



Integral University, Lucknow

Effective from Session:							
Course Code	CH101	Title of the Course	Chemistry	L	T	P	C
Year	First	Semester	Second	3	1	0	4
Pre-Requisite	10+2 with Chemistry	Co-requisite					
Course Objectives	<ul style="list-style-type: none"> Develop curiosity and interest in chemistry Acquire an appropriate knowledge and understanding in Chemistry Develop an appreciation of chemistry and its applications in daily life. 						

Course Outcomes	
CO1	Analyze and compare magnetic behavior and stability of hetero-nuclear diatomic molecules, Significance of hydrogen bonding ,band theory, radius ratio, density of unit cell, fullerenes and graphite
CO2	Comprehension of types of polymers to make an appropriate choice of use of polymers (Natural, synthetic and biodegradable).
CO3	Compare reaction intermediates and mechanism of chemical reactions and isomerism.
CO4	Interpret phase rule, phase diagram, corrosion and its prevention, calculation of activation energy, rate constant, half-life period, emf of electrochemical cells, construction and operation of galvanic cell and concentration cells,
CO5	Determination of calorific value , analyzing water softening methods, principles, instrumentations of UV, IR and NMR spectroscopy and their applications.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Chemical bonding and state of matter	Molecular theory of hetero diatomic molecules, Band theory of bonding in metals, Hydrogen bonding. Solid state chemistry: Radius ratio rule, Space lattice (only cubes), Types of Unit cells, Bragg's law, calculation of density of unit cell. One and Two Dimensional solids, Graphite as two dimensional solid and its conducting and lubricating properties. Fullerene and its applications	8	1
2	Polymers	Polymerization and its classification, Thermoplastic and thermosetting resins. Elastomers (Buna-S, Buna-N, thiokols, polyurethanes, silicons), Polyamides (Nylon-6, Nylon-6,6, Nylon-6,10, Nylon-11, Kevlar), Polyesters (Terelene), Polyacrylates (PMMA, PAN, PVC). Organic conducting and biodegradable polymers.	8	2
3	Structural and mechanistic concepts in organics	Stability of reaction intermediates, e.g. Carbanions, Carbocations and free radicals. Types of organic reactions, mechanism of nucleophilic substitution reactions. Mechanism of the following name reactions. 1) Aldol condensation 2) Cannizzaro reaction 3) Beckmann rearrangement 4) Hofmann rearrangement and 5) Diels-Alder reaction E-Z Nomenclature. R.S configuration, Optical isomerism of organic compounds containing one chiral center. Examples of optically active compounds without chirality. Conformations of n-butane.	8	3
4	Reaction kinetics, Phase rule, Electrochemistry and Corrosion	Order and molecularity of reactions. First and second order reactions. Energy of activation. Phase Rule, its application to one component system (water). Equilibrium potential, electrochemical cells (galvanic and concentration cells) Electrochemical theory of corrosion and protection of corrosion.	8	4
5	Analytical methods, Fuel and Water treatment	Basic principles of spectroscopic methods. The use of UV, Visible, IR, ¹ HNMR, for the determination of structure of simple organic compounds. Classification of fuels, determination of gross and net calorific values using Bomb Calorimeter. Hardness of water, softening of water by Lime-Soda process, Zeolites and ion exchange resins process and Reverse Osmosis. Treatment of boiler feed water by Calgon process	8	5

Reference Books:

Jain P. C. and Jain M. 1994. Engineering Chemistry. DanpatRai publishing company Pvt. Ltd., Delhi.

Bahl B.S, ArunBahl and Tuli B.D. 2007. Essentials of Physical Chemistry. S. Chand and Co. Ltd., Delhi.

Industrial Chemistry B.K.Sharma, Goel publishing house.

Fundamentals of Chemistry, R.L. Madan, S.Chand Publications

e-Learning Source:

<https://www.bing.com/videos/search?q=MO+diagram&&view=detail&mid=205AE2DEEABF42ACF824205AE2DEEABF42ACF824&&FORM=VRD GAR&ru=%2Fvideos%2Fsearch%3Fq%3DMO%2520diagram%26qs%3Dn%26form%3DQBVR%26%3D%2525eManage%2>

<https://www.bing.com/videos/search?q=phase+diagram+video&&view=detail&mid=D49B5109D6339097E40BD49B5109D6339097E40B&&FORM=VRD GAR&ru=%2Fvideos%2Fsearch%3Fq%3Dphase%2Bdiagram%2Bvideo%26FORM%3DHDRSC3>

<https://www.bing.com/videos/search?q=organic+reaction+mechanism&qpv=organic+reaction+mechanism&FORM=VDRE>



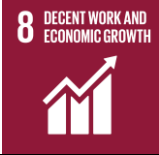
<https://byjus.com/jee/polymers/>

Course Articulation Matrix: (Mapping of COs with POs and PSOs)																
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	-	-	-	-	-	-	-	1	-	2	-	-	-	1
CO2	3	2	2	-	-	1	-	-	-	1	-	2	-	-	1	1
CO3	3	2	-	-	-	-	-	-	-	1	-	2	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	1	-	2	-	-	1	1
CO5	3	2	2	1	1	1	2	-	-	1	-	2	-	1	-	1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	Sign & Seal of HoD
------------------------------------	--------------------

Mapped SDGs

6- Clean Water and Sanitation	
7- Affordable and Clean Energy	
8- Decent Work and Economic Growth	



Attributes &SDGs Common for all branches/Disciplines

Course Code	Course Title	Attributes							SDGs No.
		Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics	
ES01	Environmental Studies					√			SDGs 6,13,14,& 15

**Department of Paramedical Sciences
(Programme: B.R.I.T)**

Effective from Session: 2017							
Course Code	ES101	Title of the Course	Environmental Studies	L	T	P	C
Year	II	Semester	III	2	1	0	3
Pre-Requisite	10+2 with Physics, Chemistry & Biology	Co-requisite					
Course Objectives	The purpose of this undergraduate course is to impart basic and key knowledge of environment and ecosystem. This will help students in enhancing their knowledge of biodiversity and its conservation. After successful completion of course, the student will able to explore concept of the subject into their respective dimensions.						

Course Outcomes

CO1	Gain knowledge about environment and ecosystem							
CO2	Students will learn about natural resource, its importance and environmental impacts of human activities on natural resource.							
CO3	Gain knowledge about the conservation of biodiversity and its importance.							
CO4	Aware students about problems of environmental pollution, its impact on human and ecosystem and control measures.							
CO5	Students will learn about increase in population growth and its impact on environment.							
Unit No.	Title of the Unit	Content of Unit					Contact Hrs.	Mapped CO
1	Introduction to Environment and Ecosystems	Environment, its components and segments, Multidisciplinary nature of Environmental studies, Concept of Sustainability and sustainable development, Environmental movements, Ecosystem, Structure & Function, Energy flow in the Ecosystem, Ecological Pyramids and Ecological Succession.					8	CO1
2	Natural Resources	Renewable and non-renewable, Soil erosion and desertification, Deforestation, Water: Use and over exploitation, Impacts of large Dams, Case studies					8	CO2
3	Biodiversity and Conservation	Levels of biological diversity, Hot spots of biodiversity, India as a Mega Diversity Nation, Endangered and endemic species of India, Threats to Biodiversity, Conservation of Biodiversity, Ecosystem and biodiversity services.					8	CO3
4	Environmental Pollution, Policies and Practices	Environmental pollution, Solid waste management, Ill effects of fireworks, Climate change, Ozone layer depletion, acid rain and impacts on human communities and Environment, Environmental Laws: Environment Protection Act, Wildlife protection Act, Forest conservation Act, Convention on Biological Diversity (CBD), Tribal rights, Human wildlife conflicts.					8	CO4
5	Human Population and the Environment	Human population growth: Impacts on environment, human health and welfare, Resettlement and rehabilitation of project affected persons, Environmental ethics, Environmental communication and public awareness, case studies.					8	CO5

Reference Books:

- 1) Agarwal, K.C. 2001 Environmental; Biology, Nidi Pub. Ltd. Bikaner.
- 2) Bharucha Erach, The Biodiversity of India, Mapin Pub. Pvt. Ltd., Ahmedabad-380, India.
- 3) Brunner R.C. 1989. Hazardous waste incineration, Mc Graw Hill
- 4) Clark R.S. Marine Pollution, Clarendon Press Oxford (TB)
- 5) Cunningham W.P.2001.Cooper, T.H. Gorhani, E & Hepworth, Environmental encyclopedia, Jacob Publication House, Mumbai.
- 6) De. A.K. Environmental chemistry Willey Eastern Limited.
- 7) Glick, H.P.1993 water in crisis, Pacific Institute for studies in dev, Environment & security, Stockholm Env, Institute, Oxford Univ, Press 473 p.
- 8) Hawkins R. E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay.
- 9) Heywood, V.H. & Watson, R. T.1995.Global biodiversity Assessment.Cambridge Univ. Press 1140 p.
- 10) Jadhve, H. and Bhosale, V. M. 1995 Environmental protection and laws, Himalaya pub, house, Delhi.284 p.
- 11) Mckinnery, M.L. and School, R. M.1996 Environmental science systems and solutions, web enhanced edition 639 p.
- 12) Mhaskar A.K. Matter Hazardous, Techno Science Pub (TM)
- 13) Miller T.G. Jr, Environmental Ecology, W. B. Saunders Co.USA,574 p. 16
- 14) Odum, E.P.1997.Fundamental chemistry, Goel Pub House Meerut.
- 15) Survey of the Environment, The Hindu (M).
- 16) Sharma B.K.2001.Environmental Chemistry, Goel Pub House Meerut

e-Learning Source:

- <https://byjus.com/biology/difference-between-environment-and-eCOsystem>.
- <https://www.youtube.com/watch?v=dRP14TB8w7k>
- <https://www.youtube.com/watch?v=3fbEVtyJCK>
- <https://www.vedantu.com/biology/conservation-of-biodiversity>
- <https://youmatter.world/en/definition/soil-erosion-degradation-definition/>
- <https://byjus.com/biology/difference-between-environment-and-eCOsystem>.

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1	1	2	3	1	1	1	1	1	1	1	1	1	1	1	1	1	-
CO2	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	-	-
CO3	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	-	-
CO4	1	2	2	1	2	1	1	1	1	1	1	1	1	1	1	1	-	-
CO5	1	2	3	1	2	1	1	2	3	1	1	1	1	1	1	1	-	-

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	Sign & Seal of HOD
------------------------------------	--------------------



**Department of Paramedical Sciences
(Programme: B.O.P.T)**

Effective from Session: 2018							
Course Code	ES101	Title of the Course	Environmental Studies	L	T	P	C
Year	II	Semester	III	2	1	0	3
Pre-Requisite	10+2 with Physics, Chemistry & Biology	Co-requisite					
Course Objectives	The purpose of this undergraduate course is to impart basic and key knowledge of environment and ecosystem. This will help students in enhancing their knowledge of biodiversity and its conservation. After successful completion of course, the student will able to explore concept of the subject into their respective dimensions.						

