skills to interpret and analyse problems underlying genetic principles. It offers insights into cellular processes like mitosis, meiosis thus linking theoretical principle to practical applications in genetics. It provides hands-on skills in DNA extraction, karyotyping thus meeting industry demand for genetic research and environmental solutions.
2	**Vertical :**	Major
3	**Type :**	Practical
4	**Credits :**	2 credits
5	**Hours Allotted :**	60 Hours
6	**Marks Allotted:**	50 Marks
7	**Course Objectives(CO):** CO 1. Understand fundamental cellular processes through hands-on exploration of mitosis, meiosis, and DNA extraction from plant materials. CO 2. Acquire skills in genetic analysis, including karyotyping and quantitative assessments of DNA and RNA. CO 3. Demonstrate practical knowledge of genetic concepts, solving problems related to Mendelian genetics and constructing pedigree charts. CO 4. Gain hands-on experience in molecular biology techniques.	
8	**Course Outcomes (OC):** Learner will be able to OC 1. explain and demonstrate the steps of mitosis and meiosis, understanding the basis of cellular division in plants. OC 2. develop practical skills in DNA extraction, qualitative/quantitative analysis. OC 3. solve problems based on genetic concepts and their practical applications OC 4. demonstrate basic techniques of molecular biology.	
9	**Modules:-** **Module 1:**	
	1. Study of mitosis from suitable plant material 2. Study of meiosis from suitable plant material/Permanent slides/Photographs 3. Study the effect of disinfectants on fomite surfaces. 4. Extraction and isolation of genomic DNA from various plant materials. 5. Purity and estimation of extracted DNA and RNA using UV-Vis Spectroscopy 6. Quantitative estimation of DNA 7. Quantitative estimation of RNA 8. Study of Karyotype - Normal male, Normal female, Down Syndrome, Klinefelter's Syndrome and Turner's Syndrome 9. Barr body identification in cells of Buccal smear. 10. Problems based on Mendelian Genetics, its modifications and gene interactions. 11. Construction of pedigree charts and analysis of Human genetic traits using Pedigree analysis. 12. Extraction and isolation of Genomic DNA from *E. coli.* 13. Separation and visualisation of DNA by Agarose gel electrophoresis (Demo) 14. Basic problems on Restriction Digestion Mapping 15. Study of ABO Blood groups in humans to understand the concept of multiple	

	alleles using data collection strategies. 16. Enzymes in Action: Exploring the Role of Restriction Endonucleases in Genetic Engineering(Assignment) 17. Role of GMO's in controlling Environmental pollutions(Assignment)	
10	**Text Books** 1. Principles of Genetics, 7th Edition D. Peter Snustad, Michael J. Simmons Publisher Wiley 2. Principles Of Genetics by Gardner E.J Publisher Wiley India	
11	**Reference Books** 1. Gene Cloning & DNA Analysis: An Introduction T A Brown Publisher Wiley-Blackwell	
12	**Internal Continuous Assessment: 40%**	**Semester End Examination: 60%** **(Refer format of the Question paper Below)**
13	**Continuous Evaluation through:** Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc.(at least 3)	

AC – 20/04/2024
Item No. – 6.7 Sem. II (12a)

As Per NEP 2020

University of Mumbai

Syllabus for Basket of MINOR	
Board of Studies in Microbiology	
UG First Year Programme	
Semester 2	
Title of Paper	**Credits**
Introduction to Microbial World	**2**
From the Academic Year	**2024-25**

Title of Paper: Introduction to Microbial World

Sr. No.	Heading	Particulars
1	**Description the course :** **Including but Not limited to :**	The omnipresence of microorganisms makes the study of microbiology very important for society as a whole. The study involves a history of Microbiology and an introduction to microbial cells and groups. The course also includes important fields of Microbiology like Environmental, Agricultural and Medical microbiology The interdisciplinary nature of the subject is relevant to all fields including Chemistry, Biochemistry, Biophysics , Bioinformatics , Biostatistics , Nanotechnology and Pharmaceutical sectors . To summarize, the subject contributes to community welfare with respect to prevention, control and treatment of diseases, development of sustainable agricultural practices, and monitoring of the environment with green technology.
2	**Vertical :**	Minor
3	**Type :**	Theory
4	**Credit**:	2 credits (1 credit = 15 Hours for Theory in a semester)
5	**Hours Allotted :**	30 Hours
6	**Marks Allotted**:	50 Marks

7	**Course Objectives**: **CO1.** To introduce cross faculty students to the microbial world. **CO2.** To narrate the history of Microbiology and groups of microorganisms. **CO3.** To explain the role of microbes in improving soil fertility . **CO4.** To emphasize the role of microbes in production of biopesticides. **CO5.** To make learners aware of the role of microbes in transmitting air borne diseases. **CO6** To impart knowledge about the role of microbes in common infectious diseases.
8	**Course Outcomes**: On completion of this course learner will be able to: **OC1.** remember history of Microbiology and groups of microorganisms. **OC2**. comprehend the Science of Microbiology and its applications in various fields. **OC3**. apply their knowledge gained to prevent water and air borne diseases. **OC4.**differentiate between various groups of microorganisms on the basis of their structural characteristics. **OC5.** evaluate the significance of microbes in diverse fields. **OC6**. develop application-based study of microorganisms.
9.	**Modules**

Semester	Paper	Module	Description	Credits
II	**Minor Course Introduction to Microbial World**	1.	**The Science of Microbiology**	**02**
		2.	**Fields of Microbiology**	

Course code		SEMESTER II	Credits
		Minor Course Introduction to Microbial World	**Credits 2 (30 L/hr)**
Module 1		**The Science of Microbiology**	**15L**
	1.1	The Historical Roots of Microbiology: Hooke, van Leeuwenhoek, and Cohn	**2L**
	1.2	Pasteur and the Defeat of Spontaneous Generation	**2L**
	1.3	Microbial Cells- The invisible world	**1L**
	1.4	Groups of microorganisms : 1.4.1 Fungi 1.4.2 Protozoa 1.4.3 Algae and Cyanobacteria	**10L**

