Syllabus of 2nd Year B.Sc. Chemistry (Hons.)

As Per National Education Policy 2020 (NEP 2020)

AY-2024-2025

UPL University of Sustainable Technology, Ankleshwar				
SRICT-Institute of Science and Research (SRICT-ISR)				
B.Sc. - Microbiology (2nd Year)				
SEM	**TYPE OF COURSE**	**COURSE CODE**	**NAME OF SUBJECT**	**Credits**
3	MAJOR	MIM300-2C	Basic Microbiology	4
	MAJOR	MIM301-2C	Physical aspects of Biochemistry	4
	MAJOR	MIM302-2C	Practicals in Microbiology-I	4
	MDC	MDC300-2C	Non-Conventional Energy Resources	4
	MDC	MDC3012C	Environmental Sustainability	4
	AEC	AEC300-2C	Introduction to Functional English	2
	AEC	AEC301-2C	English and Communications	2
	AEC	AEC302-2C	Developing Fluency and Clarity in English	2
	SEC	SEC300-2C	Stress Management	2
	SEC	SEC301-2C	Entrepreneurship Skills	2
	SEC	SEC302-2C	Team Skills	2
	VAC	VAC300-2C	IKS-II	2
			Total Credits	22
4	MAJOR	MIM303-2C	Fundamental of Medical Microbiology	4
	MAJOR	MIM304-2C	Applied and Environmental Microbiology	4
	MAJOR	MIM305-2C	Practicals in Microbiology -II	4
	MINOR	MIM300-2C	Environmental biology	4
	AEC	AEC300-2C	Introduction to Functional English	2
	AEC	AEC301-2C	English and Communications	2
	AEC	AEC302-2C	Developing Fluency and Clarity in English	2
	SEC	SEC300-2C	Stress Management	2
	SEC	SEC301-2C	Entrepreneurship Skills	2
	SEC	SEC302-2C	Team Skills	2
	VAC	VAC301-2C	Swachh Bharat	2
	VAC	VAC302-2C	National Cadet Crops	2
	VAC	VAC302-2C	National Service Scheme	2
			Total Credits	22

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B.Sc (Hons) - MICROBIOLOGY
B.Sc. SEM III
Teaching/Exam Scheme
(As per NEP-2020)

w.e.f.: July-2024

No.	Course Code	Category of course	Course title	Hours Per week			Tot. hrs	Credit	CCE	SEE	Total Marks
				L	T	P					
1	MIM300-2C	Major	Basic Microbiology	3	1	-	4	4	50	50	100
2	MIM301-2C	Major	Physical aspects of Biochemistry	3	1	-	4	4	50	50	100
3	MIM302-2C	Major	Practicals in Microbiology-I	-	-	8	8	4	50	50	100
4	MDC300-2C	MDC	Non-Conventional Energy Resources	3	1	-	4	4	50	50	100
	MDC3012C	MDC	Environmental Sustainability	-	-	-	-	-	-	-	-
5	AEC300-2C	AEC	Introduction to Functional English	1	1	-	2	2	25	25	50
	AEC301-2C	AEC	English and Communications	-	-	-	-	-	-	-	-
	AEC302-2C	AEC	Developing Fluency and Clarity in English	-	-	-	-	-	-	-	-
6	SEC300-2C	SEC	Stress Management	1	1	-	2	2	25	25	50
	SEC301-2C	SEC	Entrepreneurship Skills	-	-	-	-	-	-	-	-
	SEC302-2C	SEC	Team Skills	-	-	-	-	-	-	-	-
7	VAC300-2C	VAC	IKS-II	2	-	-	2	2	25	25	50
			Total	13	5	8	26	22	275	275	550

- CCE - Continuous and Comprehensive Evaluation.
- SEE – Semester End Evaluation.

Multi-Disciplinary Courses	1. MDC300-2C: Non-Conventional Energy Resources 2. MDC301-2C: Environmental Sustainability
Ability Enhance Course (AEC)	1. AEC300-2C : Introduction to Functional English 2. AEC301-2C : English and Communications 3. AEC302-2C : Developing Fluency and Clarity in English
Skill Enhancement Courses (SEC)	1. SEC300-2C: Stress Management 2. SEC301-2C: Entrepreneurship Skills 3. SEC302-2C: Team Skills

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As Per National Education Policy 2020 (NEP 2020)
Bachelor of Science
Course Code: MIM300-2C
Course Name: Basic Microbiology
Semester: III

w.e.f.: July 2024

Type of course: Major Course

Prerequisite: Should have basic knowledge of eukaryotic microbes and agents to control the growth of microbes.

Rationale: At the end of the course, students will have knowledge about different eukaryotic microbes, some unusual properties of bacteria and detail about agents which control the microbial growth.

Teaching and Examination Scheme:

Credits				Examination Marks		Total Marks
L	T	P	Total	CCE Marks	SSE Marks	
3	1	-	4	50	50	100

Sr. No.	Content	Total Hours
	SECTION - A	
1	**Eukaryotic Microbes** Fungi: Introduction, Importance, morphology, reproduction, physiology and cultivation. Algae: introduction, occurrence, Biological and economical importance, morphology, pigments, motility, reproduction. Protozoa: occurrence, ecology, symbiotic protozoa, importance, morphology, reproduction.	**9**
2	**Unusual properties of Bacteria** Bacteria with unusual morphology Budding and appendaged bacteria, Filamentous bacteria: actinomycetes, Sheathed bacteria, Mycoplasma, Cyanobacteria, Spirochaetes Bacteria with gliding motility: Introduction, Myxobacters and Baggiotoa Rickettsia and Chlamydia	**12**
3	**Microorganisms and their Habitats:** Structure and function of ecosystems Soil profile and soil microflora Aquatic Environment: Microflora of fresh water and marine habitats	**9**

	Atmosphere: Aeromicroflora and dispersal of microbes	
	SECTION - B	
4	**Control of Microorganisms by Physical agents:** Fundamental control of Microorganisms, Influencing conditions of antimicrobial action. Physical Agents- Low temperature, High temperature (Moist heat, Dry heat, Pasteurization, Incineration), radiation, Desiccation, osmotic pressure, Filtration. Thermal Death time and Decimal Reduction Time Sterilizing symbol.	**9**
5	**Control of Microorganisms by Chemical agents:** Characteristics of antimicrobial chemical agent. Chemical Agents - Phenol and Phenolic compounds, Alcohols, Heavy Metals, Quaternary Ammonium compounds, Aldehydes, Gaseous agents, Methods for evaluating antimicrobial agent.	**9**
6	**Chemotherapy** Chemotherapeutic agents and chemotherapy, Historical highlights of chemotherapy, Characteristics of antibiotics that qualify them as chemotherapeutic agents. Antibiotics and their mode of action 1. Inhibition of cell wall synthesis: penicillins, bacitracin 2. Damage to cytoplasmic membrane 3. Inhibition of nucleic acid and protein synthesis: streptomycin 4. Inhibition of specific enzyme systems: sulphonamides	**12**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (%)					
R Level	U Level	A Level	N Level	E Level	C Level
15	**25**	**25**	**15**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Text Books:

1. M. J. Pelczar , E.C.S. Chan & N.R. Kreig, *Microbiology* 5th ed., Tata McGraw-Hill,2012.
2. POWAR. DAGINAWALA, *General Micriobiology* Vol-II, HIMALAYAN Publishing house, 2015
3. Anantnarayan and Paniker, *Text book of Microbiology*- 10th Edition, Universities Press, 2017

Reference Books:

1. H.A. Modi, *A Handbook of Elementary Microbiology*, 1st edition, Shanti Prakashan, 2019.
2. D.K. Maheshwari , R.C. Dubey, *A Textbook of Microbiology*, reprint 1st edition, S. ChandPublishing, 1999.
3. Ronald m. Atlas, *Principles of Microbiology*, 2nd Edition, Wm. C. Brown publishers, 1995
4. J.M. Willey, L.M. Sherwood and C.J. Woolverton, *Prescott's Microbiology*, 10thEdition McGraw – Hill Education, 2017.

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Understand the world of eukaryotic microbes in detail and their physiology.	20%
CO-2	Elucidate unusual properties of bacteria and	15%
CO-3	Understand different habitat of microbes	10%
CO-4	Application of knowledge of physical agents to control microbial growth.	20%
CO-5	Application of knowledge of chemical agents to control microbial growth.	20%
CO-6	Analyzing the concept chemotherapy and mode of action of Antibiotics.	15%

List of Open-Source Software/learning website:

- MIT Open Learning - Massachusetts Institute of Technology,https://openlearning.mit.edu/
- National Programme on Technology Enhanced Learninghttps://www.youtube.com/user/nptelhrd

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Bachelor of Science
Course Code: MIM301-2C
Course Name: Physical aspects of Biochemistry
Semester: III

w.e.f.: July 2024

Type of course: Major Course.

Prerequisite: Should have fundamental knowledge of basics of chemistry.