Course Outcomes	
CO1	Gain knowledge about environment and ecosystem
CO2	Students will learn about natural resource, its importance and environmental impacts of human activities on natural resource.
CO3	Gain knowledge about the conservation of biodiversity and its importance.
CO4	Aware students about problems of environmental pollution, its impact on human and ecosystem and control measures.
CO5	Students will learn about increase in population growth and its impact on environment.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Introduction to Environment and Ecosystems	Environment, its components and segments, Multidisciplinary nature of Environmental studies, Concept of Sustainability and sustainable development, Environmental movements, Ecosystem, Structure & Function, Energy flow in the Ecosystem, Ecological Pyramids and Ecological Succession.	8	CO1
2	Natural Resources	Renewable and non-renewable, Soil erosion and desertification, Deforestation, Water: Use and over exploitation, Impacts of large Dams, Case studies	8	CO2
3	Biodiversity and Conservation	Levels of biological diversity, Hot spots of biodiversity, India as a Mega Diversity Nation, Endangered and endemic species of India, Threats to Biodiversity, Conservation of Biodiversity, Ecosystem and biodiversity services.	8	CO3
4	Environmental Pollution, Policies and Practices	Environmental pollution, Solid waste management, Ill effects of fireworks, Climate change, Ozone layer depletion, acid rain and impacts on human communities and Environment, Environmental Laws: Environment Protection Act, Wildlife protection Act, Forest conservation Act, Convention on Biological Diversity (CBD), Tribal rights, Human wildlife conflicts.	8	CO4
5	Human Population and the Environment	Human population growth: Impacts on environment, human health and welfare, Resettlement and rehabilitation of project affected persons, Environmental ethics, Environmental communication and public awareness, case studies.	8	CO5

Reference Books:

- 1) Agarwal, K.C. 2001 Environmental; Biology, Nidi Pub. Ltd. Bikaner.
- 2) Bharucha Erach, The Biodiversity of India, Mapin Pub. Pvt. Ltd., Ahemdabad-380, India.
- 3) Brunner R.C. 1989. Hazardous waste incineration, Mc Graw Hill
- 4) Clark R.S. Marine Pollution, Clanderon Press Oxford (TB)
- 5) Cunningham W.P.2001.Cooper, T.H. Gorhani, E & Hepworth, Environmental encyclopedia, Jacob Publication House, Mumbai.
- 6) De. A.K. Environmental chemistry Willey Eastern Limited.
- 7) Glick, H.P.1993 water in crisis, Pacific Institute for studies in dev, Environment & security, Stockholm Env, Institute, Oxford Univ, Press 473 p.
- 8) Hawkins R E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay.
- 9) Heywood, V.H. & Watson, R. T.1995.Global biodiversity Assessment.Cambridge Univ. Press 1140 p.
- 10) Jadhve, H. and Bhosale, V. M. 1995 Environmental protection and laws, Himalaya pub, house, Delhi.284 p.
- 11) Mckinnery, M.L. and School, R. M.1996 Environmental science systems and solutions, web enhanced edition 639 p.
- 12) Mhaskar A.K. Matter Hazardous, Techno Science Pub (TM)
- 13) Miller T.G. Jr, Environmental Ecology, W. B. Saunders Co.USA,574 p. 16
- 14) Odum, E.P.1997.Fundamental chemistry, Goel Pub House Meerut.
- 15) Survey of the Environment, The Hindu (M).
- 16) Sharma B.K.2001.Environmental Chemistry, Goel Pub House Meerut

e-Learning Source:

- <https://byjus.com/biology/difference-between-environment-and-eCOsystem>.
<https://www.youtube.com/watch?v=dRPI4TB8w7k>
<https://www.youtube.com/watch?v=3fbEVyJcK>
<https://www.vedantu.com/biology/conservation-of-biodiversity>
<https://youmatter.world/en/definition/soil-erosion-degradation-definition/>
<https://byjus.com/biology/difference-between-environment-and-eCOsystem>.

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO CO	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	1	1	1	1	1	1	1	1	2	1	3	1	1	1	1	1	-
CO2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
CO3	1	1	1	1	1	1	1	1	1	2	1	2	1	1	1	1	1	-
CO4	1	1	1	1	1	1	1	2	2	2	1	2	1	1	1	1	1	-
CO5	1	1	1	1	1	1	2	2	3	2	1	3	1	1	1	1	1	-

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	Sign & Seal of HOD
------------------------------------	--------------------



**Department of Paramedical Sciences
(Programme: B.M.L.T)**

Effective from Session: 2017-2018							
Course Code	ES101	Title of the Course	Environmental Studies	L	T	P	C
Year	II	Semester	III	2	1	0	3
Pre-Requisite	10+2 with Physics, Chemistry & Biology	Co-requisite					
Course Objectives	The purpose of this undergraduate course is to impart basic and key knowledge of environment and ecosystem. This will help students in enhancing their knowledge of biodiversity and its conservation. After successful completion of course, the student will able to explore concept of the subject into their respective dimensions.						

Course Outcomes	
CO1	Gain knowledge about environment and Ecosystem
CO2	Students will learn about natural resource, its importance and environmental impacts of human activities on natural resource.
CO3	Gain knowledge about the conservation of biodiversity and its importance.
CO4	Aware students about problems of environmental pollution, its impact on human and ecosystem and control measures.
CO5	Students will learn about increase in population growth and its impact on environment.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Introduction to Environment and Ecosystems	Environment, its components and segments, Multidisciplinary nature of Environmental studies, Concept of Sustainability and sustainable development, Environmental movements, Ecosystem, Structure & Function, Energy flow in the Ecosystem, Ecological Pyramids and Ecological Succession.	8	CO1
2	Natural Resources	Renewable and non renewable, Soil erosion and desertification, Deforestation, Water: Use and over exploitation, Impacts of large Dams, Case studies	8	CO2
3	Biodiversity and Conservation	Levels of biological diversity, Hot spots of biodiversity, India as a Mega Diversity Nation, Endangered and endemic species of India, Threats to Biodiversity, Conservation of Biodiversity, Ecosystem and biodiversity services.	8	CO3
4	Environmental Pollution, Policies and Practices	Environmental pollution, Solid waste management , Ill effects of fireworks, Climate change, Ozone layer depletion, acid rain and impacts on human communities and Environment, Environmental Laws: Environment Protection Act, Wildlife protection Act, Forest conservation Act, Convention on Biological Diversity (CBD), Tribal rights, Human wildlife conflicts.	8	CO4
5	Human Population and the Environment	Human population growth: Impacts on environment, human health and welfare, Resettlement and rehabilitation of project affected persons, Environmental ethics, Environmental communication and public awareness, case studies.	8	CO5

Reference Books:

- 1) Agarwal, K.C. 2001 Environmental; Biology, Nidi Pub. Ltd. Bikaner.
- 2) Bharucha Erach, The Biodiversity of India, Mapin Pub. Pvt. Ltd., Ahemdabad-380, India.
- 3) Brunner R.C. 1989. Hazardous waste incineration, Mc Graw Hill
- 4) Clark R.S. Marine Pollution, Clanderon Press Oxford (TB)
- 5) Cunningham W.P.2001.Cooper, T.H. Gorhani, E & Hepworth, Environmental encyclopedia, Jacob Publication House, Mumbai.

e-Learning Source:

- <https://byjus.com/biology/difference-between-environment-and-eCOsystem>
- <https://www.youtube.com/watch?v=dRP14TB8w7k>
- <https://www.youtube.com/watch?v=3fbEVytyJCK>
- <https://www.vedantu.com/biology/conservation-of-biodiversity>

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	1	1	1	1	1	1	1	1	1	-	-	1	1	1	1	1	-
CO2	1	1	1	1	1	1	1	1	1	1	-	-	1	1	1	1	1	-
CO3	1	1	1	1	1	1	1	1	1	1	-	-	1	1	1	1	1	-
CO4	1	1	1	1	1	1	1	1	1	1	-	-	1	1	1	1	1	-
CO5	1	2	1	1	1	1	3	2	1	3	-	--	1	1	1	2	1	-

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	Sign & Seal of HoD
---	-------------------------------



**Department of Paramedical Sciences
(Programme: B.F.S.)**

Effective from Session: 2019-2020							
Course Code	ES101	Title of the Course	Environmental Studies	L	T	P	C
Year	II	Semester	III	2	1	0	3
Pre-Requisite	10+2 with Physics, Chemistry & Biology	Co-requisite					
Course Objectives	The purpose of this undergraduate course is to impart basic and key knowledge of environment and ecosystem. This will help students in enhancing their knowledge of biodiversity and its conservation. After successful completion of course, the student will able to explore concept of the subject into their respective dimensions.						

Course Outcomes	
CO1	Gain knowledge about environment and eCOsystem
CO2	Students will learn about natural resource, its importance and environmental impacts of human activities on natural resource.
CO3	Gain knowledge about the conservation of biodiversity and its importance.
CO4	Aware students about problems of environmental pollution, its impact on human and ecosystem and control measures.
CO5	Students will learn about increase in population growth and its impact on environment.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Introduction to Environment and ECOSystems	Environment, its components and segments, Multidisciplinary nature of Environmental studies, Concept of Sustainability and sustainable development, Environmental movements, Ecosystem, Structure & Function, Energy flow in the Ecosystem, Ecological Pyramids and Ecological Succession.	8	CO1
2	Natural Resources	Renewable and non renewable, Soil erosion and desertification, Deforestation, Water: Use and over exploitation, Impacts of large Dams, Case studies	8	CO2
3	Biodiversity and Conservation	Levels of biological diversity, Hot spots of biodiversity, India as a Mega Diversity Nation, Endangered and endemic species of India, Threats to Biodiversity, Conservation of Biodiversity, Ecosystem and biodiversity services.	8	CO3
4	Environmental Pollution, Policies and Practices	Environmental pollution, Solid waste management, Ill effects of fireworks, Climate change, Ozone layer depletion, acid rain and impacts on human communities and Environment, Environmental Laws: Environment Protection Act, Wildlife protection Act, Forest conservation Act, Convention on Biological Diversity (CBD), Tribal rights, Human wildlife conflicts.	8	CO4
5	Human Population and the Environment	Human population growth: Impacts on environment, human health and welfare, Resettlement and rehabilitation of project affected persons, Environmental ethics, Environmental communication and public awareness, case studies.	8	CO5

Reference Books:

- 1) Agarwal, K.C. 2001 Environmental; Biology, Nidi Pub. Ltd. Bikaner.
- 2) Bharucha Erach, The Biodiversity of India, Mapin Pub. Pvt. Ltd., Ahemdabad-380, India.
- 3) Brunner R.C. 1989. Hazardous waste incineration, Mc Graw Hill
- 4) Clark R.S. Marine Pollution, Clanderon Press Oxford (TB)
- 5) Cunningham W.P.2001.Cooper, T.H. Gorhani, E & Hepworth, Environmental encyclopedia, Jacob Publication House, Mumbai.
- 6) De. A.K. Environmental chemistry Willey Eastern Limited.

e-Learning Source:

- <https://byjus.com/biology/difference-between-environment-and-ecosystem>.
- <https://www.youtube.com/watch?v=dRPl4TB8w7k>
- <https://www.youtube.com/watch?v=3fbEVtyJCK>

PO-PSO CO	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CO3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CO4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CO5	1	1	2	1	3	1	1	2	1	2	2	2	1	1	1	1	2	1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	Sign & Seal of HoD
---	-------------------------------



**Department of bioengineering
(Programme: B. Tech Biotech)**

Effective from Session: 2004							
Course Code	ES 101	Title of the Course	Environmental Studies	L	T	P	C
Year	I	Semester	I	2	1	0	3
Pre-Requisite	10+2 with Physics, Chemistry & Biology	Co-requisite					
Course Objectives	The purpose of this undergraduate course is to impart basic and key knowledge of environment and ecosystem. This will help students in enhancing their knowledge of biodiversity and its conservation. After successful completion of course, the student will able to explore concept of the subject into their respective dimensions.						