		1.4.4 Bacteria 1.4.5 Viruses	
Module 2		**Fields of Microbiology**	**15L**
	2.1	Environmental Microbiology 2.1.1 Soil : Concept of Nutrient recycling , Biogeochemical cycle (Nitrogen ,Carbon, Phosphorus). 2.1.2 Water : Definition and characteristics of Potable water , Bacterial diseases transmitted by fecally contaminated water (tabulation). 2.1.3 Air : Terms used: aerosols/ droplet / droplet nuclei , Air borne diseases transmitted by exhalation droplets	**5L**
	2.2	Agricultural Microbiology 2.2.1 Introduction to Biofertilizers and their advantages over chemical fertilizers 2.2.2 Nitrogen fixation *(Rhizobium and Azotobacte*r) , Phosphorus and Potassium solubilizers. 2.2.3 Introduction to Biopesticides and their advantages over chemical pesticides 2.2.4 *Bacillus thuringiensis* as an example of biopesticide 2.2.5 Common plant pathogens (Tabulation)	**5L**
	2.3	Medical Microbiology Common communicable diseases with respect to Causative agents, Symptoms, Treatment and Prevention 2.3.1 Bacterial: Tuberculosis 2.3.2 Protozoal: Malaria 2.3.3 Viral: Influenza	**5L**

References

1.	Lansing M. Prescott, Harley and Klein, Microbiology (2005),6th Edition. McGraw Hill Higher Education, New York.
2.	Michael J.Pelczar Jr., E.C.S. Chan ,Noel R , Microbiology TMH 5th Edition.
3.	Michael T. Madigan & J.M. Martin, Brock's Biology of Microorganisms 13th Ed. International edition 2012, Pearson Prentice Hall.
4.	R C Dubey and Dr D K Maheshwari,A textbook of Microbiology - (S Chand Pub)
5.	Frobisher, Hinsdill ,Crabtree , Good heart , Fundamentals of Microbiology , 9th Edi WB Saunders Company.
6.	Raina M. Maier , Ian L. Pepper, Charles P. Gerba , Terry J. Gentry, Environmental Microbiology , 3rd edition, Academic press.

Guidelines for examination and evaluation (External and Internal)

Evaluation Pattern for Minor course (Microbiology)

Semester 2

Theory	Credits	No. of Hours	Marks
Theory Paper	2	30	50

Theory courses

Internal Continuous Assessment: 40% (20 Marks)	Semester End Examination: 60% (30 Marks)	Duration for End semester examination
Continuous Evaluation through: Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc.	As per paper pattern*	1hour

***Paper Pattern for 30 marks :**

30 Marks per paper Semester End Theory Examination:

Duration - These examinations shall be of one hour duration

Question	Option	Marks	Questions Based on
Q1A	Attempt any two out of four (5 marks each)	10	Based on Module 1
Q1B	Attempt any five out of ten objective (MCQ type only) questions (1 marks each)	5	Based on Module 1
Q2A	Attempt any two out of four (5 marks each)	10	Based on Module 2
Q2B	Attempt any five out of ten objective (MCQ type only) questions (1 marks each)	5	Based on Module 2
	Total	**30**	

Sign of the BoS Coordinator
Dr. Aparna Dubhashi
BoS in Microbiology

Sign of the Offg. Associate Dean
Dr. Madhav R. Rajwade
Faculty of Science & Technology

Sign of the Offg. Dean
Prof. Shivram S. Garje
Faculty of Science & Technology

AC – 20.04.2024
Item No. – 5.4 (N) Sem II (5a)

As Per NEP 2020

University of Mumbai

Syllabus for Basket of OE -1, SEM II	
Board of Studies in Sociology (OE -1)	
UG First Year Programme	
Semester	**II**
Title of Paper	**Credits 2**
Basic Concepts in Research	**2 Credits**
From the Academic Year	**2024-2025**

Semester- II Open Electives (OE)-1

Basic Concepts in Research

Sr. No.	Heading	Particulars
1	**Description of the course :**	The course aims to familiarize students with the basic concepts in social research. Students will explore both quantitative and qualitative research and learn various steps in research process and conceptualization of research ideas. The course will equip students with necessary skills to engage in research in future.
2	**Vertical :**	**Open Elective**
3	**Type :**	**Theory**
4	**Credit**:	**2 credits**
5	**Hours Allotted :**	**30 Hours**
6	**Marks Allotted**:	**50 Marks**
7	**Course Objectives**: 1. Introduce basic concepts in research methodology in the social sciences. 2. Address issues related to selecting a research problem. 3. Discuss techniques and tools essential for completing a research project.	
8	**Course Outcomes:** After completion of the course, learners would be able to: 1. Understand and comprehend the basics in research methodology. 2. Apply research methodology concepts to research and project work. 3. Select an appropriate research design based on the research problem.	

9	**Modules**:-
	Module 1: Introduction to Research
	1. Definition and purpose of research 2. Qualitative research 3. Quantitative research 4. The research process: from idea to publication
	Module 2: Research Design
	1. Experimental research designs 2. Exploratory research designs 3. Preparing research proposals: Selection of the topic, Review of literature, Identifying Objectives of the Study, preparing Research Questions 4. Formulation of Hypothesis
10	**References:**
	1. Booth, W. C. Colomb, G. G. and Williams, J. M. (2016). *The Craft of Research.* 4th edition, University of Chicago Press. 2. Bryman, Alan. (2018). *Social Research Methods*, London: OUP. Creswell, J.W.(2014). *Research Methods: A Practical Guide*. 9th Edition, Pearson 3. Creswell, J.W.(2014). *Research Methods: A Practical Guide*. 9th Edition, Pearson. 4. Creswell, J.W. and Creswell, D. J. (2017). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* , 5th edition, SAGE Publications. 5. Creswell, J.W. and Creswell, D. J. (2017). *Research Design*, New Delhi: SAGE Publications. 6. Ghosh, B.N. (1984). *Scientific Method and Social Research*, New Delhi: Sterling. 7. Goode, W. J. and Hatt, P. K. (1952). *Methods in Social Research*, New York: Mc Graw-Hill Book Co. 8. Gupta, S. P. (2012). *Statistical Methods*, New Delhi: Sultan Chand & Sons. 9. Kothari, C.R. (2004). *Research Methodology: Methods and Techniques*. New Delhi: New Age International. 10. McNaab, D. (2010). *Research Methods for political Science*, New York. Routledge. 11. King, G. & et al. (1994). *Designing Social Inquiry; Scientific Interference in Social Research*, Princeton: Princeton University Press. 12. Mycoff, J. D. (2019). *Working with Political Science Research Methods*, London: Sage Publications. 13. Pierce, R. (2008). *Research methods In Politics: A Practical Guide*, New Delhi: Sage Publications. 14. O'Leary, Z. (2010). *The Essential Guide to Doing Your Research Project*, New Delhi: Sage Publications. 15. Sharma, Prasad and Satyanarayan, P. (1983). (Ed). *Research Methods in Social Sciences*, New Delhi. Sterling. **16.** Somek, B. and Lewin, C. (2005). *Research Methods in the Social Sciences*, New Delhi. Sage Publications