Rationale: At the end of the course, students are expected to gain knowledge about chemistry of water, diffusion and osmosis, electrophoresis, chromatography, pH and Isotopes.

Teaching and Examination Scheme:

Credits				Examination Marks		Total Marks
L	T	P	Total	CCE Marks	SSE Marks	
3	1	-	4	50	50	100

Sr. No.	Content	Total Hours
	SECTION - A	
1	**Water** Structure of water, Distribution of body water, Normal water balance and its regulatory mechanism, Abnormal water (dehydration & over hydration), Acid-base balance in normal health. Acid base imbalance. Buffer: definition, mechanism of action. Mechanism of regulation of pH, physiological buffer system, (bicarbonate & phosphate). H.H. equitation and it's examples to find pH and pKa. pH measurement methods.	**9**
2	**Basics of physical chemistry** Colloid Definition and Classification of Colloids, Properties of Colloids-Brownian movement, Tyndall effect, Dialysis, Ageing, coagulation, Electric Properties. Biological significance of colloids. Definition and significance of: Viscosity, Surface tension, Osmosis, Diffusion.	**12**
3	**Application of isotopes in biology** Introduction of isotopes-atomic no., mass number, isotopes, Radioisotope, Units of Radioactivity, Half-lives of isotopes, Techniques used in measurement of radioactivity. Principle and method of Geiger-Muller counter, Autoradiography, Scintillation counting.	**9**

	Biological hazards of radiation and its safety. Importance of isotopes in biological science.	
SECTION - B		
4	**Chromatography** General principle and classification of chromatography. Principle, Method and Application of chromatography – Paper chromatography, TLC, column chromatography, Adsorption & Affinity, Chromatography.	**12**
5	**Electrophoresis** Basic Principle, Factor affecting electrophoresis mobility, Basic technique and application of electrophoresis, Free electrophoresis & Zone Electrophoresis, Type of supporting medium, Electrophoresis apparatus, General technique of paper electrophoresis.	**9**
6	**Biophysical Methods** Molecular analysis using UV/visible, fluorescence, circular dichroism, NMR and ESR spectroscopy Molecular structure determination using X-ray diffraction and NMR, Molecular analysis using light scattering and mass spectrometry	**9**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (%)					
R Level	U Level	A Level	N Level	E Level	C Level
15	**25**	**25**	**15**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E:Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Text Books:

1. Upadhyay, Upadhyay & Nath, *Biophysical Chemistry*, Revised edition, Himalaya publishing House, 2009
2. B.K.Sharma, *Instrumental methods in chemical analysis*, Twenty Four Revised and Enlarged Edition, 2005
3. Rana Shinde and Chattergy, *Text book of Medical Biochemistry*, 8th Edition, 2012

Reference Books:

1. D. L. Nelson, and M. M. Cox, *Lehninger Principles of Biochemistry*, 5th edition, ElsevierPubl. 2000.
2. Conn, Eric E; Stumpf, Paul K. (Paul Karl), *Outline of biochemistry*, 5th edition, New York : Wiley, 2006

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Understand the chemistry of water and its implementation in microbiology.	20%
CO-2	Paraphrase the basics of colloids, Viscosity, Surface Tension Osmosis and Diffusion.	15%
CO-3	Analyze the application of isotopes in biology.	15%
CO-4	Understand the principle and various aspects of chromatography.	20%
CO-5	Outline the details about electrophoresis.	10%
CO-6	Understand basics of different biophysical method.	10%

List of Open-Source Software/learning website:

- MIT Open Learning - Massachusetts Institute of Technology,https://openlearning.mit.edu/
- National Programme on Technology Enhanced Learninghttps://www.youtube.com/user/nptelhrd

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As Per National Education Policy 2020 (NEP 2020)

Bachelor of Science

Course Code: MIM302-2C

Course Name: Practicals in Microbiology-I

Semester: III

w.e.f.: July 2024

Type of Course: Major course

Prerequisite: Should have fundamental knowledge bacterial colony, making slides, staining, pouring, plating, streaking.

Rationale: At the end of the course students will have exposure with world of yeast, eukaryotic microbes, fungi and algae. Students will have knowledge of controlling microorganisms by physical and chemical agents.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks		Total Marks
L	T	P	C	CCE Marks	SEE Marks	
	-	8	4	50	50	100

Contents:

Sr. No.	Content	Total Hrs. 120
	1. Isolation and cultivation of yeast 2. Study of eukaryotic microbes in hay infusion. 3. Study of morphological and colony characters of fungi: Aspergillus, Penicillium, Rhizopus and Mucor 4. Spirochete staining by Fontana's method. 5. To study bacterial motility by motility agar stab technique. 6. To study effect of osmotic pressure on growth of bacteria. 7. To study effect of uv-radiation on growth of bacteria. 8. To study effect of heavy metal on bacteria 9. To study effect of antibiotic on growth of bacteria by Agar Ditch method. 10. To study effect of antimicrobial agent (phenol, alcohol and crystal violet) on bacteria by paper disc method 11. To estimate acidity of different water sample through titration. 12. To estimate alkalinity of different water sample through titration 13. To perform surface tension test. 14. To determine pKa value.	

	15. Separation of amino acid by chromatography 16. Separation of amino acid by TLC Method. 17. Separation of plant pigment by chromatography 18. To study morphological characteristics of different algae. (Online Demonstration) 19. Working of Geiger muller counter (Online Demonstration) 20. Demonstration of electrophoresis (Online demonstration)	

Reference Books:

1. Patel, Rakesh J. and Patel Kiran, R.,"*Experimental Microbiology Vol. I and Vol. II*". Aditya Prakashan, Ahmedabad. (2009).
2. APHA, *Standard Methods for the Examination of Water and Wastewater*. 20th edition, American Water Works Association, 1999
3. M. Gopal Reddy,M., Reddy, M.N., Saigopal, D.V.R. and Mallaiah K.V., *"Laboratory Experiments in Microbiology"*, Himalaya Publishing House, Mumbai. (2007).
4. Aneja, K.R., *"Laboratory Manual of Microbiology and Biotechnology*. 2" Edition", Meditech Scientific International. (2018).
5. Grainger.John, Hurst. Janet and Burdass. Dariel, *"Basic Practical Microbiology: A Manual" The Society for General Microbiology*. The Microbiology Society (2001).
6. https://egyankosh.ac.in/bitstream/123456789/43273/1/Exp-2.pdf
7. https://www.technologynetworks.com/analysis/articles/agarose-gel-electrophoresis-how-it-works-and-its-uses-358161
8. https://www.biologydiscussion.com/algae/characteristics-algae/characteristics-of-algae-with-diagram/49889

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Understand the world of eukaryotic microbes	10%
CO-2	Students will be aware of concepts of controlling microorganisms by physical agents.	20%
CO-3	Students will be aware of concepts of controlling microorganisms by physical agents.	20%
CO-4	Students will be able to determine acidity and alkalinity of different water.	20%
CO-5	Students will know working of electrophoresis and Geiger-muller counter	10%
CO-6	Students will able to separate amino acids and plant pigment by chromatography.	20%

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Distribution of Practical Marks

A Level	B Level	C Level	D Level
10	**15**	**15**	**10**

Legends:

A= Conduction of Practical

B= Regular Record Writing

C= Viva –Voce

D= Understanding of Experiments

As Per National Education Policy 2020 (NEP 2020)
Bachelor of Science
Course Code: MDC300-2C
Course Name: Non-Conventional Energy Resources
Semester: III/IV

w.e.f July 2024

Type of course: MDC

Prerequisite: Should have underlying knowledge of various forms of energy and source.

Rationale: At the end of the course, students will have a fundamental knowledge regarding various renewable energy sources. They will also learn various challenges faced by various technologies for harnessing energy from various renewable energy sources. It also makes them aware regarding current and future role of energy sources emphasizing on methodologies to derive maximum energy out of these energy sources.

Teaching and Examination Scheme:

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Credits				Examination Marks		Total Marks
L	T	P	Total	CCE Marks	SSE Marks	
3	1	-	4	50	50	100

Contents:

Sr. No.	Content	Total Hours
	SECTION - A	
1	**Introduction to Renewable Energy systems** Principles of renewable energy; energy and sustainable development, social implications. Renewable energy availability in India and worldwide, Examples of renewable energy sources.	**9**
2.	**Solar Energy** Solar Radiation, Measurements of Solar Radiation, Flat Plate And Concentrating Collectors, Solar Direct Thermal Applications, Solar Thermal Power Generation, Fundamentals of Solar Photo Voltaic Conversion, Solar Cells, Solar PV Power Generation, Solar PV Applications.	**12**
3	**Wind Energy** Wind Energy Estimation, Types of Wind Energy Systems, Performance, Site Selection, Details of Wind Turbine Generators.	**9**
	SECTION - B	
4	**Ocean Energy & Geothermal Energy** Ocean Thermal Energy Conversion (OTEC), Principle of operation, development of OTEC plants, Tidal and wave energy, Potential and conversion techniques, mini-hydel power plants. Introduction to Geothermal energy resources, types of wells, methods for harnessing energy, advantages and disadvantages, Applications.	**12**
5	**Energy from Biomass** Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Biogas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking.	**9**
6	**Energy Conservation** Principles of energy conservation, the different energy conservation appliances, cooking stoves, Benefits of improved cooking stoves over the traditional cooking stoves, Energy Management & Audit, Waste heat recovery system, hydrogen cell, E-Vehicles.	**9**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (%)					
R Level	U Level	A Level	N Level	E Level	C Level
25	**30**	**10**	**15**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Text Books:

1. G. D. Rai, Non-Conventional Energy Sources, 6th Edition, Khanna Publisher, ISBN- 978-81-7409-073-8, 2017.
2. B. H. Khan, Non-Conventional Energy Sources, 3rd Edition, McGrow Hill Education India Pvt. Ltd., ISBN- 978-93-5260-188-2, 2009.