Course Outcomes	
CO1	Gain knowledge about environment and ecosystem
CO2	Students will learn about natural resource, its importance and environmental impacts of human activities on natural resource.
CO3	Gain knowledge about the conservation of biodiversity and its importance.
CO4	Aware students about problems of environmental pollution, its impact on human and ecosystem and control measures.
CO5	Students will learn about increase in population growth and its impact on environment.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Introduction to Environment and ECOSystems	Environment, its components and segments, Multidisciplinary nature of Environmental studies, Concept of Sustainability and sustainable development, Environmental movements, Ecosystem, Structure & Function, Energy flow in the Ecosystem, Ecological Pyramids and Ecological Succession.	8	CO1
2	Natural Resources	Renewable and non-renewable, Soil erosion and desertification, Deforestation, Water: Use and over exploitation, Impacts of large Dams, Case studies	8	CO2
3	Biodiversity and Conservation	Levels of biological diversity, Hot spots of biodiversity, India as a Mega Diversity Nation, Endangered and endemic species of India, Threats to Biodiversity, Conservation of Biodiversity, Ecosystem and biodiversity services.	8	CO3
4	Environmental Pollution, Policies and Practices	Environmental pollution, Solid waste management, Ill effects of fireworks, Climate change, Ozone layer depletion, acid rain and impacts on human communities and Environment, Environmental Laws: Environment Protection Act, Wildlife protection Act, Forest conservation Act, Convention on Biological Diversity (CBD), Tribal rights, Human wildlife conflicts.	8	CO4
5	Human Population and the Environment	Human population growth: Impacts on environment, human health and welfare, Resettlement and rehabilitation of project affected persons, Environmental ethics, Environmental communication and public awareness, case studies.	8	CO5

Reference Books:

- 1) Agarwal, K.C. 2001 Environmental; Biology, Nidi Pub. Ltd. Bikaner.
- 2) Bharucha Erach, The Biodiversity of India, Mapin Pub. Pvt. Ltd., Ahemdabad-380, India.
- 3) Brunner R.C. 1989. Hazardous waste incineration, Mc Graw Hill
- 4) Clark R.S. Marine Pollution, Clanderon Press Oxford (TB)
- 5) Cunningham W.P.2001.Cooper, T.H. Gorhani, E & Hepworth, Environmental encyclopedia, Jaicob Publication House, Mumbai.
- 6) De. A.K. Environmental chemistry Willey Eastern Limited.
- 7) Glick, H.P.1993 water in crisis, Pacific Institute for studies in dev, Environment & security, Stockholm Env, Institute, Oxford Univ, Press 473 p.
- 8) Hawkins R .E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay.
- 9) Heywood, V.H. & Watson, R. T.1995.Global biodiversity Assessment Cambridge Univ. Press 1140 p.
- 10) Jadhve, H. and Bhosale, V. M. 1995 Environmental protection and laws, Himalaya pub, house, Delhi.284 p.
- 11) Mckinnery, M.L. and School, R. M.1996 Environmental science systems and solutions, web enhanced edition 639 p.
- 12) Mhaskar A.K. Matter Hazardous, Techno Science Pub (TM)
- 13) Miller T.G. Jr, Environmental Ecology, W. B. Saunders Co.USA,574 p. 16
- 14) Odum, E.P.1997.Fundamental chemistry, Goel Pub House Meerut.
- 15) Survey of the Environment, The Hindu (M).
- 16) Sharma B.K.2001.Environmental Chemistry, Goel Pub- House Meerut

e-Learning Source:

- [https://byjus.com/biology/difference-between-environment-and-ecosystem.](https://byjus.com/biology/difference-between-environment-and-ecosystem)
<https://www.youtube.com/watch?v=dRPl4TB8w7k>
<https://www.youtube.com/watch?v=3fbEVytyJCK>
<https://www.vedantu.com/biology/conservation-of-biodiversity>
<https://youmatter.world/en/definition/soil-erosion-degradation-definition/>
[https://byjus.com/biology/difference-between-environment-and-eCOsystem.](https://byjus.com/biology/difference-between-environment-and-eCOsystem)

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO CO	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	2	2	1	1	1	3	1	1	1	1	2	1	1	1	-	-	-
CO2	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	-	-	-
CO3	1	1	2	1	1	1	2	1	1	1	1	2	1	1	1	-	-	-
CO4	1	1	1	1	1	1	2	1	1	1	1	2	1	1	1	-	-	-
CO5	1	1	2	1	1	2	3	2	1	2	1	2	1	1	1	-	-	-

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	Sign & Seal of HOD
---	-------------------------------



**Department of Bioengineering
(Programme: B. Tech and Food Tech)**

Effective from Session: 2014							
Course Code	ES 101	Title of the Course	Environmental Studies	L	T	P	C
Year	I	Semester	I	2	1	0	3
Pre-Requisite	10+2 with Physics, Chemistry & Biology	Co-requisite					
Course Objectives	The purpose of this undergraduate course is to impart basic and key knowledge of environment and eCOsystem. This will help students in enhancing their knowledge of biodiversity and its conservation. After successful completion of course, the student will able to explore concept of the subject into their respective dimensions.						
Course Outcomes							
CO1	Gain knowledge about environment and Ecosystem						
CO2	Students will learn about natural resource, its importance and environmental impacts of human activities on natural resource.						
CO3	Gain knowledge about the conservation of biodiversity and its importance.						
CO4	Aware students about problems of environmental pollution, its impact on human and ecosystem and control measures.						
CO5	Students will learn about increase in population growth and its impact on environment.						

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Introduction to Environment and Ecosystems	Environment, its components and segments, Multidisciplinary nature of Environmental studies, Concept of Sustainability and sustainable development, Environmental movements, Ecosystem, Structure & Function, Energy flow in the Ecosystem, Ecological Pyramids and Ecological Succession.	8	CO1
2	Natural Resources	Renewable and non-renewable, Soil erosion and desertification, Deforestation, Water: Use and over exploitation, Impacts of large Dams, Case studies	8	CO2
3	Biodiversity and Conservation	Levels of biological diversity, Hot spots of biodiversity, India as a Mega Diversity Nation, Endangered and endemic species of India, Threats to Biodiversity, Conservation of Biodiversity, Ecosystem and biodiversity services.	8	CO3
4	Environmental Pollution, Policies and Practices	Environmental pollution, Solid waste management, Ill effects of fireworks, Climate change, Ozone layer depletion, acid rain and impacts on human communities and Environment, Environmental Laws: Environment Protection Act, Wildlife protection Act, Forest conservation Act, Convention on Biological Diversity (CBD), Tribal rights, Human wildlife conflicts.	8	CO4
5	Human Population and the Environment	Human population growth: Impacts on environment, human health and welfare, Resettlement and rehabilitation of project affected persons, Environmental ethics, Environmental communication and public awareness, case studies.	8	CO5

Reference Books:

- 1) Agarwal, K.C. 2001 Environmental; Biology, Nidi Pub. Ltd. Bikaner.
- 2) Bharucha Erach, The Biodiversity of India, Mapin Pub. Pvt. Ltd., Ahemdabad-380, India.
- 3) Brunner R.C. 1989. Hazardous waste incineration, Mc Graw Hill
- 4) Clark R.S. Marine Pollution, Clanderon Press Oxford (TB)
- 5) Cunningham W.P.2001.Cooper, T.H. Gorhani, E & Hepworth, Environmental encyclopedia, Jaicob Publication House, Mumbai.
- 6) De. A.K. Environmental chemistry Willey Eastern Limited.
- 7) Glick, H.P.1993 water in crisis, Pacific Institute for studies in dev, Environment & security, Stockholm Env, Institute, Oxford Univ, Press 473 p.
- 8) Hawkins R. E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay.
- 9) Heywood, V.H. & Watson, R. T.1995.Global biodiversity Assessment Cambridge Univ. Press 1140 p.
- 10) Jadhve, H. and Bhosale, V. M. 1995 Environmental protection and laws, Himalaya pub, house, Delhi.284 p.
- 11) Mckinnery, M.L. and School, R. M.1996 Environmental science systems and solutions, web enhanced edition 639 p.
- 12) Mhaskar A.K. Matter Hazardous, Techno Science Pub (TM)
- 13) Miller T.G. Jr, Environmental Ecology, W. B. Saunders Co.USA,574 p. 16
- 14) Odum, E.P.1997.Fundamental chemistry, Goel Pub House Meerut.
- 15) Survey of the Environment, The Hindu (M).
- 16) Sharma B.K.2001.Environmental Chemistry, Goel Pub .House Meerut

e-Learning Source:

- <https://byjus.com/biology/difference-between-environment-and-eCOsystem>.
<https://www.youtube.com/watch?v=dRP14TB8w7k>
<https://www.youtube.com/watch?v=3fbEVtyJCK>
<https://www.vedantu.com/biology/conservation-of-biodiversity>
<https://youmatter.world/en/definition/soil-erosion-degradation-definition/>
<https://byjus.com/biology/difference-between-environment-and-eCOsystem>.

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1	1	2	2	1	1	1	3	1	1	1	1	2	1	1	1	-	-
CO2	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	-	-	-
CO3	1	1	2	1	1	1	2	1	1	1	1	2	1	1	1	-	-	-
CO4	1	1	1	1	1	1	2	1	1	1	1	2	1	1	1	-	-	-
CO5	1	1	2	1	1	2	3	2	1	2	1	2	1	1	1	-	-	-

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	Sign & Seal of HoD
---	-------------------------------



**Department of Bioengineering
(Programme: B. Tech and Biomedical Engineering)**

Effective from Session:							
Course Code	ES 101	Title of the Course	Environmental Studies	L	T	P	C
Year	I	Semester	I	2	1	0	3
Pre-Requisite	10+2 with Physics, Chemistry & Biology	Co-requisite					
Course Objectives	The purpose of this undergraduate course is to impart basic and key knowledge of environment and Ecosystem. This will help students in enhancing their knowledge of biodiversity and its conservation. After successful completion of course, the student will able to explore concept of the subject into their respective dimensions.						