11	**Internal Evaluation** : 20 Marks 1-Classroom Presentations/ Assignments - 10 Marks 2-Essay Submission/ Book review/ 10 Marks Field Visit Report / Educational Activity Report
12	**Format of Question Paper:** for the final examination Time: 1hour Marks: 30 **Note**Q.1. Essay Type Questions (Based on Unit I).Marks 15 Q.2. Essay Type Questions (Based on Unit II).Marks 15 Q.3. Short Notes/Problem(Attempt any two out of four Based on all Units).Marks 15

Sign of the BOS Chairman	**Sign of the Offg. Associate Dean**	**Sign of the Offg. Dean**
Name of the Chairman	**Name of the Associate Dean**	**Name of the Offg. Dean**
Name of the BOS	**Name of the Faculty**	**Name of the Faculty**

AC – 4/12/2024
Item No. – 7.7 (3) (N) Sem. II

As Per NEP 2020

University of Mumbai

Syllabus for Basket of Open Electives	
Ad- hoc Board of Studies in BMS	
UG First Year Programme	
Semester	II
Title of Paper	Credits 2/4
Leadership Management	2
From the Academic Year	2024-25

Sr. No.	Heading	Particulars
1	**Description the course:**	Management is not only an essence in all fields but it is a prevalent tool in the hands of corporates to governments. From planning to controlling and from budgeting to reporting, all managerial elements are the most essential parts of daily life. So the learners need to know about all aspects from rural development to creating artificial intelligence. They will understand how to develop India, one of the fifth most powerful economies in the world. It is expected that the learners should learn how to develop our economy and management for the future generation from these managerial facets.
2	**Vertical:**	Major/Minor/Open Elective /Skill Enhancement / Ability Enhancement/Indian Knowledge System (Choose By √)
3	**Type:**	Theory / Practical
4	**Credit**:	2 credits
5	**Hours Allotted:**	30 Hours
6	**Marks Allotted**:	50 Marks
7	**Course Objectives**: a) To acquaint the learners with fundamentals of leadership. b) To orient & apply the theoretical & practical perspective of leadership in the changing dynamics of the society.	
8.	**Course Outcomes**: CO1) Students will explore various leadership theories and their applications in real-world scenarios. CO2) Learner should develop effective communication skills for leading and motivating teams. CO3) Analyse the dynamics of teamwork and foster a collaborative work environment.	
9.	**Modules:**	
	Module-1: Leaders & Leadership	
	a) Definition of Leader & leadership, Traits/qualities of a successful leader, Skill sets required for an effective leader – Role of communication in leadership. b) Leadership Styles – Women as Leaders - Time Management & Leadership – Tools & techniques for effective time management.	
	Module 2: Theories & Trends in Leadership	
	a) Theories of Leadership – Great Man Theory of Leadership – Trait Theory of Leadership- Transactional & Transformational Leadership Theory.	

	b) *Leadership Training – Concept – Need for leadership* **-** Youth Leadership - Principles of youth leadership – Social leadership – Need, Success stories of successful business & social leaders.	
10	**Text Books & Reference Books:** • *Ramaswamy. V S & Namakumari. S, Marketing Management-Planning Implementation and Control, Macmillan Business Books, New Delhi, 2002, Hall of India, New Delhi.* • Khanna, S.S. Human resource Management (Text and Cases). S. Chand, New Delhi. • Chhabra, T.N.,Human Resource Management, Dhanpat Rai & Co., Delhi. • Aswathappa K.,Human Resource Management ata McGraw, Hill, New Delhi. • Robbins, Stephen P. Organisational Behaviour. Pearsons Education, New Delhi • Leadership and Self-Deception: Getting Out of the Box by The Arbinge • Dare to Lead by Brené Brown • Multipliers: How the Best Leaders Multiply Intelligence, Influence, and Capability of Others by Liz Wiseman • The Management Challenge by Manfred Kets de Vries	
11	**Internal Continuous Assessment: 40%**	**External, Semester End Examination Individual Passing in Internal and External Examination : 60%**
12	**Continuous Evaluation through:** Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc.(at least 3)	
13	**Format of Question Paper: for the final examination** **External Paper Pattern (30 Marks)** Q1. Case Study Analysis 10 Marks Q2. Answer the following (Any One) 10 marks A **Or** B Q3. Answer the following (Any One) 10 Marks A **Or** B	

Sign of the BOS Chairman **Prof. Dr. Kanchan Fulmali** **BOS in BMS**	**Sign of the Offg. Associate Dean** **Dr. Ravikant Balkrishna Sangurde** **Faculty of Commerce**	**Sign of the Offg. Associate Dean** **Prin. Kishori Bhagat** **Faculty of Management**	**Sign of the Offg. Dean** **Prof. Kavita Laghate** **Faculty of Commerce & Management**

VSC

VSC-1

Name of the Course: Medical Laboratory Technology

Sr.No.	Heading	Particulars
1	**Description the course : Including but Not limited to:**	The course provides essential skill sets required in medical laboratories as a technician, thus preparing learners to explore career opportunities in diagnostics and healthcare.
2	**Vertical :**	VSC
3	**Type :**	Practical
4	**Credits :**	2 credits
5	**Hours Allotted :**	60 Hours
6	**Marks Allotted:**	50 Marks
7	**Course Objectives(CO):** CO 1. Develop proficiency in a wide range of laboratory techniques and skills necessary for medical diagnostics CO 2. Acquire new skills and procedures in haematology, microbiology, and biochemistry with the precautionary measures	
8	**Course Outcomes (OC):** Lerner will be able to OC 1. practise safety measures in a medical laboratory. OC 2. demonstrate the ability to perform a variety of laboratory procedures, including specimen collection, processing, and analysis, using appropriate techniques and equipment OC 3. perform basic haematological analyses and report the findings. OC 4. demonstrate the ability to identify and characterize microorganisms using Microbiological techniques	
9	**Modules:-** **Module: Introduction to Medical Lab technology**	
	1. Preparation of cleaning agents and techniques of cleaning of glass and plastic ware. 2. Collection and safety measures in Handling of Clinical specimens for pathological analysis. 3. Physical examination of clinical samples like urine,stool, etc. 4. Microscopic examination of clinical samples like urine,stool, CSF etc. 5. Microscopic examination of a. different stages of Malarial parasite b. *Mycobacterium tuberculosis* c. *Entamoeba histolytica*. 6. Qualitative Estimation Of Normal and Abnormal urine components (protein, haemoglobin, glucose, ketone bodies, bilirubin, urobilinogen.) 7. Quantitative Estimation of blood glucose 8. Components of Blood. 9. Anticoagulants different types and preparation. 10. Separation of serum and Plasma from whole blood. 11. Differential WBC count 12. Total WBC count 13. Total RBC count 14. Haemoglobin estimation by Sahli's apparatus 15. Identification & characteristics of bacteria by i. Microscopic examination ii. Colony characteristics	

	iii. Motility demonstration methods iv. Biochemical's such as – a. Carbohydrate utilization tests b. Catalase, Oxidase, Coagulase c. Indole d. MR & VP 16. Identify the ABO Blood Group in Human.	
10	**Text Books** **1.** Medical Laboratory Technology by Kanai L Mukherjee Volume I,II and III	
11	**Reference Books** **1.** Godkar, P. B., & Godkar, D. P. (2003). *Textbook of medical laboratory technology*.	
12	**Internal Continuous Assessment: 40%**	**Semester End Examination: 60%** **(Refer format of Question paper Below)**
13	**Continuous Evaluation through:** Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc.(at least 3)	