Reference Books:

1. S. Rao, B.B. Parulekar, "Energy Technology", Khanna Publishers, 3rd Edition, 2018.
2. S. C. Bhatia, R. K. Gupta,"Textbook of Renewable Energy",Woodhead Pub. Ind. Pvt Ltd.
3. V. T. Patil , A.T. Patil, " Renewable Energy Technologies", Nirali Prakashan, 1st Edition, 2020

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Describe the need, importance, and scope of non-conventional and alternate energy resources.	15%
CO-2	Explain the various techniques used in power generation through solar energy.	20%
CO-3	Demonstrate the different types of Wind energy systems and factors affecting power generation through Wind turbine generators.	15%
CO-4	Analyze the principle of operation for ocean thermal energy & geothermal energy with relevant applications.	20%
CO-5	Summarize the various methodologies available for utilization of energy from Biomass.	15%
CO-6	Summarize principles of energy conservation through Energy management principles and audit.	15%

List of Open Source Software/learning website:

- Students can refer to video lectures available on the websites including NPTEL
- https://www.rsc.org/pe
- https://archive.nptel.ac.in/courses/
- https://byjus.com/physics/conventional-and-nonconventional-sources-of-energy/
- https://www.geeksforgeeks.org/non-conventional-sources-of-energy/
- https://beeindia.gov.in/sites/default/files/4Ch12.pdf

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As Per National Education Policy 2020 (NEP 2020)

Bachelor of Science

Course Code: MDC301-2C

Course Name: Environmental Sustainability

Semester: III/IV

w.e.f.: July 2024

Type of Course: MDC

Prerequisite: Should have basic knowledge of Sustainable Development.

Rationale: At the end of the course students will have knowledge an increased awareness among students on issues in areas of sustainability. To understand the role of engineering and technology within sustainable development.

Teaching and Examination Scheme:

Credits				Examination Marks		Total Marks
L	T	P	Total	CCE Marks	SSE Marks	
3	1	-	4	50	50	100

Contents:

Sr. No.	Content	Total Hrs.
	SECTION-A	
1	**Concept of sustainable development** Sustainable development Goals, Indian & Global Scenario, Elements of sustainable development, Sustainable habitat, Sustainable Urbanization, Economy of Natural resources.	**9**
2	**Industrial ecology and Green Productivity** GP methodology, Green building, Conventional and renewable sources, Zero waste concept, Need for renewable energy and Growth of renewable energy in India	**12**
3	**Climate change & circular economy** Climate change and Global warming, Acid Rain, Ozone layer depletion, Climate Change and India's Effort to Tackle Climate Change, Circular economy and waste valorization.	**12**
	SECTION-B	
4	**Cleaner Production Methodology** Six steps methodology for CP, Analyze process steps, generating cleaner production opportunities, selecting cleaner production solutions, Implementation, maintaining cleaner production, Benefits of CP.	**9**

5	**Need for Cleaner Production** Barriers and drivers to Cleaner Production, Introduction and implementation of good housekeeping, Check lists for good housekeeping and need to implement good housekeeping.	**9**
6	**Case studies of CP** Co-processing of Hazardous and Non Hazardous Wastes as Alternate Fuel in Cement Kiln, Creation of Wealth from High TDS Waste Stream through "Waste Recovery Plant".	**9**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (%)					
R Level	U Level	A Level	N Level	E Level	C Level
25	**30**	**10**	**15**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Text Books:

1. M. Gresens, Environmental Sustainability, ISBN- 9780985569853, 3rd Edition, New Academia Publishing, 2012.
2. J. Blewitt, Understanding Sustainable Development, 2nd Edition, ISBN-978-0-415-70782-4, Routledge Publishing , 2014.
3. R. Goodland, The concept of Environmental Sustainability, An/IUaI Reviews, 1995.
4. Carol Sze Ki Lin, Guneet Kaur, Chong Li and Xiaofeng Yang, Waste valorization: Waste streams in Circular Economy, Wiley publishing, ISBN: 9781119502753, 2020.

Reference Books:

1. D.T. Allen, D.R Shonnard, Sustainability Engineering: Concepts, Design and case studies, Prentice Hall.
2. R.N. Bhattacharya, Environmental Economics. Oxford University Press, 2002.
3. S.C. Bhattacharya, Energy Economics, Springer, London, 2011.
4. A. N. Agrawal, Indian Economy: Problems of development and planning. pune: Vishwa Prakashan, 1995.
5. A. S, Bradely, A.O. Adebayo, P. Maria, Engineering applications in sustainable design and development, Cengage learning.
6. Environment impact assessment guidelines, Notification of government of India, 2006.

List of Open-Source Software/learning website:

1. NPTEL
2. Coursera.org
3. https://portals.iucn.org/library/sites/library/files/documents/Hlth-022.pdf
4. https://ncert.nic.in/textbook/pdf/keec109.pdf
5. https://open.umn.edu/opentextbooks/textbooks/96
6. https://ncert.nic.in/textbook/pdf/jesc116.pdf

Course Outcomes:

After completing this course, student will be able to

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Sr. No.	CO statement	Marks % weightage
CO-1	Understand the relevance and the concept of sustainability and the global initiatives in this direction	15 %
CO-2	Explain the different types of environmental pollution problems and their sustainable solutions	20 %
CO-3	Discuss the environmental regulations and standard	20 %
CO-4	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles	15 %
CO-5	Outline the concepts related to conventional and non-conventional energy	15 %
CO-6	Identify the role of engineering and technology within sustainable development	15 %

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As Per National Education Policy 2020 (NEP 2020)
Bachelor of Science
Course Code: AEC300-2C
Course Name: Introduction to Functional English
Semester: III/IV

w.e.f- July 2024

Type of Course: Ability Enhance Course

Prerequisite: Zeal to learn the subject

Rationale: At the end of the course, students will have knowledge of English language. It also targets the understanding of grammar, focusing on comprehension, and reading, speaking and writing skills.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks		Total Marks
L	T	P	C	CCE Marks	SSE Marks	
1	1	-	2	25	25	50

Contents:

Sr. No.	Content	Total Hrs.
	SECTION-A	
1	**Listening** To enable students to listen and understand • Conversations based on familiar situations • Specific information • Short lectures, descriptions, and narrations, rapid talks, passages read aloud • Listening to pre-recorded Interviews and conversations	7
2	**Speaking** To enable the students to • Introduce themselves, Introducing others • Greeting and formulae of everyday conversation • Describe person, place or situation • Ask for Requests, Offering help, Congratulating, Enquiries and Seeking permission.	8

SECTION-B		
3	**Reading** To enable the students to • Read for information news features, articles, newspapers and texts • Read to get the overall idea, and comprehend the passage • Brochure, Advertisements and Picture reading	**8**
4	**Writing** To enable the students to… • Write leave application, apology and request letters • Write paragraphs, developing points /ideas • Dialogue writing. • Writing a speech.	**7**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (%)					
R Level	U Level	A Level	N Level	E Level	C Level
25	**30**	**10**	**15**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Reference Books:

1. Living English Structure, Standard Allen, Longman
2. A Comprehensive English Language Course, Chandak Chattarji, Orient Longman
3. Developing Communication Skills, K. Mohan and M. Banerji, McMillan, Chennai
4. Grant Taylor. English Conversation Practice. (Tata McGraw Hill, New Delhi)
5. R P Bhatnagar and R T Bell (1999) Communication in English, (Orient Longman, Hyderabad)

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Use language functions for basic conversation, descriptions and Introduce themselves	20%
CO-2	Understand basic spoken conversations and longer discourse	10%
CO-3	Read and understand simple texts	10%
CO-4	Write formal letters to seek permission, leave and apology and write simple paragraphs	20%
CO-5	Write various formal and informal documents of day to day life	20%
CO-6	Use grammar effectively to make themselves competent Listener, Speaker, Reader and Writer by exposing to various set of situations	20%

List of Open Source Software: Books / Audio Visual Course Recommended

- Learn English Teens – (20 episodesBritish Council)
- Spoken English— D Sasikumar and PV Dhamija. (With Audio Cassette) (Tata Mcgraw Hill Publication Ltd, New Delhi) (Units 1-13)