Course Outcomes	
CO1	Gain knowledge about environment and Ecosystem
CO2	Students will learn about natural resource, its importance and environmental impacts of human activities on natural resource.
CO3	Gain knowledge about the conservation of biodiversity and its importance.
CO4	Aware students about problems of environmental pollution, its impact on human and ecosystem and control measures.
CO5	Students will learn about increase in population growth and its impact on environment.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Introduction to Environment and Ecosystems	Environment, its components and segments, Multidisciplinary nature of Environmental studies, Concept of Sustainability and sustainable development, Environmental movements, Ecosystem, Structure & Function, Energy flow in the Ecosystem, Ecological Pyramids and Ecological Succession.	8	CO1
2	Natural Resources	Renewable and non-renewable, Soil erosion and desertification, Deforestation, Water: Use and over exploitation, Impacts of large Dams, Case studies	8	CO2
3	Biodiversity and Conservation	Levels of biological diversity, Hot spots of biodiversity, India as a Mega Diversity Nation, Endangered and endemic species of India, Threats to Biodiversity, Conservation of Biodiversity, Ecosystem and biodiversity services.	8	CO3
4	Environmental Pollution, Policies and Practices	Environmental pollution, Solid waste management, Ill effects of fireworks, Climate change, Ozone layer depletion, acid rain and impacts on human communities and Environment, Environmental Laws: Environment Protection Act, Wildlife protection Act, Forest conservation Act, Convention on Biological Diversity (CBD), Tribal rights, Human wildlife conflicts.	8	CO4
5	Human Population and the Environment	Human population growth: Impacts on environment, human health and welfare, Resettlement and rehabilitation of project affected persons, Environmental ethics, Environmental communication and public awareness, case studies.	8	CO5

Reference Books:	
1) Agarwal, K.C. 2001 Environmental; Biology, Nidi Pub. Ltd. Bikaner.	
2) Bharucha Erach, The Biodiversity of India, Mapin Pub. Pvt. Ltd., Ahemdabad-380, India.	
3) Brunner R.C. 1989. Hazardous waste incineration, Mc Graw Hill	
4) Clark R.S. Marine Pollution, Clanderon Press Oxford (TB)	
5) Cunningham W.P.2001.Cooper, T.H. Gorhani, E & Hepworth, Environmental encyclopedia, Jaicob Publication House, Mumbai.	
6) De. A.K. Environmental chemistry Willey Eastern Limited.	
7) Glick, H.P.1993 water in crisis, Pacific Institute for studies in dev, Environment & security, Stockholm Env, Institute, Oxford Univ, Press 473 p.	
8) Hawkins R. E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay.	
9) Heywood, V.H. & Watson, R. T.1995.Global biodiversity Assessment, Cambridge Univ. Press 1140 p.	
10) Jadhve, H. and Bhosale, V. M. 1995 Environmental protection and laws, Himalaya pub, house, Delhi.284 p.	
11) Mckinnery, M.L. and School, R. M.1996 Environmental science systems and solutions, web enhanced edition 639 p.	
12) Mhaskar A.K. Matter Hazardous, Techno Science Pub (TM)	
13) Miller T.G. Jr, Environmental Ecology, W. B. Saunders Co.USA,574 p. 16	
14) Odum, E.P.1997.Fundamental chemistry, Goel Pub House Meerut.	
15) Survey of the Environment, The Hindu (M).	
16) Sharma B.K.2001.Environmental Chemistry, Goel Pub House Meerut	
e-Learning Source:	
https://byjus.com/biology/difference-between-environment-and-eCOsystem .	
https://www.youtube.com/watch?v=dRP14TB8w7k	
https://www.youtube.com/watch?v=3fbEVytyJck	
https://www.vedantu.com/biology/conservation-of-biodiversity	
https://youmatter.world/en/definition/soil-erosion-degradation-definition/	
https://byjus.com/biology/difference-between-environment-and-eCOsystem .	

Course Articulation Matrix: (Mapping of COs with POs and PSOs)																		
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	2	2	1	1	1	3	1	1	1	1	2	1	1	1	-	-	-
CO2	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	-	-	-
CO3	1	1	2	1	1	1	2	1	1	1	1	2	1	1	1	-	-	-
CO4	1	1	1	1	1	1	2	1	1	1	1	2	1	1	1	-	-	-
CO5	1	1	2	1	1	2	3	2	1	2	1	2	1	1	1	-	-	-

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	Sign & Seal of HoD
---	-------------------------------



Department of Civil Engineering
(Programme : Civil Engineering UG Programme)

Effective from Session:							
Course Code	ES 101	Title of the Course	Environmental Studies	L	T	P	C
Year	1	Semester	I	2	1	0	3
Pre-Requisite	10+2 with Physics, Chemistry & Biology/ Maths	Co-requisite					
Course Objectives	The purpose of this undergraduate course is to impart basic and key knowledge of environment and ecosystem. This will help students in enhancing their knowledge of biodiversity and its conservation. After successful completion of course, the student will able to explore concept of the subject into their respective dimensions.						

Course Outcomes	
CO1	Gain knowledge about environment and ecosystem
CO2	Students will learn about natural resource, its importance and environmental impacts of human activities on natural resource.
CO3	Gain knowledge about the conservation of biodiversity and its importance.
CO4	Aware students about problems of environmental pollution, its impact on human and ecosystem and control measures.
CO5	Students will learn about increase in population growth and its impact on environment.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Introduction to Environment and Ecosystems	Environment, its components and segments, Multidisciplinary nature of Environmental studies, Concept of Sustainability and sustainable development, Environmental movements, Ecosystem, Structure & Function, Energy flow in the Ecosystem, Ecological Pyramids and Ecological Succession.	8	CO1
2	Natural Resources	Renewable and non-renewable, Soil erosion and desertification, Deforestation, Water: Use and over exploitation, Impacts of large Dams, Case studies	8	CO2
3	Biodiversity and Conservation	Levels of biological diversity, Hot spots of biodiversity, India as a Mega Diversity Nation, Endangered and endemic species of India, Threats to Biodiversity, Conservation of Biodiversity, Ecosystem and biodiversity services.	8	CO3
4	Environmental Pollution, Policies and Practices	Environmental pollution, Solid waste management, Ill effects of fireworks, Climate change, Ozone layer depletion, acid rain and impacts on human communities and Environment, Environmental Laws: Environment Protection Act, Wildlife protection Act, Forest conservation Act, Convention on Biological Diversity (CBD), Tribal rights, Human wildlife conflicts.	8	CO4
5	Human Population and the Environment	Human population growth: Impacts on environment, human health and welfare, Resettlement and rehabilitation of project affected persons, Environmental ethics, Environmental communication and public awareness, case studies.	8	CO5

Reference Books:

- 1) Agarwal, K.C. 2001 Environmental; Biology, Nidi Pub. Ltd. Bikaner.
- 2) Bharucha Erach, The Biodiversity of India, Mapin Pub. Pvt. Ltd., Ahmedabad-380, India.
- 3) Brunner R.C. 1989. Hazardous waste incineration, Mc Graw Hill
- 4) Clark R.S. Marine Pollution, Clanderon Press Oxford (TB)
- 5) Cunningham W.P.2001.Cooper, T.H. Gorhani, E & Hepworth, Environmental encyclopedia, Jaicob Publication House, Mumbai.
- 6) De. A.K. Environmental chemistry Willey Eastern Limited.
- 7) Glick, H.P.1993 water in crisis, Pacific Institute for studies in dev, Environment & security, Stockholm Env, Institute, Oxford Univ, Press 473 p.
- 8) Hawkins R. E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay.
- 9) Heywood, V.H. & Watson, R. T.1995.Global biodiversity Assessment .Cambridge Univ. Press 1140 p.
- 10) Jadhve, H. and Bhosale, V. M. 1995 Environmental protection and laws, Himalaya pub, house, Delhi.284 p.
- 11) Mckinnery, M.L. and School, R. M.1996 Environmental science systems and solutions, web enhanced edition 639 p. 12) Mhaskar A.K. Matter Hazardous, Techno Science Pub (TM)
- 13) Miller T.G. Jr, Environmental Ecology, W. B. Saunders Co.USA,574 p. 16
- 14) Odum, E.P.1997.Fundamental chemistry, Goel Pub House Meerut.
- 15) Survey of the Environment, The Hindu (M).
- 16) Sharma B.K.2001.Environmental Chemistry, Goel Pub .House Meerut

e-Learning Source:

<https://byjus.com/biology/difference-between-environment-and-eCOsystem>.

<https://www.youtube.com/watch?v=dRPl4TB8w7k>

<https://www.youtube.com/watch?v=3fbEVyJyJck>

<https://www.vedantu.com/biology/conservation-of-biodiversity>

<https://youmatter.world/en/definition/soil-erosion-degradation-definition/>

<https://byjus.com/biology/difference-between-environment-and-eCOsystem>.

PO-PSO CO	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	2	2	1	1	1	3	1	1	1	1	2	1	1	-	-	-	-
CO2	1	1	1	1	1	1	3	1	1	1	1	1	1	1	-	-	-	-
CO3	1	1	2	1	1	1	2	1	1	1	1	2	1	1	-	-	-	-
CO4	1	1	1	1	1	1	2	1	1	1	1	2	1	1	-	-	-	-
CO5	1	1	2	1	1	2	3	2	1	2	1	2	1	1	-	-	-	-

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	Sign & Seal of HoD
------------------------------------	--------------------



**Department of B. Tech Computer Science and Engineering
(Programme - B. Tech)**

Effective from Session:							
Course Code	ES 101	Title of the Course	Environmental Studies	L	T	P	C
Year	I	Semester	I	2	1	0	3
Pre-Requisite	10+2 with Physics, Chemistry & Biology/ Maths	Co-requisite					
Course Objectives	The purpose of this undergraduate course is to impart basic and key knowledge of environment and ecosystem. This will help students in enhancing their knowledge of biodiversity and its conservation. After successful completion of course, the student will able to explore concept of the subject into their respective dimensions.						

Course Outcomes	
CO1	Gain knowledge about environment and ecosystem
CO2	Students will learn about natural resource, its importance and environmental impacts of human activities on natural resource.
CO3	Gain knowledge about the conservation of biodiversity and its importance.
CO4	Aware students about problems of environmental pollution, its impact on human and ecosystem and control measures.
CO5	Students will learn about increase in population growth and its impact on environment.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Introduction to Environment and Ecosystems	Environment, its components and segments, Multidisciplinary nature of Environmental studies, Concept of Sustainability and sustainable development, Environmental movements, Ecosystem, Structure & Function, Energy flow in the Ecosystem, Ecological Pyramids and Ecological Succession.	8	CO1
2	Natural Resources	Renewable and non- renewable, Soil erosion and desertification, Deforestation, Water: Use and over exploitation, Impacts of large Dams, Case studies	8	CO2
3	Biodiversity and Conservation	Levels of biological diversity, Hot spots of biodiversity, India as a Mega Diversity Nation, Endangered and endemic species of India, Threats to Biodiversity, Conservation of Biodiversity, Ecosystem and biodiversity services.	8	CO3
4	Environmental Pollution, Policies and Practices	Environmental pollution, Solid waste management, Ill effects of fireworks, Climate change, Ozone layer depletion, acid rain and impacts on human communities and Environment, Environmental Laws: Environment Protection Act, Wildlife protection Act, Forest conservation Act, Convention on Biological Diversity (CBD), Tribal rights, Human wildlife conflicts.	8	CO4
5	Human Population and the Environment	Human population growth: Impacts on environment, human health and welfare, Resettlement and rehabilitation of project affected persons, Environmental ethics, Environmental communication and public awareness, case studies.	8	CO5

Reference Books:

- 1) Agarwal, K.C. 2001 Environmental; Biology, Nidi Pub. Ltd. Bikaner.
- 2) Bharucha Erach, The Biodiversity of India, Mapin Pub. Pvt. Ltd., Ahmedabad-380, India.
- 3) Brunner R.C. 1989. Hazardous waste incineration, Mc Graw Hill
- 4) Clark R.S. Marine Pollution, Clanderon Press Oxford (TB)
- 5) Cunningham W.P.2001.Cooper, T.H. Gorhani, E & Hepworth, Environmental encyclopedia, Jaicob Publication House, Mumbai.
- 6) De. A.K. Environmental chemistry Willey Eastern Limited.
- 7) Glick, H.P.1993 water in crisis, Pacific Institute for studies in dev, Environment & security, Stockholm Env, Institute, Oxford Univ, Press 473 p.
- 8) Hawkins R. E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay.
- 9) Heywood, V.H. & Watson, R. T.1995.Global biodiversity Assessment.Cambridge Univ. Press 1140 p.
- 10) Jadhve, H. and Bhosale, V. M. 1995 Environmental protection and laws, Himalaya pub, house, Delhi.284 p.
- 11) Mckinnery, M.L. and School, R. M.1996 Environmental science systems and solutions, web enhanced edition 639 p. 12) Mhaskar A.K. Matter Hazardous, Techno Science Pub (TM)
- 13) Miller T.G. Jr, Environmental Ecology, W. B. Saunders Co.USA,574 p. 16
- 14) Odum, E.P.1997.Fundamental chemistry, Goel Pub House Meerut.
- 15) Survey of the Environment, The Hindu (M).
- 16) Sharma B.K.2001.Environmental Chemistry, Goel Pub.House Meerut

e-Learning Source:

- <https://byjus.com/biology/difference-between-environment-and-eCOsystem>.
<https://www.youtube.com/watch?v=dRPI4TB8w7k>
<https://www.youtube.com/watch?v=3fbEVytyJCK>
<https://www.vedantu.com/biology/conservation-of-biodiversity>
<https://youmatter.world/en/definition/soil-erosion-degradation-definition/>
<https://byjus.com/biology/difference-between-environment-and-eCOsystem>.