SEC- 2

Name of the Course: Food Adulteration

Sr.No.	Heading	Particulars
1	**Description the course : Including but Not limited to:**	This syllabus introduces the critical topic of food adulteration, highlighting its relevance in ensuring food safety and public health. Through practical applications and theoretical insights, students learn to identify, prevent, and address food adulteration
2	**Vertical :**	Skill enhancement
3	**Type :**	Practical
4	**Credits :**	2 credits
5	**Hours Allotted :**	60 Hours
6	**Marks Allotted:**	100 Marks
7	**Course Objectives(CO):** (List the course objectives) CO 1. Understand the Concept of Food Adulteration: Define and comprehend the various forms of food adulteration, including intentional and unintentional contamination. CO 2. Identify Common Adulterants: Learn to recognize commonly used adulterants in different food products and understand their potential health hazards. CO 3. Analytical Techniques: Acquire knowledge of analytical methods and techniques used to detect and quantify adulterants in food	
8	**Course Outcomes (OC):** (List the course outcomes) On completion of the course, learners should OC 1. Be able to identify and detect various forms of food adulteration using appropriate analytical techniques. OC 2. Develop the ability to assess the potential health risks associated with adulterated food.	
9	**Modules:-** **Module 1:**	
	1. Concept & types of adulteration, health hazards associated with adulteration 2. Organoleptic testing of food samples 3. Test for adulterants in milk & milk products 4. Detection of adulterants in i) oil & fats ii) sweetening agents iii)food grains iv) pulses and dals v) spices and condiments 5. Detection of common adulterants in miscellaneous products like saffron, common/iodized salt, tea, coffee, vinegar, green peas, pan masala, apples.	
10	**Text Books** **1. Food Adulteration and Its Detection" by S. Sukumar. New Age International (P) Limited** **2. Food Adulteration: Incidents and Measures" by Ashish Kumar Singh.CRC Press.**	
11	**Reference Books** **1. DART-Detect adulteration with rapid test -FSSAI**	

12	**Internal Continuous Assessment: 50%**	**Semester End Examination: 50%**
13	**Continuous Evaluation through:** Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc.(at least 3)	
14	**Format of Question Paper:**	

AC – 20.04.2024
Item No. – 5.6 (N) Sem II (1a)

As Per NEP 2020

University of Mumbai

Syllabus for Basket of AEC	
Board of Studies in Marathi	
UG First Year Programme	
Semester	**II**
Title of Paper	**Credits**
लेखन कौशल्ये १- (कार्यालयीन लेखनव्यवहार आणि पत्रव्यवहार)	**2**
From the Academic Year	**2024-25**

Sr. No.	Heading	Particulars
1	**Description the course :** **Including but Not limited to :**	**लेखन कौशल्ये१-** **(कार्यालयीन लेखनव्यवहार आणि पत्रव्यवहार)** लेखन ओळख ते लेखन कौशल्य हा बराच मोठा प्रवास आहे. वाचन आणि लेखनाच्या सरावाने, लेखन कौशल्य विकसित करता येते. बहुतेक वेळा आपण मिळवलेले ज्ञान हे लिखित स्वरूपात मांडावे लागते. त्यासाठी आपण लेखन कौशल्याचे योग्य उपयोजन करतो. लेखन म्हणजे मजकूर तंतोतंत उतरवणे नव्हे. एखादे निवेदन, वृत्त, निबंध, पुस्तकाची टिपणे, अर्ज यांसाठी लेखन आवश्यक असते. कार्यालयीन पत्रव्यवहार, कार्यवृत्ते, नोंदी, जाहिरात, टिप्पणी ही सर्व उपयोजित लेखन कौशल्ये आहेत. कार्यालयीन पत्रव्यवहार करणे हे एक वेगळ्या प्रकारचे कौशल्य आहे. त्यातील काही उपयोजन कौशल्यांचा विचार या अभ्यासपत्रिकेत अपेक्षित आहे. कार्यालयीन लेखन व्यवहार आणि पत्रव्यवहार या अभ्यासपत्रिकेत शिकविला जाईल.
2	**Vertical :**	Ability Enhancement Course
3	**Type :**	Theory + Practical
4	**Credit**:	02 (1 credit = 15 Hours for Theory in a semester)
5	**Hours Allotted :**	30
6	**Marks Allotted**:	50
7	**Course Objectives**: (List some of the course objectives) १. कार्यालयीन लेखन व्यवहार स्वरूप समजावून सांगणे. २. कार्यालयीन पत्रव्यवहाराचे स्वरूप समजावून सांगणे. ३. प्रभावी कार्यालयीन लेखनासाठी आवश्यक असणाऱ्या क्षमता आणि तंत्रांचा परिचय करून देणे.	
8	**Course Outcomes**: (List some of the course outcomes) १. विद्यार्थ्यांना कार्यालयीन लेखन व्यवहाराचे स्वरूप समजेल. २. विद्यार्थ्यांना कार्यालयीन पत्रव्यवहाराचे स्वरूप समजेल. ३. प्रभावी कार्यालयीन लेखनासाठी आवश्यक असणाऱ्या तंत्रांचा विद्यार्थ्यांना परिचय होईल.	
9	**Modules**:- Per credit One module can be created	
	घटक एक घटक एक : कार्यालयीन लेखनव्यवहार -	
	१. जाहीर निवेदन आणि माहितीपत्रक २. इतिवृत्त लेखन ३. टिप्पणी लेखन (६० मिनिटांच्या १५ तासिका) श्रेयांकन १.	