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As Per National Education Policy 2020 (NEP 2020)
Bachelor of Science
Course Code: AEC301-2C
Course Name: English and Communication Skills
Semester: III/IV

w.e.f. July 2024

Type of course: Ability Enhance Course

Prerequisite: Zeal to learn the subject

Rationale: At the end of the course, students will have knowledge of English language. It also targets the understanding of grammar, focusing on comprehension, and reading, speaking and writing skills. This would be developed through balanced and integrated tasks.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks		Total Marks
L	T	P	C	CCE Marks	SSE Marks	
1	1	-	2	25	25	50

Contents:

Sr. No.	Content	Total Hrs.
	SECTION-A	
1	**Basics of Communication** • Definitions Communication, • The Process of Communication • Flow of Communication- Downward, Upward, Horizontal and Diagonal. • Barriers in Communication: Language Barrier, Cultural Barrier, Gender Barrier, Attitudinal Barrier and Psychological Barrier. • Some Remedies to overcome Barriers • Difference between General and Scientific Communication	**8**
2	**Non-Verbal Communication** • Kinesics • Proxemics • Paralinguistic features • Chronemics and Haptics	**7**
	SECTION-B	
3	**Basic of Listening Skills** • Introduction	**8**

	• Listening v/s Hearing • Poor Listening v/s Effective Listening • Advantages of Effective Listening • Techniques/tips for Effective Listening • Listening Practice	
4	**Basics of Reading Skills** • Introduction to Reading • Reading Speed • Benefits of Effective Reading • Four Basic Steps to Effective Reading • Types of Reading: Skimming, Scanning, Extensive Reading, Intensive Reading • Reading Comprehension Practice (Different type of passages- Science/Business/Literary)	**7**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (%)					
R Level	U Level	A Level	N Level	E Level	C Level
25	**30**	**10**	**15**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Text Book:

Communication Skills By Sanjay Kumar, Pushpalata 1st Edition, 2011 (OUP)

Reference Books:

1. Basic Communication Skills for Technology, Andreja. J. Ruther Ford, Pearson Education, 2nd Edition, 2011.
2. Developing Soft Skills, Sherfield, Montegomery and Moody, Pearson, 4th Edition, 2015.
3. Remedial English Grammar, F.T. Wood, Macmillan, 4th Edition, 2007.

Course Outcomes:

After completing this course, students will be able to;

Sr. No.	CO statement	**Marks % weightage**
CO-1	The students will be able to form correct sentences in English by acquiring basic competence in grammar	20%
CO-2	Analyze grammar effectively to make themselves competent Listener, Speaker, Reader and Writer by exposing to variousset of situations	20%
CO-3	The students will feel confident enough to listen to and read English for everyday communication needs.	10%
CO-4	Apply the dynamics of various rules of grammar and check its validation while they speak and write language correctly.	20%
CO-5	List ideas using various forms of vocabulary in variedsituations in oral and written communication	20%
CO-6	The students will be able to access information in English necessary for	10%

	academic, personal and professional development.	

List of Open Source Software/learning website:

- Website: English GUETA
- Android App/iPhone App of English GUETA
- YouTube Channel of English GUETA

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As Per National Education Policy 2020 (NEP 2020)

Bachelor of Science
Course Code: AEC302-2C
Course Name: Developing Fluency and Clarity in English
Semester: III/IV

w.e.f.: July 2024

Type of course: Ability Enhance Course

Prerequisite: Zeal to learn the subject

Rationale: At the end of the course, this paper teaches students the skills in the front desk Management. It introduces them to business English.

Teaching and Examination Scheme:

Credits				Examination Marks		Total Marks
L	T	P	C	CCE Marks	SSE Marks	
1	1	-	2	25	25	50

Contents:

Sr. No.	Content	Total Hrs.
	SECTION-A	
1	**UNIT: 1 English for Front Desk Management** 1. Greeting, Welcoming 2. Dealing with complaints, giving instructions or directions 3. Giving information: About Various Facilities, Distance, Area, Local Specialties, 4. Consultation and Solution of Problems 5. Accepting Praises and Criticism, Apologizing.	**8**
2	**UNIT: 2 Fluency and Etiquette** 1. Polite sentences and Words 2. Use of Persuading words 3. Intonation and Voice Modulation 4. Developing Vocabulary.	**7**
	SECTION-B	
3	**UNIT: 3 Business Speeches** 1. Principles of Effective Speech and Presentations 2. Speeches: Introduction, Vote of Thanks, Occasional Speech, Theme Speech 3. Use of Audio- Visual Aids in Presentations	**7**
4	**UNIT: 4 Cross-Cultural Communication** 1. Dealing with Language Differences 2. Probing Questions to get information 3. Etiquette in Cross-cultural Communication	**8**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (%)					
R Level	U Level	A Level	N Level	E Level	C Level

25	30	10	15	10	10

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Text Book:

1. Urmila *Rai* and S.M.*Rai*, *Effective Documentation & Presentation*, Himalaya Publishing house, Mumbai, 2009.

Reference Books:

1. J. V. Vilanilam. More Effective Communication: A Manual for Professionals, New Delhi, Sage Publications, 2000.
2. R S N Pillai & Bagavathi, Modern Commercial Correspondence,, S Chand & Co, 2008.
3. Reuben Ray, Communication Today, Himalaya Publishing House, Mumbai, 2015.
4. Raymond Lesikar, Business Communication: Making Connections in a Digital World, 11th Edition, AITBS – Publishers Delhi, 2017.
5. Sushil Bahl, Business Communication Today, New Delhi: Response Books, 1996.
6. Ron Ludlow, Fergus Panton, The Essence of Effective Communication, Prentice Hall, New York, 1992.
7. Pradhan, Bhende & Thakur, Business Communication, 5th Edition, Himalaya Publishing House, 2008.
8. N Krishnaswamy, Lalitha Krishnaswamy and others, Mastering Communication Skills and Soft Skills, Bloomsbury, New Delhi, 2015.
9. Krishna Mohan, Meera Banerji, Developing Communication Skills, Macmillan India Limited, 2000

Course Outcomes:

After completing this course, students will be able to;

Sr. No.	CO statement	Marks % weightage
CO-1	Recollect day to day communication at different places.	20%
CO-2	Express your thoughts and views to others.	15%
CO-3	Develop public speaking skills.	15%
CO-4	Distinguish between general communication and corporate communication.	20%
CO-5	Organize speech so one can easily understand.	10%
CO-6	Convince other to work together in corporate world.	20%

List of Open Source Software/learning website:

- http://www.english-online.org.uk/

As Per National Education Policy 2020 (NEP 2020)
Bachelor of Science
Course Code: SEC300-2C
Course Name: Stress Management
Semester: III/IV

w.e.f.- July 2024

Type of Course: SEC Course

Prerequisite: Should be well aware of importance of mental health.

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Rationale:

Students will have a better understanding of the effects and ramifications of stress on their work after completing this course. Through stress reduction, students can learn how to manage work-life balance and get ready for a better future.

Teaching and Examination Scheme:

Credits				Examination Marks		Total Marks
L	T	P	Total	CCE Marks	SSE Marks	
1	1	-	2	25	25	50

Contents

Sr. No.	Content	Total Hrs.
	SECTION-A	
1	**Meaning and nature of stress:** Difference between eustress and distress; Frustration, conflict and pressure; Meaning of stressors; common stressors at work place: Stressors unique to age and gender.	**7**
2	**Cognitive appraisal of stress:** General adaptation to stress; Consequences of stress; Physiological and psychological changes associated with the stress response. Stress and Memory; Stress and Other Cognitive Variables; Stressful environmental conditions on performance.	**8**
	SECTION-B	
3	**Strategies of Stress Management:** Prevention of Stress Challenging Stressful Thinking; Problem Solving; Emotional and cognitive coping styles; Strategies of Synthesis and Prevention; Resilience and Stress; Optimal functioning; Making changes last; Small changes and large rewards	**7**
4	**Preparing for the Future:** Care of the Self: Nutrition and Other Lifestyle Issues: Stress reduction practices: Time management; Exercise; Relaxation techniques; yoga; meditation.	**8**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (%)					
R Level	U Level	A Level	N Level	E Level	C Level
25	**30**	**10**	**15**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

References:

1. Clayton,M, Brilliant stressmanagement How to manage stress in any situation's 1st edition, Greart Britain Pearson Education
2. Cooper C.,& Palmer.S Conquer Your Stress, London: Institute of personal development Universities Press

3. Dutta P.K. Stress management Himalaya, Himalaya Publishing House
4. Lee K. ; Reset: Make the Most of Your Stress: Your 24-7 Plan for Well-being. Universe Publishing
5. Ogden.J, Health Psychology 2nd edition Philadelphia, Open University press
6. Olpin, M. & Hesson M. Stress Management for Life: A Research-Based Experiential Approach. 4th edition. Wadsworth Publishing.