Course Articulation Matrix: (Mapping of COs with POs and PSOs)																			
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	
	CO1	1	1	1	1	1	1	3	2	1	1	1	1	1	1	1	1	-	-
CO2	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	1	-	-	
CO3	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	-	-	
CO4	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	-	-	
CO5	1	1	1	1	1	2	3	2	1	1	1	1	1	1	1	1	-	-	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	Sign & Seal of HOD
------------------------------------	--------------------



**Department of computer Science and Engineering
(Programme: B. Tech -CTIS)**

Effective from Session:							
Course Code	ES 101	Title of the Course	Environmental Studies	L	T	P	C
Year	I	Semester	I	2	1	0	3
Pre-Requisite	10+2 with Physics, Chemistry & Biology/ Maths	Co-requisite					
Course Objectives	The purpose of this undergraduate course is to impart basic and key knowledge of environment and Ecosystem. This will help students in enhancing their knowledge of biodiversity and its conservation. After successful completion of course, the student will able to explore concept of the subject into their respective dimensions.						

Course Outcomes	
CO1	Gain knowledge about environment and Ecosystem
CO2	Students will learn about natural resource, its importance and environmental impacts of human activities on natural resource.
CO3	Gain knowledge about the conservation of biodiversity and its importance.
CO4	Aware students about problems of environmental pollution, its impact on human and Ecosystem and control measures.
CO5	Students will learn about increase in population growth and its impact on environment.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Introduction to Environment and Ecosystems	Environment, its components and segments, Multidisciplinary nature of Environmental studies, Concept of Sustainability and sustainable development, Environmental movements, Ecosystem, Structure & Function, Energy flow in the Ecosystem, Ecological Pyramids and Ecological Succession.	8	CO1
2	Natural Resources	Renewable and non-renewable, Soil erosion and desertification, Deforestation, Water: Use and over exploitation, Impacts of large Dams, Case studies	8	CO2
3	Biodiversity and Conservation	Levels of biological diversity, Hot spots of biodiversity, India as a Mega Diversity Nation, Endangered and endemic species of India, Threats to Biodiversity, Conservation of Biodiversity, Ecosystem and biodiversity services.	8	CO3
4	Environmental Pollution, Policies and Practices	Environmental pollution, Solid waste management, Ill effects of fireworks, Climate change, Ozone layer depletion, acid rain and impacts on human communities and Environment, Environmental Laws: Environment Protection Act, Wildlife protection Act, Forest conservation Act, Convention on Biological Diversity (CBD), Tribal rights, Human wildlife conflicts.	8	CO4
5	Human Population and the Environment	Human population growth: Impacts on environment, human health and welfare, Resettlement and rehabilitation of project affected persons, Environmental ethics, Environmental communication and public awareness, case studies.	8	CO5

Reference Books:

- 1) Agarwal, K.C. 2001 Environmental; Biology, Nidi Pub. Ltd. Bikaner.
- 2) Bharucha Erach, The Biodiversity of India, Mapin Pub. Pvt. Ltd., Ahemdabad-380, India.
- 3) Brunner R.C. 1989. Hazardous waste incineration, Mc Graw Hill
- 4) Clark R.S. Marine Pollution, Clanderon Press Oxford (TB)
- 5) Cunningham W.P.2001.Cooper, T.H. Gorhani, E & Hepworth, Environmental encyclopedia, Jaicob Publication House, Mumbai.
- 6) De. A.K. Environmental chemistry Willey Eastern Limited.
- 7) Glick, H.P.1993 water in crisis, Pacific Institute for studies in dev, Environment & security, Stockholm Env, Institute, Oxford Univ, Press 473 p.
- 8) Hawkins R. E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay.
- 9) Heywood, V.H. & Watson, R. T.1995.Global biodiversity Assessment.Cambridge Univ. Press 1140 p.
- 10) Jadhve, H. and Bhosale, V. M. 1995 Environmental protection and laws, Himalaya pub, house, Delhi.284 p.
- 11) Mckinnery, M.L. and School, R. M.1996 Environmental science systems and solutions, web enhanced edition 639 p.
- 12) Mhaskar A.K. Matter Hazardous, Techno Science Pub (TM)
- 13) Miller T.G. Jr, Environmental Ecology, W. B. Saunders Co.USA,574 p. 16
- 14) Odum, E.P.1997.Fundamental chemistry, Goel Pub House Meerut.
- 15) Survey of the Environment, The Hindu (M).
- 16) Sharma B.K.2001.Environmental Chemistry, Goel Pub.House Meerut

e-Learning Source:

- <https://byjus.com/biology/difference-between-environment-and-eCOsystem>.
<https://www.youtube.com/watch?v=dRPl4TB8w7k>
<https://www.youtube.com/watch?v=3fbEVytyJCK>
<https://www.vedantu.com/biology/conservation-of-biodiversity>
<https://youmatter.world/en/definition/soil-erosion-degradation-definition/>
<https://byjus.com/biology/difference-between-environment-and-eCOsystem>.

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1	1	1	1	1	1	1	3	2	1	1	1	1	1	1	1	-	-
CO2	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	-	-	-
CO3	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	-	-	-
CO4	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	-	-	-
CO5	1	1	1	1	1	2	3	2	1	1	1	1	1	1	1	-	-	-

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

<p align="center">Name & Sign of Program Coordinator</p>	<p align="center">Sign & Seal of HOD</p>
---	---



**Department of Electrical Engineering
(Programme: B. Tech)**

Effective from Session:							
Course Code	ES 101	Title of the Course	Environmental Studies	L	T	P	C
Year	I	Semester	I	2	1	0	3
Pre-Requisite	10+2 with Physics, Chemistry & Biology / Maths	Co-requisite					
Course Objectives	The purpose of this undergraduate course is to impart basic and key knowledge of environment and ecosystem. This will help students in enhancing their knowledge of biodiversity and its conservation. After successful completion of course, the student will able to explore concept of the subject into their respective dimensions.						

Course Outcomes	
CO1	Gain knowledge about environment and ecosystem
CO2	Students will learn about natural resource, its importance and environmental impacts of human activities on natural resource.
CO3	Gain knowledge about the conservation of biodiversity and its importance.
CO4	Aware students about problems of environmental pollution, its impact on human and ecosystem and control measures.
CO5	Students will learn about increase in population growth and its impact on environment.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Introduction to Environment and Ecosystems	Environment, its components and segments, Multidisciplinary nature of Environmental studies, Concept of Sustainability and sustainable development, Environmental movements, Ecosystem, Structure & Function, Energy flow in the Ecosystem, Ecological Pyramids and Ecological Succession.	8	CO1
2	Natural Resources	Renewable and non -renewable, Soil erosion and desertification, Deforestation, Water: Use and over exploitation, Impacts of large Dams, Case studies	8	CO2
3	Biodiversity and Conservation	Levels of biological diversity, Hot spots of biodiversity, India as a Mega Diversity Nation, Endangered and endemic species of India, Threats to Biodiversity, Conservation of Biodiversity, Ecosystem and biodiversity services.	8	CO3
4	Environmental Pollution, Policies and Practices	Environmental pollution, Solid waste management, Ill effects of fireworks, Climate change, Ozone layer depletion, acid rain and impacts on human communities and Environment, Environmental Laws: Environment Protection Act, Wildlife protection Act, Forest conservation Act, Convention on Biological Diversity (CBD), Tribal rights, Human wildlife conflicts.	8	CO4
5	Human Population and the Environment	Human population growth: Impacts on environment, human health and welfare, Resettlement and rehabilitation of project affected persons, Environmental ethics, Environmental communication and public awareness, case studies.	8	CO5

Reference Books:

- 1) Agarwal, K.C. 2001 Environmental; Biology, Nidi Pub. Ltd. Bikaner.
- 2) Bharucha Erach, The Biodiversity of India, Mapin Pub. Pvt. Ltd., Ahemdabad-380, India.
- 3) Brunner R.C. 1989. Hazardous waste incineration, Mc Graw Hill
- 4) Clark R.S. Marine Pollution, Clanderon Press Oxford (TB)
- 5) Cunningham W.P.2001.Cooper, T.H. Gorhani, E & Hepworth, Environmental encyclopedia, Jaicob Publication House, Mumbai.
- 6) De. A.K. Environmental chemistry Willey Eastern Limited.
- 7) Glick, H.P.1993 water in crisis, Pacific Institute for studies in dev, Environment & security, Stockholm Env, Institute, Oxford Univ, Press 473 p.
- 8) Hawkins R. E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay.
- 9) Heywood, V.H. & Watson, R. T.1995.Global biodiversity Assessment Cambridge Univ. Press 1140 p.
- 10) Jadhve, H. and Bhosale, V. M. 1995 Environmental protection and laws, Himalaya pub, house, Delhi.284 p.
- 11) Mckinnery, M.L. and School, R. M.1996 Environmental science systems and solutions, web enhanced edition 639 p. 12) Mhaskar A.K. Matter Hazardous, Techno Science Pub (TM)
- 13) Miller T.G. Jr, Environmental Ecology, W. B. Saunders Co.USA,574 p. 16
- 14) Odum, E.P.1997.Fundamental chemistry, Goel Pub House Meerut.
- 15) Survey of the Environment, The Hindu (M).
- 16) Sharma B.K.2001.Environmental Chemistry, Goel Pub House Meerut

e-Learning Source:

- <https://byjus.com/biology/difference-between-environment-and-eCOsystem>.
<https://www.youtube.com/watch?v=dRPI4TB8w7k>
<https://www.youtube.com/watch?v=3fbEVytyJCK>
<https://www.vedantu.com/biology/conservation-of-biodiversity>
<https://youmatter.world/en/definition/soil-erosion-degradation-definition/>
<https://byjus.com/biology/difference-between-environment-and-eCOsystem>.

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	2	2	1	1	1	3	1	1	1	1	2	2	1	1	1	-	-
CO2	1	1	1	1	1	1	3	1	1	1	1	1	2	1	1	1	-	-
CO3	1	1	2	1	1	1	2	1	1	1	1	2	2	1	1	1	-	-
CO4	1	1	1	1	1	1	2	1	1	1	1	2	2	1	1	1	-	-
CO5	1	1	2	1	1	2	3	2	1	2	1	2	2	1	1	1	-	-

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	Sign & Seal of HOD
---	-------------------------------



**Department of Electronics and Communication Engineering
(Programme: B. Tech)**

Effective from Session:							
Course Code	ES 101	Title of the Course	Environmental Studies	L	T	P	C
Year	I	Semester	I	2	1	0	3
Pre-Requisite	10+2 with Physics, Chemistry & Biology / Maths	Co-requisite					
Course Objectives	The purpose of this undergraduate course is to impart basic and key knowledge of environment and ecosystem. This will help students in enhancing their knowledge of biodiversity and its conservation. After successful completion of course, the student will able to explore concept of the subject into their respective dimensions.						