	घटक दोन : घटक दोन : पत्रव्यवहार -२	
	१.कार्यालयीन/प्रशासनिक पत्र २. नोकरीसाठी अर्जलेखन ३. पत्रात्मक लेखन : नवी रूपे (शुभेच्छा, निमंत्रण) (६० मिनिटांच्या १५ तासिका) श्रेयांकन १.	
10	**Text Books:** N.A.	
11	**Reference Books: संदर्भसूची** : १. प्रशासनिक लेखन, भाषा संचालनालय, महाराष्ट्र शासन, मुंबई, १९६६ २. भाषिक सर्जन आणि उपयोजन, राजन गवस, अरुण शिंदे, गोमटेश्वर पाटील, दर्या प्रकाशन, पुणे, २०१२ ३. परब प्रकाश, व्यावहारिक मराठी, मिथुन प्रकाशन, डोंबिवली पूर्व, मुंबई, १९८९ ४. नाईक सदानंद, राजभाषा मराठी, व्यावहारिक मराठी, प्रका-नागरी सेवा प्रबोधिनी, मुंबई, २००२ ५. तावरे स्नेहल (संपा.), व्यावहारिक मराठी, स्नेहवर्धन प्रकाशन, पुणे,चौथी आवृत्ती, २०११ ६. केतकी मोडक, संतोष शेणई, सुजाता शेणई (संपा.), उपयोजित मराठी, पद्मगंधा प्रकाशन, २०१२ ७. नसीराबादकर ल. रा., व्यवहारिक मराठी, भाषा विकास संशोधन संस्था, कोल्हापूर २०२३	
12	**Internal Continuous Assessment: 40%**	**External, Semester End Examination 60%** **Individual Passing in Internal and External Examination**
13	**Continuous Evaluation through:** Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc.(at least 3)	**अंतर्गत चाचणी परीक्षा : २० गुण** चाचणी परीक्षा /लेखी/ ऑनलाईन/ प्रकल्प/ गृहपाठ - २० गुण
14	**Format of Question Paper:** for the final examination बहिर्गत परीक्षा ३० गुण (वेळ एक तास) ● एकूण तीन प्रश्न विचारावेत. ● प्रत्येक घटकावर अंतर्गत पर्याय असलेले प्रत्येकी १० गुणांचे दोन प्रश्न विचारावेत. ● तिसरा प्रश्न हा घटक १ आणि २ वर आधारित अंतर्गत पर्यायासह दोन टीपा/लघुप्रश्न स्वरूपाचा असावा.	

Sign of the BOS Chairman **Name of the Chairman** **Name of the BOS**	**Sign of the Offg. Associate Dean** **Name of the Associate Dean** **Name of the Faculty**	**Sign of the Offg. Dean** **Name of the Offg. Dean** **Name of the Faculty**

AC – 20.04.2024
Item No. – 5.6 (N) Sem II (5a)

As Per NEP 2020

University of Mumbai

Syllabus for Basket of AEC	
Board of Studies in HINDI	
UG First Year Programme	
Semester	**II**
Title of Paper	**Credits**
हिन्दी भाषा : कौशल के आधार	**2**
From the Academic Year	**2024-25**

Sr. No.	Heading	Particulars
1	**Description the course :** **Including but Not limited to :**	**हिन्दी भाषा : कौशल के आधार** हिंदी राजभाषा होने के साथ-साथ भारत में बोलीजने वाली एक प्रमुख भाषा है। भारत के अधिकांश निवासी और यहां तक कि भारत के बाहर बसनेवाले भारतवंशी भी अपने दैनिक आपसी वार्तालाप, कार्य-व्यवहार में हिंदी भाषा का ही प्रयोग करते हैं। विश्व की प्रमुख पांच भाषाओं के अंतर्गत हिंदी का अस्तित्व है, इस दृष्टि से हिंदी को लेकर विभिन्न प्रकार के कौशल सीखे और सिखाए जा सकते हैं। विद्यार्थियों के लिए हिंदी एक सामान्य भाषा होने के साथ विशेष भाषा तब बन जाती है जब वह हिंदी के माध्यम से अपने कौशल में अभिवृद्धि करें, हिंदी के माध्यम से रोजगार के कई अवसरों को प्राप्त करें। इस दृष्टि से पाठ्यक्रम अत्यंत लाभवर्धक और उपयोगी सिद्ध होगा। हिंदी भाषा में कौशल विकास की असीम संभावनाएं हैं और कौशल के विभिन्न आयाम जुड़े हुए हैं जो अलग-अलग दिशाओं में देखे जा सकते हैं। पाठ्यक्रम विद्यार्थियों में लेखन, वाचन कौशल की अभिवृद्धि करने के साथ रोजगारपरक अवसर प्रदान करता है।
2	**Vertical :**	Open Elective
3	**Type :**	Theory
4	**Credit**:	2 credits (1 credit = 15 Hours for Theory in a semester)
5	**Hours Allotted :**	30 Hours
6	**Marks Allotted**:	50 Marks
7	**Course Objectives**: (List some of the course objectives) 1. विद्यार्थियों को लेखन, वाचन कौशल का ज्ञान देना एवं रोजगार के अवसरों से जोड़ना। 2. विद्यार्थियों को लेखन, वाचन कौशल से परिचय करते हुए अभिव्यक्ति की शैलियों का विकास करना। 3. विद्यार्थियों को भाषण कला के विविध रूपों को समझाना, मौलिकता में अभिवृद्धि लाना एवं विशेषज्ञता दिलाना। 4. विद्यार्थियों को श्रवण कौशल की विशेषताओं से परिचय कराते हुए श्रवण कौशल के लाभों से अवगत कराना।	

8 **Course Outcomes**: (List some of the course outcomes)

CO-1) विद्यार्थियों को लेखन, वाचन कौशल के ज्ञान प्राप्ति के साथ मौलिक अभिव्यक्ति में बदलाव आएगा।

CO-2) विद्यार्थियों का लेखन, वाचन कौशल द्वारा मानसिक विकास होगा, पठन-शक्ति, शैली का विकास होगा।

CO-3) विद्यार्थियों को लेखन, भाषण कौशल से भाषिक-शक्ति, शैलियों का संवर्धन होगा विशेषज्ञता आएगी।

CO-4) विद्यार्थियों को लेखन, वाचन, श्रवण, भाषण कौशल की विशेषताओं और उपयोगिता का ज्ञान प्राप्त होगा।