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	To understand the nature and consequences of stress	20%
CO-2	To understand the impact of stress on work	15%
CO-3	understand the cognitive variables of stress	15%
CO-4	To recognize the stressors, adaptive and maladaptive behaviour	20%
CO-5	To learn managing work-life balance	10%
CO-6	Prepare themselves for better future by reducing the stress.	20%

As Per National Education Policy 2020 (NEP 2020)
Bachelor of Science
Course Code: SEC301-2C
Course Name: Entrepreneurship Skills
Semester: III/IV

w.e.f.- July 2024

Type of Course: SEC Course

Prerequisite: Understanding of skills as major contributors to self-development.

Rationale:

After studying this course, students will be able to identify their entrepreneurial potential Students will be able to understand the process of setting up entrepreneurial ventures and learn general management skills that are important for the successful launch of a new venture.

Teaching and Examination Scheme:

Credits				Examination Marks		Total Marks
L	T	P	Total	CCE Marks	SSE Marks	

1	1	-	2	25	25	50

Contents:

Sr. No.	Content	Total Hrs.
	SECTION-A	
1	**Introduction** Concept, knowledge and skills requirement; characteristics of successful entrepreneurs; role of entrepreneurship in economic development; entrepreneurship process; factors impacting emergence of entrepreneurship	**7**
2	**Starting the venture** Generating business idea – sources of new ideas, methods of generating ideas, opportunity recognition; environmental scanning, competitor and industry analysis; feasibility study – market feasibility, technical/operational feasibility, financial feasibility: drawing business plan, start ups.	**8**
	SECTION-B	
3	**Functional plans** Marketing plan – marketing research for the new venture, steps in preparing marketing plan, contingency planning; organizational plan – form of ownership, designing organization structure; financial plan – cash budget, working capital	**7**
4	**Sources of finance** Debt or equity financing, commercial banks, venture capital; financial institutions supporting entrepreneurs; legal issues – intellectual property rights patents, trademarks, copyrights, trade secrets, licensing.	**8**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (%)					
R Level	U Level	A Level	N Level	E Level	C Level
25	**30**	**10**	**15**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

References:

1. Entrepreneurship, Hisrich, Robert D., Michael Peters and Dean Shephered, Tata McGraw Hill, New Delhi
2. Entrepreneurship, Barringer, Brace R., and R. Duane Ireland, Pearson Prentice Hall, New Jersy
3. Entrepreneurship, Lall, Madhurima, and Shikha Sahai, Excel Books, New Delhi
4. Entrepreneurship Development and Small Business - Charantimath, Poornima, Pearson Education, New Delhi
5. Entrepreneurship, Kuratko, Donand and Richard Hodgetts, Cengage Learning India Pvt. Ltd., New Delhi.

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	To introduce the students to the entrepreneurship as a mindset.	20%

CO-2	Develop entrepreneurial skills by giving an overview of the capabilities that are needed to become an entrepreneur.	15%
CO-3	Understand the process of setting up entrepreneurial ventures	15%
CO-4	Learn general management skills	20%
CO-5	To develop a keen insight in the students for identifying viable disruptive business opportunities	10%
CO-6	Effectively manage ventures.	20%

As Per National Education Policy 2020 (NEP 2020)
Bachelor of Science
Course Code: SEC302-2C
Course Name: Team Skills
Semester: III/IV

w.e.f.- July 2024

Type of Course: SEC Course

Prerequisite: Knowing of team work to be the source of consolidated and completed task.

Rationale:

After studying this course, students will be understand the significance of team skills. They can design, develop and adapt to situations as an individual and as a team too.

Teaching and Examination Scheme:

Credits				Examination Marks		Total Marks
L	T	P	Total	CCE Marks	SSE Marks	
1	1	-	2	25	25	50

Contents:

Sr. No.	Content	Total Hrs.
	SECTION-A	
1	**Team Building:** Developing team and team work, roles of leader and team members, skill development and application, traits and essential skills for teambuilding, common pitfalls in teams, advantages of teamwork	**7**
2	**Listening as team skill:**	**8**

	Advantages of effective listening, listening as team member and team leader, use of active listening strategies to encourage sharing of ideas, use empathy, listen to tone and voice modulation, recapitulate points etc.	
SECTION-B		
3	**Social and Cultural Etiquette:** Need for etiquette like impression, image, earn respect, appreciation etc. Aspects of social and cultural/corporate etiquette in promoting teamwork, importance of time, place, propriety and adaptability to diverse cultures.	**7**
4	**Trust and collaboration:** Explain the importance of trust in creating collaborative team, agree to disagree and disagree to agree- spirit of team work, understanding fear of being judged and strategies to overcome fear.	**8**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (%)					
R Level	U Level	A Level	N Level	E Level	C Level
25	**30**	**10**	**15**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

References:

1. The 17 Indisputable Laws of Teamwork: Embrace Them and Empower Your Team by John C Maxwell.
2. The Five Dysfunctions of a Team: A Leadership Fable by Patrick Lencioni.
3. Crucial Conversations: Tools for Talking When Stakes are high by Kerry Patterson, Joseph Grenny, et al.
4. Talking to Strangers: What We Should Know about the People We Don't Know by Malcolm Gladwell.
5. Team of Teams: New Rules of Engagement for a Complex World by Stanley McChrystal, Tantum Collins, et al.

Course Outcomes:

After completing this course, student will be able to

Sr. No.	**CO statement**	**Marks % Weightage**
CO-1	Appreciate team skills as leader	20%
CO-2	Engage effective communication by respecting diversity learn to build team	15%
CO-3	Embracing good listening skills	15%
CO-4	Project a good personal image and social etiquette	20%
CO-5	Share new ideas in team and overcome fear	10%
CO-6	How to create collaborative team and work effectively	20%

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As Per National Education Policy 2020 (NEP 2020)
Bachelor of Science
Course Code: VAC300-2C
Course Name: Indigenous Science and Technology (IKS-II)
Semester: III

w.e.f.- July 2024

Type of Course: Value added course

Prerequisite: Should have fundamental knowledge of ancient Indian practices developed by Indians over the centuries.

Rationale:

At the end of the course, students are expected understand the concepts of the ancient Indian practices in science developed by Indians over the centuries. Students can able to understand the contributions of ancient and medieval Indians in the area of chemistry and metallurgy, ecology and environment.

Teaching and Examination Scheme:

Credits				Examination Marks		Total Marks
L	T	P	Total	CCE Marks	SSE Marks	
2	-	-	2	25	25	50

Contents:

Sr. No.	Content	Total Hrs.
	SECTION-A	
1	**Fundamentals of technological innovations & Astronomy** An overview of Indian contributions to technology, technological Innovations. Weaving Mathematics into Beautiful Poetry- *Bhaskaracarya*. The Evolution of Sine Function in India, Vedanga Jyotish & Measuring Time & Calendar	**7**
2	**Metallurgy, Textile Chemistry & Pyro Technology** Copper/Bronze/Zinc: Important Mines (*Zawar*, *Khetri* mines), Iron and Wootz Steel Technology Textile and Dyeing - Indian Specialities (Kutchi Embroidery, Cotton Textile etc.), Ceramic Technology, Stone (Lapidary), Shell, Ivory, Faience & Glass Technology	**8**
	SECTION-B	
3	**Water Management & Transportation** Harappan and traditional water management system of Gujarat, historical sites- Sringeverpur, South Indian Water Management System, Western Ghats Cave-	**7**

	Kanheri, etc., Modes of Transportations and Reforms, Grand Trunk Road, (*Uttarapath & Dakshinapath*), Boat & Ship Building	
4	**Ecology, Environment & India's Contribution to the World** *Nakshatrara Gyaan* and Agriculture, Forest Management and Urban Planning, agroforestry, tank, lakes, and stepwells. Zinc smelting, idea of zero, binary number, medicine, rocket, shampoo etc.	**8**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (%)					
R Level	U Level	A Level	N Level	E Level	C Level
25	**30**	**10**	**15**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

References:

1. R.M. Pujari, Pradeep Kolhe, N. R. Kumar, 'Pride of India: A Glimpse into India's Scientific Heritage', Samskrita Bharati Publication.
2. 'Indian Contribution to science', compiled by Vijnana Bharati. 'Knowledge traditions and practices of India', Kapil Kapoor, Michel Danino, CBSE, India.
3. Bibhuti bhushan Datta, Ancient Hindu Geometry: The Science of the Śulba, 1932, repr. Cosmo Publications, New Delhi, 1993
4. Bibhuti bhushan Datta & Avadhesh Narayan Singh, History of Hindu Mathematics, 1935, repr. Bharatiya Kala Prakashan, Delhi, 2004
5. R. Balasubramaniam, Marvels of Indian Iron through the Ages, Rupa & Infinity Foundation, New Delhi, 2008
6. Anil Agarwal & Sunita Narain, (eds), Dying Wisdom: Rise, Fall and Potential of India's Traditional Water-Harvesting Systems, Centre for Science and Environment, New Delhi, 1997