Course Outcomes	
CO1	Gain knowledge about environment and ecosystem
CO2	Students will learn about natural resource, its importance and environmental impacts of human activities on natural resource.
CO3	Gain knowledge about the conservation of biodiversity and its importance.
CO4	Aware students about problems of environmental pollution, its impact on human and ecosystem and control measures.
CO5	Students will learn about increase in population growth and its impact on environment.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Introduction to Environment and Ecosystems	Environment, its components and segments, Multidisciplinary nature of Environmental studies, Concept of Sustainability and sustainable development, Environmental movements, Ecosystem, Structure & Function, Energy flow in the Ecosystem, Ecological Pyramids and Ecological Succession.	8	CO1
2	Natural Resources	Renewable and non-renewable, Soil erosion and desertification, Deforestation, Water: Use and over exploitation, Impacts of large Dams, Case studies	8	CO2
3	Biodiversity and Conservation	Levels of biological diversity, Hot spots of biodiversity, India as a Mega Diversity Nation, Endangered and endemic species of India, Threats to Biodiversity, Conservation of Biodiversity, Ecosystem and biodiversity services.	8	CO3
4	Environmental Pollution, Policies and Practices	Environmental pollution, Solid waste management, Ill effects of fireworks, Climate change, Ozone layer depletion, acid rain and impacts on human communities and Environment, Environmental Laws: Environment Protection Act, Wildlife protection Act, Forest conservation Act, Convention on Biological Diversity (CBD), Tribal rights, Human wildlife conflicts.	8	CO4
5	Human Population and the Environment	Human population growth: Impacts on environment, human health and welfare, Resettlement and rehabilitation of project affected persons, Environmental ethics, Environmental communication and public awareness, case studies.	8	CO5

Reference Books:	
1) Agarwal, K.C. 2001 Environmental; Biology, Nidi Pub. Ltd. Bikaner.	
2) Bharucha Erach, The Biodiversity of India, Mapin Pub. Pvt. Ltd., Ahemdabad-380, India.	
3) Brunner R.C. 1989. Hazardous waste incineration, Mc Graw Hill	
4) Clark R.S. Marine Pollution, Clanderon Press Oxford (TB)	
5) Cunningham W.P.2001.Cooper, T.H. Gorhani, E & Hepworth, Environmental encyclopedia, Jaicob Publication House, Mumbai.	
6) De. A.K. Environmental chemistry Willey Eastern Limited.	
7) Glick, H.P.1993 water in crisis, Pacific Institute for studies in dev, Environment & security, Stockholm Env, Institute, Oxford Univ, Press 473 p.	
8) Hawkins R.E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay.	
9) Heywood, V.H. & Watson, R. T.1995.Global biodiversity Assessment Cambridge Univ. Press 1140 p.	
10) Jadhve, H. and Bhosale, V. M. 1995 Environmental protection and laws, Himalaya pub, house, Delhi.284 p.	
11) Mckinnery, M.L. and School, R. M.1996 Environmental science systems and solutions, web enhanced edition 639 p.	
12) Mhaskar A.K. Matter Hazardous, Techno Science Pub (TM)	
13) Miller T.G. Jr, Environmental Ecology, W. B. Saunders Co.USA,574 p. 16	
14) Odum, E.P.1997.Fundamental chemistry, Goel Pub House Meerut.	
15) Survey of the Environment, The Hindu (M).	
16) Sharma B.K.2001.Environmental Chemistry, Goel Pub House Meerut	
e-Learning Source:	
https://byjus.com/biology/difference-between-environment-and-eCOsystem .	
https://www.youtube.com/watch?v=dRP14TB8w7k	
https://www.youtube.com/watch?v=3fbEVytyJck	
https://www.vedantu.com/biology/conservation-of-biodiversity	
https://youmatter.world/en/definition/soil-erosion-degradation-definition/	
https://byjus.com/biology/difference-between-environment-and-eCOsystem .	

PO-PSO CO	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	2	2	1	1	1	3	1	1	1	1	2	1	1	2	2	-	-
CO2	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	1	-	-
CO3	1	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	-	-
CO4	1	1	1	1	1	1	2	1	1	1	1	2	1	1	1	1	-	-
CO5	1	1	2	1	1	2	3	2	1	2	1	2	1	1	2	3	-	-

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	Sign & Seal of HOD
------------------------------------	--------------------



**(Department of Mechanical Engineering)
(Programme: B. Tech)**

Effective from Session:							
Course Code	ES 101	Title of the Course	Environmental Studies	L	T	P	C
Year	I	Semester	I	2	1	0	3
Pre-Requisite	10+2 with Physics, Chemistry & Biology/ Maths	Co-requisite					
Course Objectives	The purpose of this undergraduate course is to impart basic and key knowledge of environment and ecosystem. This will help students in enhancing their knowledge of biodiversity and its conservation. After successful completion of course, the student will able to explore concept of the subject into their respective dimensions.						

Course Outcomes	
CO1	Gain knowledge about environment and ecosystem
CO2	Students will learn about natural resource, its importance and environmental impacts of human activities on natural resource.
CO3	Gain knowledge about the conservation of biodiversity and its importance.
CO4	Aware students about problems of environmental pollution, its impact on human and ecosystem and control measures.
CO5	Students will learn about increase in population growth and its impact on environment.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Introduction to Environment and Ecosystems	Environment, its components and segments, Multidisciplinary nature of Environmental studies, Concept of Sustainability and sustainable development, Environmental movements, Ecosystem, Structure & Function, Energy flow in the Ecosystem, Ecological Pyramids and Ecological Succession.	8	CO1
2	Natural Resources	Renewable and non- renewable, Soil erosion and desertification, Deforestation, Water: Use and over exploitation, Impacts of large Dams, Case studies	8	CO2
3	Biodiversity and Conservation	Levels of biological diversity, Hot spots of biodiversity, India as a Mega Diversity Nation, Endangered and endemic species of India, Threats to Biodiversity, Conservation of Biodiversity, Ecosystem and biodiversity services.	8	CO3
4	Environmental Pollution, Policies and Practices	Environmental pollution, Solid waste management, Ill effects of fireworks, Climate change, Ozone layer depletion, acid rain and impacts on human communities and Environment, Environmental Laws: Environment Protection Act, Wildlife protection Act, Forest conservation Act, Convention on Biological Diversity (CBD), Tribal rights, Human wildlife conflicts.	8	CO4
5	Human Population and the Environment	Human population growth: Impacts on environment, human health and welfare, Resettlement and rehabilitation of project affected persons, Environmental ethics, Environmental communication and public awareness, case studies.	8	CO5

Reference Books:

- 1) Agarwal, K.C. 2001 Environmental; Biology, Nidi Pub. Ltd. Bikaner.
- 2) Bharucha Erach, The Biodiversity of India, Mapin Pub. Pvt. Ltd., Ahemdabad-380, India.
- 3) Brunner R.C. 1989. Hazardous waste incineration, Mc Graw Hill
- 4) Clark R.S. Marine Pollution, Clanderon Press Oxford (TB)
- 5) Cunningham W.P.2001.Cooper, T.H. Gorhani, E & Hepworth, Environmental encyclopedia, Jaicob Publication House, Mumbai.
- 6) De. A.K. Environmental chemistry Willey Eastern Limited.
- 7) Glick, H.P.1993 water in crisis, Pacific Institute for studies in dev, Environment & security, Stockholm Env, Institute, Oxford Univ, Press 473 p.
- 8) Hawkins R.E. Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay.
- 9) Heywood, V.H. & Watson, R. T.1995.Global biodiversity Assessment Cambridge Univ. Press 1140 p.
- 10) Jadhve, H. and Bhosale, V. M. 1995 Environmental protection and laws, Himalaya pub, house, Delhi.284 p.
- 11) Mckinnery, M.L. and School, R. M.1996 Environmental science systems and solutions, web enhanced edition 639 p.
- 12) Mhaskar A.K. Matter Hazardous, Techno Science Pub (TM)
- 13) Miller T.G. Jr, Environmental Ecology, W. B. Saunders Co.USA,574 p. 16
- 14) Odum, E.P.1997.Fundamental chemistry, Goel Pub House Meerut.
- 15) Survey of the Environment, The Hindu (M).
- 16) Sharma B.K.2001.Environmental Chemistry, Goel Pub House Meerut

e-Learning Source:

- <https://byjus.com/biology/difference-between-environment-and-eCOsystem>.
- <https://www.youtube.com/watch?v=dRPl4TB8w7k>
- <https://www.youtube.com/watch?v=3fbEVyJtJcK>
- <https://www.vedantu.com/biology/conservation-of-biodiversity>
- <https://youmatter.world/en/definition/soil-erosion-degradation-definition/>
- <https://byjus.com/biology/difference-between-environment-and-eCOsystem>.

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO CO	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	2	2	1	1	1	3	1	1	1	1	2	1	1	2	-	-	-
CO2	1	1	1	1	1	1	3	1	1	1	1	1	1	1	1	-	-	-
CO3	1	1	2	1	1	1	2	1	1	1	1	2	1	1	1	-	-	-
CO4	1	1	1	1	1	1	2	1	1	1	1	2	1	1	1	-	-	-
CO5	1	1	2	1	1	2	3	2	1	2	1	2	1	1	2	-	-	-

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	Sign & Seal of HOD
---	-------------------------------



Integral University, Lucknow

Effective from Session: 2017 - 18							
Course Code	MT112	Title of the Course	Engineering Mathematics - II	L	T	P	C
Year	I	Semester	II	3	1	0	4
Pre-Requisite	10+2 Mathematics	Co-requisite					
Course Objectives	The course is aimed to develop the skills in mathematics which is necessary for grooming them into successful engineering graduate. The topics introduced will serve as basic tools for specialized studies in science field.						