9 **Modules**:-

इकाई	पाठ	व्याख्यान संख्या
इकाई -1	1. लेखन कौशल का अर्थ एवं स्वरूप 2. लेखन कौशल की उपयोगिता एवं महत्व 3. लेखन कौशल की विधियाँ 4. लेखन कौशल के भेद एवं विशेषताएँ 5. वाचन कौशल का अर्थ, स्वरूप एवं विशेषताएँ 6. वाचन कौशल की उपयोगिता 7. वाचन कौशल की विधियाँ एवं विशेषताएँ	व्याख्यान- 15 क्रेडिट- 01
इकाई -2	8. भाषण कौशल का अर्थ एवं स्वरूप 9. भाषण कौशल का महत्व एवं उपयोगिता 10. भाषण कौशल की विशेषताएँ 11. भाषण कौशल की विधियाँ 12. श्रवण कौशल का अर्थ एवं स्वरूप 13. श्रवण कौशल का महत्व एवं उपयोगिता 14. श्रवण कौशल की विशेषताएँ	व्याख्यान- 15 क्रेडिट- 01

10 **संदर्भ ग्रंथ सूची** -

1. हिंदी भाषा शिक्षण के विविध आयाम - प्राध्यापक डॉ. राठौर, किनले एडिशन
2. अभिनव पत्र लेखन - डॉ अनिल सिंह
3. हिंदी के व्यावहारिक रूप - डॉ संतोष मोटवानी, परिदृश्य प्रकाशन, मुंबई
4. हिंदी भाषा लेखन कौशल - गुलीबाबा पब्लिकेशन प्राइवेट लिमिटेड

11	**Internal Continuous Assessment: 40%**	**External, Semester End Examination 60% Individual Passing in Internal and External Examination**
12	**Continuous Evaluation through:** **<u>मूल्यांकन प्रारूप</u>** ***आंतरिक मूल्यांकन- 20- अंक*** रचनात्मक कार्य, प्रकल्प इत्यादि- 10 अंक, कक्ष शिक्षण के दौरान सहभागिता इत्यादि - 05 अंक अकादमिक, व्यावसायिक एवं कौशल संवर्धन गतिविधियाँ- 05 अंक कुलयोग -**20 अंक**	
13	**Format of Question Paper:** ***बाह्य मूल्यांकन- लिखित परीक्षा- 30- अंक*** ***परीक्षा अवधि- 01 घंटा*** ***निम्नलिखित तीन में से किन्हीं दो प्रश्नों के उत्तर लिखिए*** ***30 अंक*** कुलयोग- **30 अंक**	

Sign of the BOS Chairman
Name of the Chairman
Name of the BOS

Sign of the Offg. Associate Dean
Name of the Associate Dean
Name of the Faculty

Sign of the Offg. Dean
Name of the Offg. Dean
Name of the Faculty

AC –
Item No. –

As Per NEP 2020

University of Mumbai

Syllabus for Basket of VES	
Board of Studies in Value Education	
UG First Year Programme	
Semester	**II**
Title of Paper	**Credits 2**
I) Environmental Management & Sustainable Development -II	
From the Academic Year	**2024-25**

Name of the Course: Environmental Management & Sustainable Development -II

Sr. No.	Heading	Particulars
1	Description the course : Including but Not limited to :	This introductory course explores the interconnectedness of our environment and the challenges it faces. Designed for students from all faculties, it equips you with a foundational understanding of: • Ecosystems and biodiversity: Explore the intricate web of life on Earth and the importance of species diversity. • Human impact: Analyse how human activities affect natural resources, climate, and pollution. • Sustainability: Discover principles for living in harmony with the environment and meeting our needs without compromising future generations. Regardless of major, environmental awareness is crucial. This course empowers learner to: • Become an informed citizen: Make responsible choices and advocate for environmental protection. • Understand complex environmental issues: Gain a holistic view of challenges like climate change and pollution. Explore solutions and career paths: Discover potential careers in environmental management, conservation, or sustainable development.
2	Vertical :	**Open Elective**
3	Type :	Theory / ~~Practical~~
4	Credit:	2 credits / (1 credit = 15 Hours for Theory or 30 Hours of Practical work in a semester)
5	Hours Allotted :	30 Hours
6	Marks Allotted:	50 Marks
7	**Course Objectives:** 1. To create and disseminate knowledge to the students about environmental problems at local, regional and global scale. 2. To introduce about ecosystems, biodiversity and to make aware for the need of	

	conservation. 3. To sensitize students towards environmental concerns, issues, and impacts of human population. 4. To prepare students for successful career in environmental departments, research institutes, industries, consultancy, and NGOs, etc.
8	**Course Outcomes:** 1. Use principles of Environmental Science for explaining sustainable development and its related ethical concerns 2. Display scientific perspective for issues confronting our present day environment. 3. Analyze the national and global environmental issues relating air, water, soil, and land use, biodiversity, and pollution. 4. Explain the Role of an individual in relation to human population and environmental pollution. 5. Recognize the importance of collective efforts for environmental sustainability as reflected in various treaties, conventions and laws
9	**Modules:-**
	Unit I: Environmental Pollution and Health (8 lectures)
	Understanding pollution: Production processes and generation of wastes; Assimilative capacity of the environment; Definition of pollution; Point sources and non-point sources of pollution. Air pollution: Sources of air pollution; Primary and secondary pollutants; Criteria pollutants- carbon monoxide, lead, nitrogen oxides, ground-level ozone, particulate matter and Sulphur dioxide; Other important air pollutants- Volatile Organic compounds (VOCs), Peroxyacetyl Nitrate (PAN), Polycyclic aromatic hydrocarbons (PAHs) and Persistent organic pollutants (POPs); Indoor air pollution; Adverse health impacts of air pollutants; National Ambient Air Quality Standards. Water pollution: Sources of water pollution; River, lake and marine pollution, groundwater pollution; water quality parameters and standards; adverse health impacts of water pollution on human and aquatic life. Soil pollution and solid waste: Soil pollutants and their sources; Solid and hazardous waste; Impact on human health. Noise pollution: Definition of noise; Unit of measurement of noise pollution; Sources of noise pollution; Noise standards; adverse impacts of noise on human health. Thermal and Radioactive pollution: Sources and impact on human health and ecosystems.
	Unit II: Environmental Management (7 lectures)
	Introduction to environmental laws and regulation: Constitutional provisions- Article 48A, Article 51A (g) and other derived environmental rights; Introduction to environmental legislations on the forest, wildlife and pollution control. Environmental management system: ISO 14001 Life cycle analysis; Cost-benefit analysis Pollution control and management; Waste Management- Concept of 3R (Reduce, Recycle and Reuse) and sustainability; Ecolabeling /Ecomark scheme. Introduction to Millennium Development Goals, Sustainable Development Goals, & Mission Life.