After completing this course, student will be able to

Sr. No.	**CO statement**	**Marks % weightage**
CO-1	Describe the concepts of Indian Science and Technology and astronomy	20%
CO-2	Summarize various developments in Metallurgy, Textile Chemistry	15%
CO-3	Summarize various developments in Pyro Technology	15%
CO-4	Discuss development In Water Management	20%
CO-5	Discuss the developments in the Transportation	10%
CO-6	Demonstrate the ecology and environments with India's contribution to world	20%

List of Open-Source Software/learning website:

1. https://iksindia.org/
2.
3. https://margheritacollege.in/admin_portal/all_mrgclg_files/department_studymat/History%20of%20science%20and%20technology%20in%20India9577.pdf

4. https://avadicrpf.kvs.ac.in/sites/default/files/582171867vvm.pdf

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B.Sc (Hons) - MICROBIOLOGY

B.Sc. SEM IV

Teaching/Exam Scheme

(As per NEP-2020)

w.e.f.: July-2024

No.	Course Code	Category of course	Course title	Hours Per week			Tot. hrs	Cr edit	CCE	SEE	Total Marks
				L	T	P					
1	MIM303-2C	Major	Fundamental of Medical Microbiology	3	1	-	4	4	50	50	100
2	MIM304-2C	Major	Applied and Environmental Microbiology	3	1	-	4	4	50	50	100
3	MIM305-2C	Major	Practicals in Microbiology -II	-	-	8	8	4	50	50	100
4	MIM300-2C	Minor	Environmental Biology	3	-	1	4	4	50	50	100
5	AEC300-2C	AEC	Introduction to Functional English	1	1	-	2	2	25	25	50
	AEC301-2C	AEC	English and Communications	-	-	-	-	-	-	-	-
	AEC302-2C	AEC	Developing Fluency and Clarity in English	-	-	-	-	-	-	-	-
6	SEC300-2C	SEC	Stress Management	1	1	-	2	2	25	25	50
	SEC301-2C	SEC	Entrepreneurship Skills	-	-	-	-	-	-	-	-
	SEC302-2C	SEC	Team Skills	-	-	-	-	-	-	-	-
7	VAC301-2C	VAC	Swachh Bharat	1	-	2	1	2	25	25	50
	VAC302-2C	VAC	National Cadet Crops	-	-	-	-	-	-	-	-
	VAC302-2C	VAC	National Service Scheme	-	-	-	-	-	-	-	-
			Total	12	4	9	25	22	275	275	550

- CCE - Continuous and Comprehensive Evaluation.
- SEE – Semester End Evaluation.

Ability Enhance Course (AEC)	1. AEC300-2C : Introduction to Functional English 2. AEC301-2C : English and Communications 3. AEC302-2C : Developing Fluency and Clarity in English
Skill Enhancement Courses (SEC)	1. SEC204-2C: Stress Management 2. SEC205-2C: Entrepreneurship Skills 3. SEC206-2C: Team Skills

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Value Added Courses (VAC)	1. VAC301-2C : Swachh Bharat 2. VAC302-2C : National Cadet Crops 3. VAC303-2C : National Service Scheme

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As Per National Education Policy 2020 (NEP 2020)
Bachelor of Science
Course Code: MIM303-2C
Course Name: Fundamentals of Medical Microbiology
Semester: IV

w.e.f.: July 2024

Type of course: Major Course

Prerequisite: Should have fundamental knowledge of Antigen, Antibody and Immunity

Rationale: At the end of the course, students are expected to have fundamental knowledge in Normal flora, Process of Infection, Innate and Adaptive Immunity.

Teaching and Examination Scheme:

Credits				Examination Marks		Total Marks
L	T	P	Total	CCE Marks	SSE Marks	
3	1	-	4	50	50	100

Sr. No.	Content	Total Hours
	SECTION - A	
1	**Introduction to Medical Microbiology** Microbiota of Human body: Origin of the normal flora, Normal Flora and human host, Germfree and Gnotobiotic life, Effect of Antimicrobial Agents. Characteristics of normal flora organisms. Distribution and occurrence of normal flora of skin, eye, respiratory tract, mouth, Intestinal tract, Genitourinary tract.	**12**
2	**Infection Process** Pathogenicity, Microbial Adherence: Examples of Adherence of pathogenic bacteria, Examples of adherence of viruses. Penetration of epithelial cell layers: Passive penetration into the body Active penetration into the body. Events in infection following penetration: Growth in underlying Tissue, Infection of the lymphatic system, Infection of the blood.	**9**

3	**Microbial virulence factors:** Virulence and infection Antiphagocytic factors, Exotoxins, Endotoxins, Other virulence factors.	**9**
SECTION - B		
4	**Introduction to Immunology** Definition, Classification, Overview of immune system, Cells, Tissues, and Organs of Immune system, Components of blood and their functions	**12**
5	**Innate Host Resistance** Innate Resistance Overview, Physical and Mechanical Barrier Defenses of Innate Resistance, Chemical defenses, Phagocytosis, Inflammatory response.	**9**
6	**Adaptive Immunity** Overview of Adaptive Immunity, Types of Adaptive Immunity, Antigens, Antibody, Immune disorders.	**9**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (%)					
R Level	U Level	A Level	N Level	E Level	C Level
15	**25**	**25**	**15**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Text Books:

1. Anantnarayan and Paniker, *Text book of Microbiology*- 10th Edition, University Press: 2017
2. KI Mukherjee, *Medical laboratory technology, VOL-1*, 4th ed, McGraw Hill, 2023
3. M. J. Pelczar , E.C.S. Chan & N.R. Kreig, *Microbiology* 5th ed., Tata McGraw-Hill,2012.

Reference Books:

1. J.M. Willey, L.M. Sherwood and C.J. Woolverton, *Prescott's Microbiology*, 10th Edition McGraw – Hill, 2020.
2. Ronald m. Atlas, *Principles of Microbiology*, 2th Edition, Wm. C. Brown Publishers, 1995

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Summarize the importance of normal microbiota of human body.	20%
CO-2	Elucidate about process of infections.	15%
CO-3	Describe the virulence and Antiphagocytic factors in detail.	15%
CO-4	Understand term immunity and basic concept of immunology.	20%
CO-5	Analyze about nonspecific defense mechanisms of human.	15%
CO-6	Understand Adaptive Immunity and its types.	15%

List of Open-Source Software/learning website:

- NPTEL
- https://www.cbspd.co.in/essentials-of-microbiology-cbs-edition-an-integrated-clinical-based-approach-including-parasitology
- https://www.cbspd.co.in/essentials-of-microbiology

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As Per National Education Policy 2020 (NEP 2020)
Bachelor of Science
Course Code: MIM304-2C
Course Name: Applied and Environmental Microbiology
Semester: IV

w.e.f.: July 2024

Type of Course: Major course

Prerequisite: Should have fundamental knowledge of different areas of applied Microbiology.

Rationale: At the end of the course, students will have knowledge about role of bacteria in different filed of applied microbiology, application of bacteria for human kind.

Teaching and Examination Scheme:

Credits				Examination Marks		Total Marks
L	T	P	Total	CCE Marks	SSE Marks	
3	1	-	4	50	50	100

Sr. No.	Content	Total Hours
	SECTION - A	
1	**Soil Microbiology** Normal flora of soil, Methods of studying soil Microflora, Rhizosphere, humus, Interaction among soil microorganisms Biogeochemical cycle: Nitrogen cycle, carbon cycle, sulphur cycle Biochemical transformation of other elements.	**9**
2	**Water Microbiology** Natural water, Marine microbiology, Bacteriological examination of Domestic water, Purification of water, Waste water microbiology and methods of waste water treatment.	**9**

3	**Aeromicrobiology** Micro flora of Air, Enumeration of microorganisms in air, Significance of microorganisms in air, Control of Air borne microorganisms.	**12**
SECTION - B		
4	**Dairy Microbiology** Sources of microorganism in milk, Types of microorganisms in milk, Milk borne diseases, Microbiological examination of milk, Pasteurization of milk and determination of the efficiency of pasteurization (Phosphatase test).	**12**
5	**Food Microbiology** Microbial flora of fresh foods, Microbial spoilage of foods, Microbiological examination of foods, Preservation of foods (inhibition principles and killing principles).	**9**
6	**Industrial microbiology** Role of microorganisms in industry, Characteristics of industrially important microorganisms, Introduction to fermenter design. Range of fermentation products (primary metabolite, secondary metabolite, microbial inoculants, enzymes, elicitors etc.)	**9**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (%)					
R Level	U Level	A Level	N Level	E Level	C Level
15	**30**	**25**	**10**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Text Books:

1. M. J. Pelczar, E.C.S. Chan, N. Krieg, *Microbiology - Concepts and Applications*, International ed, McGraw Hill., 1993.
2. Powar. Daginawala, *General Micriobiology* Vol-II, HIMALAYAN Publishing house, 2015

Reference Books:

1. J.M. Willey, L.M. Sherwood and C.J. Woolverton, *Prescott's Microbiology,* 10th Edition McGraw-Hill 217
2. Vivek Upasani, , *Food and Dairy Microbiology*, Nirav Prakashan Ahmedabad

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Illustrate the normal flora of soil and their role in agriculture, microbial interactions.	20%
CO-2	Understand the concept of water microbiology for analysis of water quality.	15%
CO-3	Analyze the concept of micro flora of air and its significance.	15%
CO-4	Paraphrase the microbiology of milk and microbes involved in dairy industries.	20%
CO-5	Discuss the significance of microbial spoilage of food, food borne diseases and the methods of preservation.	10%
CO-6	Outline the role of microorganisms in industry	10%

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As Per National Education Policy 2020 (NEP 2020)
Bachelor of Science
Course Code: MIM305-2C
Course Name: Practicals in Microbiology-II
Semester: IV

w.e.f.: July 2024

Type of Course: Major course

Prerequisite: Should have fundamental knowledge bacterial colony, making slides, staining, pouring, plating, streaking.