Course Outcomes	
CO1	Solve first order linear equations and higher order differential equation of certain types and interpret the solutions.
CO2	To use shift theorems to compute the Laplace transform, inverse Laplace transform and the solutions of second order, linear equations with constant coefficients.
CO3	Able to determine given function in terms of sine and cosine terms in Fourier series.
CO4	Apply problem-solving using concepts and techniques from PDE's and Fourier analysis applied to diverse situations in physics, engineering, financial mathematics and in other mathematical contexts.
CO5	Apply method of least squares to find the curve of best fit for the given data

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Unit I	Linear differential equations of first order, Linear differential equations of higher order with constant coefficients, Complementary functions and particular integrals, Solution of second order differential equations by changing dependent and independent variables, Method of variation of parameters, Applications to engineering problems (without derivation) .	8	1
2	Unit II	Laplace transform of different types of functions, Laplace transform of derivatives and integrals, Unit step function, Laplace transform of periodic functions, Inverse Laplace transform, Convolution theorem, Applications to solve simple linear differential equations.	8	2
3	Unit III	Periodic functions, Trigonometric series , Fourier series of period 2π , Euler's formulae, Even and odd functions, Functions having arbitrary period, Change of interval, Half range sine and cosine series Introduction of partial differential equations, Solution of second order linear homogeneous partial differential equations with constant coefficients and their classifications to parabolic, elliptic and hyperbolic forms with illustrative examples.	8	3
4	Unit IV	Method of separation of variables for solving partial differential equations, Wave equation up to two-dimensions, Heat conduction equations up to two dimensions, Laplace equation.	8	4
5	Unit V	Mean, Median, Mode, Standard deviation and Variance, Method of least squares, Curve fitting of straight line and parabola.	8	5

Reference Books:

1. Advanced Engineering Mathematics, Wiley Eastern Ltd.
2. Advanced Engineering Mathematics, Khanna Publication.
3. Higher Engineering Mathematics, Khanna Publication.
4. Advanced Engineering Mathematics, CBS Publication.

e-Learning Source:

- <https://nptel.ac.in/courses/111106100/>
- <https://nptel.ac.in/courses/111105123/>
- https://courses.maths.ox.ac.uk/node/view_material/1720
- <https://nptel.ac.in/courses/111103021/>

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO CO	Course Articulation Matrix: (Mapping of COs with POs and PSOs)															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	2	2	1				1		2	1	1		
CO2	3	2	1	2	2	1						2	1	1		
CO3	3	2	1	1	1	1						2	1	1		
CO4	3	2	1	2	3	1				1		2	1	1		
CO5	3	1	1	1	2	1						2	1	1		

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	Sign & Seal of HoD
------------------------------------	--------------------



Integral University, Lucknow

Effective from Session: 2017-18									
Course Code	ME101	Title of the Course	Basic Mechanical Engineering			L	T	P	C
Year	I	Semester	I			3	1	0	4
Pre-Requisite	NONE	Co-requisite	NONE						
Course Objectives	1. Be able to have the basic concepts of thermal sciences and temperature measurement on the basis of Zeroth law of thermodynamics. 2. To understand and apply first and second law of thermodynamics to various processes and real systems. 3. Be able to model the problem using free-body diagrams and reach to solution by using equilibrium equations. 4. Be able to draw Shear Force Diagram (SFD) and Bending Moment Diagrams (BMD) for statically determinate beams. 5. Be able to design simple components on the basis of knowledge of stress, strain and strength of material.								

Course Outcomes	
CO1	Explain basic concepts of thermal sciences and temperature measurement on the basis of zeroth law of thermodynamics.
CO2	Understand and apply first and second law of thermodynamics to various processes and real systems.
CO3	Model the problem using free-body diagrams and reach to solution by using equilibrium equations.
CO4	Draw Shear Force Diagram (SFD) and Bending Moment Diagrams (BMD) for statically determinate beams.
CO5	Design simple components on the basis of knowledge of stress, strain and strength of material.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Fundamental Concepts and Definitions	Definition of Thermodynamics, System, surrounding and universe, Phase, Concept of continuum, Macroscopic & microscopic point of view. Density, Specific volume, Pressure, temperature. Thermodynamic equilibrium, Property, State, Path, process, Cyclic process, Energy and its form, Work and heat, Enthalpy. Zeroth law: Concepts of Temperature, Zeroth law	8	CO1
2	First law Second law	First law of thermodynamics, Concept of processes, Flow processes and control volume, Flow work, Steady flow energy equation, Mechanical work in a steady flow of process. Essence of second law, Thermal reservoir, Heat engines, COP of heat pump and refrigerator. Statements of second law, Carnot cycle, Clausius inequality.	8	CO2
3	Basic Concept Friction	Laws of motion, Transfer of force to parallel position, Resultant of planer force system. Free Body diagrams, equilibrium and its equation. Introduction, Laws of Coulomb friction, Equilibrium of bodies involving dry friction, belt friction.	8	CO3
4	Structure analysis	Beams: Introduction, Shear force and bending moment, Shear and bending moment diagram for statically determinate beams.	8	CO4
5	Stress and strain analysis	Simple Stress and strain: Introduction, Normal, shear stresses, Stress-strain diagrams for ductile and brittle materials. Pure Bending of Beams: Introduction, Simple bending theory.	8	CO5

Reference Books:	
Van Wylen G.J. & Sonnlog R.E. Fundamentals of Classical Thermodynamics, John Wiley & Sons, Inc. NY.	
Wark Wenneth: Thermodynamics (2nd edition) Mc Graw Hill Book Co. NY.	
Holman, J.P.: Thermodynamics, Mc Graw Hill Book Co.NY.	
Shames I.H., Engineering Mechanics, P.H.I.	
D.S. Kumar, Mechanical Engineering, S.K. Katarial & Sons.	
Bhavi Katti S.S., Engineering Mechanics, New Age Pub.	
P.K. Bharti: Engineering Mechanics, Kataria and Sons.	
e-Learning Source:	
https://www.youtube.com/watch?v=Dv2UeVCSRYs&list=PL2_EvjPqHc10CTN7cHiM5xB2qD7BHUrV7	
https://www.youtube.com/watch?v=DzvIEz3dKXQ&t=1s	
https://www.youtube.com/watch?v=A-3W1EbQ13k&list=PLvqSpQzTE6M_MEUdn1izTMB2vZgP1NLfs	

Course Articulation Matrix: (Mapping of COs with POs and PSOs)															
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	CO1	3	2	2	1		2						3	3	2
CO2	3	3	3	2		3						3	3	3	2
CO3	3	3	3	2		3						3	3	2	1
CO4	3	2	2	2		3						3	3	2	1

CO5	3	3	2	1		3					3	3	2	2
-----	---	---	---	---	--	---	--	--	--	--	---	---	---	---

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

<p style="text-align: center;">Name & Sign of Program Coordinator</p>	<p style="text-align: center;">Sign & Seal of HoD</p>
---	---



Integral University, Lucknow

Effective from Session: 2020-21							
Course Code	CS101	Title of the Course	Computer Programming	L	T	P	C
Year	I	Semester	II	3	1	0	4
Pre-Requisite	None	Co-requisite	None				
Course Objectives	<ul style="list-style-type: none"> To give knowledge of computers, networks, algorithms & flowcharts. To provide fundamental concepts of programming language 'C'. To show the use of functions and pointers to different problems. To study the implementation of arrays, matrices and strings. To give concepts of user defined data types structure & union. 						

Course Outcomes	
CO1	Understand basic concepts of computer, networks and formulation of algorithmic solutions to problems.
CO2	Understanding of programming concepts of C language and their implementation.
CO3	Analyze and develop programs on pointers and functions.
CO4	Develop programs on different operations on arrays, matrices & strings.
CO5	Implement programs on structure, union & Dynamic memory allocation.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Introduction to Computers	Generation of computers, Characteristic and classifications of computers. Components of Computer: CPU, Various I/O Devices, Memory & its types, (Memory Hierarchy, Storage Media), Computer Software and their types, Operating System. Computer Networks & Communication: LAN, MAN, WAN, Network Topologies, Modes of Data Communication. Introduction to Internet and its Safeguard: Internet Addresses, Domain Name System, URL, Web Browsers Search Engines, Firewalls, Anti-Virus, Translators. Algorithm and flowchart: Algorithm and flow chart characteristics, Sketching Flowcharts of various problems.	8	1
2	Starting C	Standard I/O in 'C', 'C' Fundamental, C Character set, Constants, Variables, Keywords and Identifiers, Data types, Declaration. Operators and Expressions, Conditional statements (If, If-else), Nesting of if- else statement, switch statement, The? operator, goto statement. Decision making and Looping (While, Do-While, for), Break and Continue statements, Case Control Structures (Switch), C programs based on above concepts.	8	2
3	Introduction to pointers	Declaration and initialization of pointers, accessing the address of the variable, accessing the variable through the pointer, chain of pointers, pointers operators, pointer arithmetic Introduction to Functions: Need of "C" function, User Defined and Library Functions, Prototype of Function, Call by Value; Call by Reference; Nesting of Functions, Recursion. Pointers with function, C program based on above concept.	8	3
4	Array	Concept of One Dimensional and Multi-Dimensional arrays, Declaration, Operations: insert, delete, search, traverse, and merge, matrix operations, Sorting: Bubble sort, merge sort, insertion sort. Character array and strings: declaring and initializing strings variable, reading and writing a character, reading and writing strings from terminal, Arithmetic operations on characters, string handling functions. Application of pointers, and function on array, C program based on above concept.	8	4
5	Structures	Defining Structure, Declaration of Structure Variable, Accessing Structure members, copying and comparing structure variable, operation on individual member, nesting of structures, Array of structures. Application of pointers and function on Structures. Union Defining Union Declaration of Union, difference between structure and Union, Introduction of Static and Dynamic memory allocation- The process of Dynamic memory allocation, C program based on above concept.	8	5

Reference Books:

1. Foundation of Information Technology by 'D.S. Yadav'- New age International
2. Programming in 'C' by 'E Balagurusamy'. -TMH Publication.
3. Let us 'C' by 'Yashwant Kanitkar'-BPB Publication.
4. The C Programming Essentials by Dey- Pearson Publication.

e-Learning Source: https://onlinecourses.nptel.ac.in/noc22_cs40/preview

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2				3		3	2			2	3	2	
CO2	3	3	1			1		2				2	1	3	
CO3	3	2				2	3	2				3			3
CO4	3	2		2		3	2	2				1			3
CO5			1			1							1		3

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation



Integral University, Lucknow

Effective from Session: 2019-20							
Course Code	CH102	Title of the Course	Engineering Chemistry Lab	L	T	P	C
Year	First	Semester	Second	0	0	2	2
Pre-Requisite	10 + 2 with Chemistry	Co-requisite					
Course Objectives	<ul style="list-style-type: none"> To understand qualitative and quantitative problems Improvement of practical/technical skills. Ability to work effectively and safely in a laboratory environment. Enhancing communication skill. 						

Course Outcomes	
CO1	Analysis of iron ore.
CO2	Study of water quality parameters.
CO3	Study of Iodometric titration.
CO4	Comprehension of principle, instrumentation and use of UV-VIS spectrophotometer and pH meter.
CO5	Detection of functional groups and elements in organic compounds.

Unit No.	Title of the Experiment	Content of Unit	Contact Hrs.	Mapped CO
1	Iron content	To determine the Iron content in the given iron ore by using external indicator.	2	1
2	Alkalinity	To determine the Alkalinity in the given water sample.	2	2
3	Chloride content	To determine the Chloride content in the given water sample by Mohr's method. (Argentometric method).	2	2
4	Available chlorine	To determine the Percentage of Available Chlorine in the given sample of Bleaching powder iodometrically.	2	3
5	Hardness	To determine the temporary and permanent hardness in water sample by Complexometric titration using EDTA as standard solution.	2	2
6	Chemical displacement	To determine the Equivalent weight of Iron by Chemical Displacement method. (The Equivalent weight of copper is 63.5)	2	3
7	pH metric determination	To determine the strength of given HCl solution by titrating it against NaOH solution using pH meter.	2	4
8	Spectrophotometric measurement	To determine the iron concentration in the given water sample by Spectrophotometer using potassium thiocyanate as color developing agent.	2	4
9	Functional group detection	To detect the presence of functional groups in the given organic compound.	2	5
10	Elements detection	To detect the presence of Elements in the given organic compound.	2	5

Reference Books:

Fundamentals of Chemistry with Quantitative analysis-I, R.L. Madan., S.Chand Publications

Advance Practical Chemistry: Jagdamba Singh, L.D.S Yadav, Jaya Singh, I.R. Siddiqui, Pragati Edition.