	Unit III: **Environmental Treaties and Conventions (8 lectures)**
	1) Major International Environmental Agreements: Stockholm Conference on Human Environment,1972, Ramsar Convention on Wetlands, 1971, Montreal Protocol, 1987, Basel Convention (1989), Earth Summit at Rio de Janeiro,1992, Kyoto Protocol, 1997, Earth Summit at Johannesburg, 2002. 2) Major Indian Environmental Legislations: The Wild Life (Protection) Act, 1972; The Water (Prevention and Control of Pollution) Act, 1974; The Forest (Conservation) Act, 1980; The Air (Prevention and Control of Pollution) Act, 1981; The Environment (Protection) Act, 1986; The Biological Diversity Act, 2002
	Unit IV: **Case Studies and Field Survey (7 lectures)**
	The students are expected to be engaged in some of the following or similar identified activities: • Discussion on one national and one international case study related to the environment and sustainable development. • Field visits to identify local/regional environmental issues, make observations including data collection and prepare a brief report. • One student one tree initiative. • Documentation of campus biodiversity. • Campus environmental management activities such as solid waste disposal, water management, and sewage treatment.
10	**Text Books** 1. Ahluwalia, V. K. (2015). Environmental Pollution, and Health. The Energy and Resources Institute (TERI). 2. Central Pollution Control Board Web page for various pollution standards. https://cpcb.nic.in/standards/ 3. Masters, G. M., & Ela, W. P. (2008). Introduction to environmental engineering and science (No. 60457). Englewood Cliffs, NJ: Prentice Hall. 4. Jørgensen, Sven Marques, Erik João Carlos and Nielsen, Søren Nors (2016) Integrated Environmental Management, A transdisciplinary Approach. CRC Press. 5. Barrow, C. J. (1999). Environmental management: Principles and practice. Routledge. 6. Theodore, M. K. and Theodore, Louis (2021) Introduction to Environmental Management, 2nd Edition. CRC Press. 7. Richard A. Marcantonio, Marc Lame (2022). Environmental Management: Concepts and Practical Skills. Cambridge University Press. 8. UNEP (2007) Multilateral Environmental Agreement Negotiator's Handbook, University of Joensuu, ISBN 978-952-458-992-5 9. Ministry of Environment, Forest and Climate Change (2019) A Handbook on International Environment Conventions & Programmes. https://moef.gov.in/wp-content/uploads/2020/02/convention-V-16-CURVE-web.pdf 10. Ministry of Environment, Forest and Climate Change (2019) A Handbook on International Environment Conventions & Programmes. https://moef.gov.in/wp-content/uploads/2020/02/convention-V-16-CURVE-web.pdf 11. India Code – Digital repository of all Central and State Acts: https://www.indiacode.nic.in/ 12. University Grants Commission, D.O.No.F. 14-5/2015(CPP-II) dated 2nd August1 2019.

12	**Internal Continuous Assessment: 40%**	**Semester End Examination : 60%**
13	**Continuous Evaluation through:** Quizzes, Class Tests, presentation, project, role play, creative writing, Field Visits, Case Studies, assignments, One Student one tree initiative etc. (at least 4)	
14	**Format of Question Paper:** for the final examination For OE: External - 30 Marks (2 Credits) Internal - 20 Marks Question Paper Format for 30 Marks Format of Question Paper: 30 Marks per paper Semester End Theory Examination: 1. Duration - These examinations shall be of one hour and 30 minutes duration. 2. Theory question paper pattern: There shall be 04 questions each of 10 marks out of which students will attempt ANY THREE	

Signature:
Prof. Kavita Laghate
Chairman of Board of Studies in Value Education

AC –28/06/2024

Item No. – 5.7 (N)

University of Mumbai

Syllabus for Extension Work in Vertical VI - CC	
Board of Studies in Extension Work	
UG First Year Program	
Semester	**II**
Title of Paper	**Credit**
Extension Work	**2**
From the Academic Year	**2024-25**

Introduction

The National Education Policy (NEP) 2020 is a comprehensive framework introduced by the Government of India to revamp the country's education system. It has replaced the previous National Policy on Education, which has aim to ensure universal access to quality education from preschool to higher education, including vocational education. NEP 2020 emphasizes a more holistic, multidisciplinary, and flexible curriculum which lay emphasis on conceptual understanding rather than rote learning allowing students to choose subjects across disciplines without strict boundaries.

The National Education Policy (NEP) 2020 of India addresses the role of higher education institutions in fostering community engagement and extension work. It highlights the social responsibility of higher education institutions towards their communities. It encourages institutions to engage with local communities, address societal challenges, and contribute to sustainable development. The policy promotes the implementation of outreach programs by higher education institutions to disseminate knowledge, provide services, and support community development. These programs may include literacy campaigns, career development programs, social issues awareness programs, health and hygiene initiatives, skill development workshops, and technology-oriented activities. The policy suggests integrating extension work into the curriculum of higher education programs. This allows learners to gain practical experience, develop leadership skills, and contribute to community development while pursuing their studies. It recognizes incentives to encourage active engagement in community service and extension activities.

Overall, NEP 2020 recognizes the significant role of higher education institutions in promoting community engagement, social responsibility, and sustainable development through extension work. By integrating extension activities into their mission and operations, institutions can contribute to building inclusive and resilient societies.

Extension work in the context of education refers to the activities and programs conducted by educational institutions to engage with communities, address societal needs, and promote social development.

Aim of Extension Work under NEP:

- Extension work aims to identify and address the specific needs and challenges faced by communities. NEP 2020 encourages higher education institutions to engage with local communities and contribute to their development by offering programs and services that

address social needs, such as literacy programs, health awareness campaigns, and vocational training.

- Extension work aims to empower communities by providing them with the knowledge, skills, and resources they need to address their own requirements and improve their quality of life.

Key objectives of Extension Work under NEP:

- To ensure equal access to quality education and educational opportunities to aspirants.
- To support the government initiatives in achieving universal foundational literacy and numeracy as per sustainable development program.
- To organize remedial programs to address the learning breaches among the youth and provide unending education opportunities.
- To offer more holistic, multidisciplinary, and flexible curricular activities with an emphasis on conceptual understanding and personality development.
- To offer a wide range of activities & promote critical thinking, creativity, and innovation.
- To provide aspirants with multiple pathways for skill development and employment.
- To implement outreach programs to disseminate knowledge, provide services, and support community development.

Extension Work Activities:

Extension Work activities introduced by DLLE are a crucial aspect of the educational environment, offering multifaceted benefits that extend beyond academic learning. Many extension activities focus on social issues, sustainability, and environmental conservation. These activities educate the communities on sustainable practices which promote inclusivity and social justice. These activities focus especially on training women in various skills, including entrepreneurship and digital literacy through various vocational skill-oriented projects offered by the department. These activities have significantly contributed to skill development among community members, leading to improved employment opportunities and personality development. Learners participate in extension work activities as part of their curriculum, to gain practical experience and to contribute to community development. Thus, engaging in extension work fosters a sense of social responsibility and civic engagement among the learners and facilitators.