Rationale: At the end of the course students will became aware of microbial flora of human, soil and air. Students will able to analyse quality of water, milk and food and also they will be able to screen industrial important microorganisms.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks		Total Marks
L	T	P	C	CCE Marks	SEE Marks	
	-	8	4	50	50	100

Contents:

Sr. No.	Content	Total Hrs. 120
	List of Practicals	
	1. Study of mouth flora (Gram staining of teeth surface bacteria) 2. Study of mouth flora (Gram staining of tongue surface bacteria) 3. Cell wall and capsule staining of bacteria 4. Laboratory study of skin flora 5. Agglutination Reaction: Widal test	

6. Isolation of actinomycetes. 7. Study of microflora of soil. 8. Isolation and cultivation of symbiotic nitrogen fixing bacteria: Rhizobium 9. Isolation and cultivation of non-symbiotic nitrogen fixing bacteria: Azotobacter 10. Microbiological analysis of water by SPC/MPN and detection of coliforms 11. Study of microbial flora of air.

12. Microbiological analysis of milk by standard plate count method and MBRT Test.
13. Detection of Acid-Fast organisms.
14. Microbiological analysis of food by standard plate count method.
15. Study of pigment producing bacteria.
16. Screening of organic acid producing organisms.
17. Screening of amylase producing organisms.
18. Screening of antibiotic producing organisms.
19. Antigen-Antibody reaction test (Online demonstration)
20. Precipitation reaction by Gel Immunodiffusion technique (Online demonstration)

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
25	**30**	**10**	**15**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E:Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Reference Books:

1. Patel, Rakesh J. and Patel Kiran, R.,"*Experimental Microbiology Vol. I and Vol. II"*. Aditya Prakashan, Ahmedabad. (2009).
2. M. Gopal Reddy,M., Reddy, M.N., Saigopal, D.V.R. and Mallaiah K.V., "*Laboratory Experiments in Microbiology"*, Himalaya Publishing House, Mumbai. (2007).
3. Aneja, K.R., *"Laboratory Manual of Microbiology and Biotechnology*. 2" Edition", Meditech Scientific International. (2018).
4. Grainger.John, Hurst. Janet and Burdass. Dariel, *"Basic Practical Microbiology: A Manual"* The Society for General Microbiology. (2001).
5. https://microbenotes.com/introduction-to-antigen-antibody-reactions/
6. https://www.coursesidekick.com/chemistry/3885786
7. https://egyankosh.ac.in/bitstream/123456789/12449/1/Experiment-10.pdf

Course Outcomes:

After completing this course, student will be able to

Sr. No.	**CO statement**	**Marks % weightage**
CO-1	Students will became aware of microbial flora of human, soil and air	10%
CO-2	Understand Agglutination, precipitation and antigen-antibody reaction.	20%

CO-3	Students will able to isolate and cultivate nitrogen fixing bacteria.	10%
CO-4	Students will able to analyze quality of water, milk and food.	20%
CO-5	Students will know about pigment producing bacteria.	20%
CO-6	Able to recognize and screen industrial important microorganisms	20%

Distribution of Practical Marks:

A Level	B Level	C Level	D Level
10	**15**	**15**	**10**

Legends: A= Conduction of Practical, B= Regular Record Writing, C= Viva –Voce, D= Understanding of Experiments

As Per National Education Policy 2020 (NEP 2020)
Bachelor of Science
Course Code: MIM300-2C
Course Name: Environmental biology
Semester: IV

w.e.f.: July 2024

Type of Course: Minor course

Prerequisite: Should have fundamental knowledge of environment, ecosystem, biodiversity and pollution.

Rationale: Upon successful completion, students will be able to understand the causes, effects, and risks of environmental issues, as well as the strategies and policies to reduce environmental issues.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks		Total Marks
L	T	P	C	CCE Marks	SEE Marks	
3	1	0	4	50	50	100

Contents:

Sr. No.	Content	Total Hrs.
	SECTION-A	
1	**Introduction of Environmental biology and natural resources** Definition, scope and importance-need for public awareness. Use, over-exploitation and case study of forest resources, water resources, mineral resources, food resources, energy resources and land resources.	9
2	**Ecosystem and Biodiversity** Concept of an ecosystem. Structure and function of an ecosystem, producer, consumer and decomposers. Energy flow in the ecosystem. Ecological sucession. Food chain, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of following ecosystem- forest ecosystem, grassland ecosystem, desert ecosystem and aquatic ecosystem. **Biodiversity:** Introduction, definition of genetic, species and ecosystem diversity. Biodiversity at global, national and local levels. India as a mega diversity nation. Hotspot of biodiversity and threats to biodiversity.	9
3	**Pollution** Definition, causes, effects and control measures of air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution and nuclear hazards.	9
	SECTION-B	
4	**Management and control measures** **Solid waste management:** cause, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Case studies. **Disaster management:** Floods, earthquake, cyclone and landslides. E-waste and plastic waste. Recycling and reuse. **Water conservation:** Rain water harvesting, watershed management, climate change, global warming, acid rain, ozone layer depletion and nuclear accidents.	9
5	**Cleaning up of environment by using plants** Phytoremediation- Basic concepts, biological cleaning up of the environment with plants. Medicinal plants and their role. Project medicinal plants, Afforestation, forestry and their types-commercial forestry, production forestry, social forestry, agro forestry.	12

6	**Environmental ethics** Environment protection act- Air prevention and control of pollution Act, Water prevention and control of pollution Act, wildlife protection Act, forest conservation Act. Issues involved in enforcement of environmental legislation.	**9**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
25	**30**	**10**	**15**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E:Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Text Books:

1. Benny Joseph, *Environmental Studies*, New Delhi, Tata McGraw Hill Publishing co. Ltd 2005.
2. Erach Bharucha, *Textbook of environmental studies for undergraduate courses*, Hyderabad, Universities Press 2005.

Reference Books:

1. Anji Reddy. M, *Textbook of Environmental Sciences and Technology*, Hyderabad, BS Publications 2007.
2. Y Anjaneyulu., *Introduction to Environmental Sciences*, BS Publications 2004.

Course Outcomes:

After completing this course, student will be able to

Sr. No.	**CO statement**	**Marks % weightage**
CO-1	Understand the fundamental concepts of different natural resources.	20%
CO-2	Comprehend the ecosystem and biodiversity.	15%
CO-3	Explain phenomenon responsible for different types of pollution.	15%
CO-4	Understand the management and control measures for environmental issues.	15%
CO-5	Discuss the concept of phytoremediation.	20%
CO-6	Understand the environmental ethics.	15%

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As Per National Education Policy 2020 (NEP 2020)
Bachelor of Science (Hons) - Chemistry
Course Code: VAC301-2C
Course Name: Swachh Bharat
Semester: IV

w.e.f.: July 2024

Type of course: Value Added Course

Prerequisite: Should have fundamental knowledge of importance of cleanliness and hygiene both at the personal level and in our surroundings.

Rationale: At the end of the course, students are expected understand the concepts of the developmental challenges with reference to sanitation infrastructure and practices to build values of cleanliness, hygiene and waste management in diverse socioeconomic contexts. Students are expected understand the concepts of planning of social policy and programmes to use waste management techniques at community level and instil a sense of service towards society and the Nation.

Teaching and Examination Scheme:

Credits				Examination Marks		Total Marks
L	T	P	C	CCE Marks	SSE Marks	
1	-	2	2	25	25	50

Contents:

Sr. No.	Content	Total Hours
	SECTION - A	
1	**Introduction to Swachh Bharat Abhiyan** Gandhian philosophy of Cleanliness, Swachh Bharat Abhiyan (SBA), Hygiene, Sanitation & Sustainable Waste Management, Agencies and nodal Ministries for SBA, Different phases of the SBA and its evaluation, Citizens' Responsibilities: Role of Swacchagrahi.	**8**
2	**Swachh Bharat: Rural Facets** Indicators for Swachh Bharat, i. Sanitation coverage across households (2014 vs. 2022), ii. Open Defecation Free (ODF) Villages: Parameters, iii. ODF plus model: Key indicators	**7**

SECTION - B		
3	**Swachh Bharat: Urban Facets** i. Sustainable sanitation, ii. Waste/water and solid waste management, iii. Garbage Free Cities	**8**
4	**Prospects and Challenges** Attitudes and Perceptions, Operational and Financial issues, Monitoring & Supervision, Community Mobilization	**7**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (%)					
R Level	U Level	A Level	N Level	E Level	C Level
20	**25**	**25**	**10**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate

C: Create and above Levels (Revised Bloom's Taxonomy)

Reference Books:

1. E book on rural sanitation and drinking water, Ministry of drinking water and sanitation, GoI, 1st Edition, 2014.
2. Ch. Srinivasa Rao, S.K. Soam, R.V.S. Rao, V. Murali, M.A. Basith, P. Vijender Reddy, Laxman M. Ahir, Swachh Bharat Abhiyan at ICAR-NAARM, ISBN: 978-81-933781-3-7, 2018.
3. Clean India: Clean Schools- A Handbook- A National Mission, MHRD, Gov of India, 2016.