THE EXTENSION DIMENSION (Reach to Unreached)

The college students are enrolled for extension work projects and perform various activities for the **social awareness based on various issues / problems in the society such as Save Girl Child, Pollution, Aids, Global Warming, Environment, Tree Plantation, Importance of Education, Illiteracy, Child Labour, Dowry Deaths, Malnutrition, Watershed Management and so many.** The students are creating awareness about these social problems / issues through various activities such as Street Play, Exhibition, Poster Making, Songs, Speech, Survey, Elocution, and participation in Seminar & Conferences. For this purpose, students are going to remote areas and involve the community and make them aware of our role in eradicating social problems faced by the society and trying to convince the people human duties as an ideal citizen.

To facilitate the sensitization of the student to the socio-cultural realities, the Department offers extension work projects encompassing social issues for the student. There are many Extension Work Projects being offered by the department under the two different units for enhancing the employability and IT skills of the student. The projects are given below for which the details are available on DLLE website at www.mudlle.ac.in

I) Vocational Career Oriented Projects

1. Career Project [CP]
2. Industry Orientation Project [IOP]
3. Anna Poorna Yojana [APY]
4. Skill Development (SD)

II) Community Oriented Projects

1. Population Education Club (PEC)
2. Survey Research
3. Education for All (EFA- NIOS, IDOL)
4. Environment Education
5. Civic Sense (CS)
6. Consumer Guidance

Given below are the activities / programs to be conducted by the colleges as a part of Extension Work as enlisted topics. The learner will focus on enlisted topics and participate in following activities during Semester II in this academic year.

ACTIVITIES FOR SEMESTER II = 2 Credits

Sr. No.	Unit	No. of Lectures
1.	Organising & Participation in Training Session Every learner should attend the orientation / training session organised by their college for orientation of annual extension work program. Attendance is compulsory. **In this session the learners will be oriented about the activities to be conducted during the semester followed by question-and-answer session.** The learner must read resource material and guideline carefully and plan his / her activities for the semester during academic year.	2 Lectures
2.	Participation in Project /Activities (as given below) **In this session learners will be oriented about any 5 Topics selected by college (preferably which are not taken in Semester 1) for awareness under Extension Work. The college may select more than 5 topics if the enrolment of learners is more than 200. The learners will participate in activities based on these topics selected by college.)** 1. Maharashtra Policy for women. 2. Status of women in India. / Women achievers of modern India 3. Banking procedures. 4. Legal procedures. 5. Violence against women / Laws protecting women/ Inheritance laws. 6. Child Labour. 7. Environment- pollution and its effect / Save Trees and Natural Resources 8. Water Harvesting.	22 Lectures including guidance for practice session, preparations and actual conduct of program.

	9. Pollution (Noise pollution / industrial pollution etc.) 10. Issues related to LGBT. 11. HIV –AIDS / Covid 19 etc. 12. Consumer Awareness (Act 2019), Need and Importance 13. E-waste management 14. Stress and Harassment. 15. Global warming 16. Importance of Ethics and Values 17. Old Age Homes / Status of Senior Citizens 18. Distance Education Opportunities 19. First Aid Awareness 20. Voting rights / Human Rights **Learners will be oriented and motivated to participate in minimum four activities given below based on above topics:** 1. Seminar /conferences, discussion sessions, debate, rallies 2. Competitions (essay/creative writing, elocution, poster/ video/ rangoli making etc. – Minimum 2 competitions) 3. Extension Work group activities of other groups in the college. 4. Prepare your PPT, design your posters / charts. 5. Survey / short term academic courses / innovative programs. 6. Field visit / field work / case studies / developing innovative engineering models / projects 7. Participation in Street Plays 8. Event / hospitality / human resource management program /assignment 9. Novel formulation development (pharmacy), 10. Self-medication survey (pharmacy), **Learners are required to prepare <u>short videos (duration 3-4 minutes)</u> of the activity where the college will organize such competition.**	

	The learners will be oriented about various career development opportunities in University of Mumbai, and schemes of student development by the Government. **<u>Learners will be oriented and given an opportunity for:</u>** - Script writing / Direction for street play. - Composing / Singing (Songs, Powada) - Playing Musical Instrument during the event. - Participation in various college and university level competitions. - Participate in Cultural Performance / Organising Committee for Festival / Programs / Event Management.	
3	<u>Participation Video / Stage Performance / Assignment / Report Writing and submission</u> - Present your report / video during the college program. - All learners enrolled in Extension Work can make activity video or stage performance (3-4 minutes duration) creating awareness about any social issues / topics enlisted here followed by assignment / report writing as per format. - **College will organise a program in the hall / classroom for all learners and give them an opportunity** to present their assignment / report with PPT / video presentation followed by question answer session / test / interview by the college.	6 Lectures including guidance for practice session, preparations and actual conduct of program.

Evaluation Pattern

<u>Internal Assessment</u>

Sr. No.	Assessment Criteria	Maximum Marks
1	Attendance, punctuality, completion of hours, participation in programs, presentations and feedback.	10
2	Proficiency in required skill sets, overall performance, submission of written report / assignments and expected development.	10
	Total	20 Marks

External Assessment

(Based on Extension Work guidelines and five enlisted topics chosen by the college.)

Question Paper Pattern

Time: 1.00 Hours **Total Marks 30**

Instructions: 1. All questions are compulsory.

2. Figures to the right indicate maximum marks.

Q.1. Rewrite the following statement by choosing correct alternative given below. - 06 Marks (6 statements. One mark each)

Q.2. Write short Notes On (Any Two out of Four) - 06 Marks

Q.3. Answer the following questions. (Any Three out of Five) - 18 Marks

References:

- Guidelines for Extension Work published by Department of Lifelong Learning and Extension, University of Mumbai.
- Agricultural Extension: Principles and Methods" by "Ray V. Herren (2008)
- Agricultural Extension by G. S. R. Murthy (2010)
- Introduction to Agricultural Extension by S. S. Acharya (2015)
- Agricultural Extension in Developing Countries by R. W. Snapp (2012)
- Extension Communication and Management by B. M. Panda (2016)

Sign of BOS Chairman **Prof. Kunal Jadhav** **Ad-hoc Board of Studies in Extension Work**	**Sign of the Offg. Associate Dean** **Dr. Suchitra Naik** **Faculty of Humanities**	**Sign of the Offg. Associate Dean** **Dr. Manisha Karne** **Faculty of Humanities**	**Sign of the Dean** **Prof. Dr. Anil Singh** **Faculty of Humanities**