Text Books:

1. Rudresh kumar Sugam, Sonali Mittra, Arunabha Ghosh, Kachra Mukt, Shouchalaya Yukt Bharat, Council on Energy, Environment and Water, 2014.
2. L. C. De, Swachh Bharat, Aavishkakr Publishers Distributors, ISBN: 978-81-944464-8-6, 2019.

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Understanding the significance of the Swachh Bharat Abhiyan.	20%
CO-2	Ability to analyse and predict the sanitation challenges of India	15%
CO-3	Sanitation and Hygeine	15%
CO-4	Determine the link between sanitation and development.	20%
CO-5	Contribute to the Swachh Bharat Abhiyan through real time projects/	10%
CO-6	Contribute to the Swachh Bharat Abhiyan through fieldwork.	20%

List of Open-Source Software/learning website:

1. "Swachh Bharat Mission - Gramin, Department of Drinking Water and Sanitation,
2. Ministry of Jal Shakti"
3. India 2021, Ministry of Information & Broadcasting
4. http://swachhbharatmission.gov.in/SBMCMS/swachhta-pakhwada.htm
5. https ://swachhbharatm ission.gov. in/SBMCMS/a bout-us. Htm
6. https://swachhbharatmission.gov.in/sbmcms/writereaddata/Portal/Images/pdf/3yearsbook.pdf
7. https://swachhbharatmission.gov.in/SBMCMS/writereaddata/Portal/Images/pdf/Swachhata-Sanskriti-Draft-G2-Small-Review-Copy.pdf

List of practicals:

Suggested Activities: List of activities to be undertaken:

1. Identify plastic and e-waste in and around the institution and suggest innovative technologies to minimize wastage.
2. Identify events/fests that generate maximum waste and ways to minimize it.
3. Visit canteen/shops and track the lifecycle of wet/dry waste in and around the institution and document the findings in the form of a Project Report.
4. Conduct interviews of stakeholders to understand the level of awareness.
5. Conduct a Clean Audit of the Institution and identify areas for action.
6. Conduct cleanliness drives.
7. Organise Swachhata Pakhwada meetings, rallies, and mobilization camps within the identified communities.
8. Students may participate in the Swachh Bharat Internship programme.
9. If required students can share their experiences in the form of a Project Report.
10. Any other Practical/Practice as decided from time to time.

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As Per National Education Policy 2020 (NEP 2020)
Bachelor of Science
Course Code: VAC302-2C
Course Name: National Cadet Corps
Semester: IV

w.e.f.: July 2024

Type of Course: Value Added Course

Prerequisite: Student must be an NCC cadet.

Rationale: This course is designed to inculcate unity and discipline in the students and orient student towards Army life.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks		Total Marks
L	T	P	C	CCE Marks	SEE Marks	
1	-	2	2	25	25	50

Contents:

Sr. No.	Content	Total Hrs.
	SECTION-A	
1	**NCC and National Integration & Awareness:** Aims and Objectives of NCC, Organization &Training, National Integration: Importance and Necessity, Freedom Struggle and Nationalist Movement in India, National Interests, Objectives, Threats and Opportunities, Unity in Diversity	**05**
2	**Drill:** Foot drill, Drill with arms, Ceremonial drill	**15**
	SECTION-B	
3	**Personality Development and Leadership:** Introduction to Personality Development, Self-Awareness - Know yourself/ Insight, Change your mind set, Interpersonal relationship and communication, Communication Skills, Types of Leadership, Time Management, Stress Management Skills, Sociability: Social Skills, Values / Code of Ethics	**05**
4	**Map reading:** Introduction to types of Maps and Conventional Signs, Scales & Grid System, Topographical forms and technical terms, Relief, Contours and Gradients, Cardinal points and Types of North, Types of bearings and use of Service Protractor, Prismatic compass and its use & GPS, Setting a Map, finding North and own position, Map to	**05**

	Ground, Ground to Map	

Text Books:

1. National Cadet Corps by R. Gupta, Ramesh Publishing House, New Delhi

Reference Books:

1. Cadet Hand Book (Army) by NCC, New Delhi

List of Practicals:

1. To instill a sense of national integration and awareness among NCC cadets
2. To develop discipline, coordination, and teamwork among NCC cadets through drill exercises
3. To enhance the overall personality and leadership qualities of NCC cadets
4. To impart skills in map reading and navigation to NCC cadets

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	Analyze the role of NCC in fostering national unity and promoting a sense of patriotism among youth.	5%
CO-2	Develop a comprehensive understanding of the principles and significance of national integration.	15%
CO-3	Acquire proficiency in various drill commands and movements used in NCC training	30%
CO-4	Enhance self-awareness and self-confidence through structured personality development exercises	10%
CO-5	Apply leadership principles in practical scenarios, including organizing events, leading teams, and managing resources efficiently	10%
CO-6	Demonstrate practical skills in map reading through field exercises, orienteering activities, and navigation challenges	30%

List of Open-Source Software/learning website:

https://indiancc.nic.in/

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As Per National Education Policy 2020 (NEP 2020)
Bachelor of Science
Course Code: VAC303-2C
Course Name: National Service Scheme
Semester: IV

w.e.f.: July 2024

Type of Course: Value Added Course

Prerequisite: Students must be an NSS Volunteer

Rationale: This course aims primarily to inculcate the personal development and character of students and young individuals through voluntary community service.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks		Total Marks
L	T	P	C	CCE Marks	SEE Marks	
1	-	2	2	25	25	50

Contents:

Sr. No.	Content	Total Hrs.
	SECTION-A	
1	**Fundamental of NSS:** Introduction of NSS, Origin of NSS, AIMS & Objective of NSS,NSS MOTTO, NSS Emblem, NSS Day NSS Anthem & Motivational song • Uhte Samaj k Liye Uthe Uthe • Ham sab Mil kar Desh ko Apni • Hum Honge Kamyab Hum honge Kamyab	8
2	**Youth population in India and its characteristics** Introduction to India: Physical, socio-economic and demographic background, study of Indian population composition (Age composition), youth composition, youth policy importance of youth policy youth policy in India, NSS as youth organization.	7
	SECTION-B	
3	**Activity Based Program:** Shramdaan: Tree plantation, cleaning, Watering, Weeding, Any other activities, Swatchatha Programme, Visit and Conserving Ancient monuments and heritage site, Socio Economic Survey of Village/slum, Nature Camp, Environmental Education etc.	7

4	**Awareness Program:** Seminar, Workshop, celebration of national and international day, Personality development program, group activities, Women Empowerment Programme, Health Camps, Blood grouping awareness, Water Conservation Programme	**8**

Reference Books:

1. Prof. B.K. Shivanna, "National Service Scheme" Printing Press KSOU, Mysore 201 1
2. MadhuAhuja, Students Leaders in the National Service Scheme (NSSS) in Delhi : A case study 1986 (New·Delhi : Dept. of Management and Extension , Lady Irwin College, University of pelhi, 1986)
3. Chattarjee, B., Social serice opportu n ities for students in Slum Areas (reprint : Delhi
4. Delhi School of Social Work, U n iversity of Delhi 1973)
5. NSS Manual 2006, Ministry of youth Services and Sports, Govt. of Ind ia, New Delhi.

List of Practical:

1. To know the fundamental AIMS & Objective of NSS
2. To develop discipline, coordination, and teamwork among NSS volunteers during social activities.
3. To enhance the overall personality and leadership qualities of NSS Volunteers.
4. To impart the various awareness program, seminar and camps.

Course Outcomes:

After completing this course, student will be able to

Sr. No.	CO statement	Marks % weightage
CO-1	To understand the concept of National Service Scheme	5%
CO-2	To introduce the concept and importance of values and Ethics in youths	15%
CO-3	To motivate the NSS volunteers actively participate in community activities.	30%
CO-4	Know the organizational structure and its functions at national to Institutional level.	10%
CO-5	Learn the skills of critical thinking and Decision making	10%
CO-6	Appreciate the culture of Shramdaan and its benefits through working as a team or group.	30%

List of Open-Source Software/learning website:

https://nss.gov.in/mission-objectives