Practical Organic Chemistry, A.I.Vogel.

e-Learning Source:

<https://www.bing.com/videos/search?q=functional+group+detection&&view=detail&mid=F232CD67537BBA0CC3EBF232CD67537BBA0CC3EB&&FORM=VRD GAR&ru=%2Fvideos%2Fsearch%3Fq%3Dfunctional%2520group%2520detection%26qs%3Dn%26form%3DQBVR%26%3D%2525eMan age>

<https://www.bing.com/videos/search?q=alkalinity+of+water+sample&qvpt=alkalinity+of+water+sample&view=detail&mid=7AF6506DB69D2C2F3EA37AF6506DB69D2C2F3EA3&&FORM=VRD GAR&ru=%2Fvideos%2Fsearch%3Fq%3Dalkalinity+of+water+sample>

<https://www.bing.com/videos/search?q=iodometric+titration&qvpt=Iodometric+titration&FORM=VDRE>

Course Articulation Matrix: (Mapping of COs with POs and PSOs)																
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	-	-	-	-	2	1	2	2	-	2	3	-	-	-
CO2	3	2	2	-	-	-	2	1	2	2	-	2	3	-	-	1
CO3	3	2	-	-	-	-	2	1	2	2	-	2	3	-	-	-
CO4	3	2	-	2	1	-	2	1	2	2	-	2	3	-	-	1
CO5	3	2	-	-	-	-	2	1	2	2	-	2	3	-	-	-

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	Sign & Seal of HoD
------------------------------------	--------------------

Mapped SDG

6- Clean Water and Sanitation





Integral University, Lucknow

Effective from Session: 2015-16							
Course Code	ME102	Title of the Course	MECHANICAL ENGINEERING LAB	L	T	P	C
Year	I	Semester	II	0	0	2	1
Pre-Requisite	NONE	Co-requisite	NONE				
Course Objectives	<ul style="list-style-type: none"> To understand the working and basic components of 4 stroke petrol engine and 4 stroke Diesel engine through study their models. To understand the working and basic components of 2 stroke petrol and vapor compression refrigeration system through model study. To understand basic components and working of water tube boiler through model study. To learn the technique for determine of hardness and impact strength of a material. To learn the technique for determine of compressive strength of a brick through UTM. 						

Course Outcomes	
CO1	To understand the working and basic components of 4 stroke petrol engine and 4 stroke Diesel engine through study their models.
CO2	To understand the working and basic components of 2 stroke petrol and vapor compression refrigeration system through model study
CO3	To understand basic components and working of water tube boiler through model study.
CO4	To learn the technique for determine of hardness and impact strength of a material.
CO5	To learn the technique for determine of compressive strength of a brick through UTM.

Exper iment No.	Title of the Experiment	Content of Unit	Contact Hrs.	Mapped CO
1	Four Stroke Petrol Engine	To Study & Sketch the model of S.I. Engine (4 Stroke)	2	CO1
2	Four Stroke Diesel Engine	To Study & Sketch the model of C.I. Engine (4 Stroke).	2	CO1
3	Two Stroke Petrol Engine	To Study & Sketch the model of S.I. Engine (2 Stroke)	2	CO2
4	Vapor Compression	To Study & Sketch the model of Vapor Compression Refrigerators	2	CO2
5	Water Tube Boiler	To Study & Sketch the model of water tube boiler (Babcock & Wilcox)	2	CO3
6	Impact Testing	To determine the Impact Strength of Mild Steel using Izod Method	2	CO4
7	Hardness Testing	To determine the harness of a mild steel specimen by using hardness tester (Rockwell Hardness test)	2	CO4
8	UTM Testing	To learn the technique for determine of compressive strength of a brick through UTM.	2	CO5

e-Learning Source:

<https://www.vlab.co.in/>

Course Articulation Matrix: (Mapping of COs with POs and PSOs)															
PO- PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1		3			3	2		3	3	2	2
CO2	3	2	2	2		3			3	2		3	3	2	2
CO3	3	2	3	2		3			3	2		3	3	2	2
CO4	3	3	3	2		3			3	2		3	3	2	2
CO5	3	3	2	1		3			2	2		3	3	2	2

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Name & Sign of Program Coordinator	Sign & Seal of HoD
------------------------------------	--------------------



Integral University, Lucknow

Effective from Session: 2020-21							
Course Code	CS102	Title of the Course	COMPUTER PROGRAMMING LAB	L	T	P	C
Year	I	Semester	II	0	0	2	1
Pre-Requisite	None	Co-requisite	None				
Course Objectives	<ul style="list-style-type: none"> To learn the basic concepts and syntax of C programming. To be able to develop logics which help them to create programs and applications using C language. To learn the use of C libraries functions in C language. To learn the file handling and basic memory allocation concepts in C language. After learning the C programming, they can easily switch over to any other language. 						

Course Outcomes	
CO1	Able to understand the basic concepts of C programming language and their implementation.
CO2	Able to design and develop various programming problems using C programming concepts.
CO3	Able to analyze and develop programs on pointers and functions.
CO4	Able to develop programs on different operations on arrays, matrices & strings.
CO5	Able to implement programs on structure, union & Dynamic memory allocation.

S. No.	List of Experiments	Contact Hrs.	Mapped CO
1	Write a Program to print any message.	1	1
2	Write a Program to print sum and multiply of two numbers.	1	1
3	Write a Program to enter the temperature in Celsius(c) then count it into Fahrenheit.	1	1
4	Write a Program to swap the number taking the help of third variable.	1	1
5	Write a Program to calculate the volume of box.	1	1
6	Write a Program to swap the number without taking the help of third variable.	2	2
7	Write a Program to check a year is leap year not.	2	2
8	Write a Program to print number is even or odd.	2	2
9	Write a Program to Print month of name using switch case.	2	2
10	Write a Program to print the no is positive or negative.	2	2
11	Write a Program to find the greater number enter by user.	2	3
12	Write a Program to find the greater number Input 3 No.	2	3
13	Write a Program to enter any no and check whether the given no is palindrome or not.	2	3
14	Write a Program to enter any no. and check whether the given no. is Armstrong or not.	2	3
15	Write a Program to Print Pattern * ** *** ****	1	3
16	Write a Program to Print Pattern 1 2 3 4 1 2 3 1 2 1	1	4
17	Write a Program to Print Pattern 1 1 2 1 2 3 1 2 3 4	1	4
18	Write a program to find in C to design the report card of 5 subject according to the following condition if the total percentage are. >=35 and <45 IIIrdDiv >=45 and <60 IIndDiv >=60 IstDiv If any students score <35 in any of the subject display fail	1	4
19	Write a Program to create 2-D array or order M*N and insert the element and display it.	2	4
20	Write a Program to find the addition of two matrix of order M*N.	2	4
21	Write a Program to find the Transpose of the matrix.	2	5

22	Write a Program to swap two numbers Call by Value.	2	5
23	Write a Program to swap two number using function pointers.	2	5
24	Write a Program for structure of player Name, batting average and then name.	2	5

Reference Books:

1. Foundation of Information Technology by 'D.S. Yadav'
2. Programming in 'C' by 'E Balagurusamy'.
3. Let us 'C' by 'YashwantKanitkar'
4. The C Programming Essentials by Dey

e-Learning Source:

1. https://onlinecourses.nptel.ac.in/noc22_cs40/preview

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	2		3		3						2	1	1
CO2	1	1	1	2	1		3						2	1	1
CO3	1	2	2	2			3						2	1	1
CO4	1	2	2	2			3						2	1	1
CO5	1	2	1				3						2	1	1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation



Integral University, Lucknow

Effective from Session: 2020-21						
Course Code	LN151	Title of the Course	Basic Professional Communication Lab	L	T	P
Year	I	Semester	I	0	0	2
Pre-Requisite	10+2	Co-requisite	U.G. Program			
Course Objectives	<ul style="list-style-type: none"> The course aims to educate the students in both the artistry and utility of the English language for professional purposes through the study of language and literature. The key component of the various types of professional communication is basically communication in the English language which is now a global language. The Department of Languages caters to the needs of the students aspiring for training, expertise and excellence in professional communication with a marked emphasis on English for Specific/Special Purposes (ESP). Students will be given new insights into the concepts of soft skills & professional communication to boost their confidence which will help them choose and build a better career which depends not only on the hard skills, but on one's soft skills & professional ethics also. The course will help them overcome their fear & anxiety of public speaking & guide them to be a good & effective communicator whom people love to hear. 					

Course Outcomes	
CO1	Students will be introduced to the basic understanding of communication and Professional Communication. Knowledge of Professional, cultural and cross-cultural communication will be imparted. Meaning and process of communication, verbal and nonverbal communication will be focused. Basic Understanding of communication and Professional/Business Communication will be provided. They will also learn & practice how to introduce oneself in professional setting & how to manage speaking anxiety. .
CO2	Corrections in basic English sounds and correct pronunciations will be practiced by various Listening exercises & word games to help them become better conversationalist.
CO3	Basic tools of communication and improvement in communicative competence. Improvement in communicative competence will be done by using various software applications, showing them cultural movies & involving them in exercises like small & situational talk.
CO4	Phonetic Alphabet and Phonetic Transcriptions will be taught & practiced to improve vocal clarity & pronunciation. Understanding the structural and functional grammar and basic structure of language.
CO5	Intonation & Stress will be practiced to make them learn how paralinguistic features dramatically affect meaning & how it can help one in becoming a persuasive & engaging speaker.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Introduction	Difference between Introduction and Description, SWOT Analysis	6	CO 1
2	Software -I	Listening exercises, Pronunciation improvement through self- testing, Vocabulary improvement through word games	6	CO 2
3	Software – II	Conversational skills, Exercises based on Language Skills/ Small talk, Cultural movies	6	CO 3
4	Phonetics	Phonetic Alphabet and Phonetic Transcriptions	6	CO 4
5	Non-verbal communication	Intonation and Stress	6	CO 5

Reference Books:

1. Gerson, Sharon J. *Technical Writing: Process and Product* (5th edition). Prentice Hall, 2005.
2. K. Floyd, *Interpersonal Communication: The Whole Story*. McGraw Hill, 2009.
3. Greenbaum, Sidney and Nelson Gerald, *An Introduction to English Grammar*. Routledge, 2009.
4. Swan, Michael, *Practical English Usage*. OUP, 2005.
5. Murphy, Raymond. *English Grammar in Use*. Cambridge University Press, 2019.
6. Kumar, Sanjay and Pushp Lata., *Communication Skills*. Oxford University Press, Oxford 2011.

7. Raman, Meenakshi, and Sangeeta Sharma. *Technical Communication: Principals and Practice*. Second Edition, Oxford University Press, 2012.

8. Gerson, Sharon J. *Technical Communication: Process and Product* (9th edition). Longman Pub., 2016.

e-Learning Source:

1. <https://ndl.iitkgp.ac.in/>

2. <https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=9RA537jM1m7VD3VCoav4IQ==>

3. <https://library.iul.ac.in/>

Course Articulation Matrix: (Mapping of COs with POs and PSOs)

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	N.A.	N.A.	N.A.	N.A.	N.A.	3	3	3	3	3	N.A.
CO2	3	3	3	3	3	3	3	N.A.	N.A.	N.A.	N.A.	N.A.	3	3	3	3	3	N.A.
CO3	3	3	2	3	3	3	3	N.A.	N.A.	N.A.	N.A.	N.A.	3	3	3	3	3	N.A.
CO4	3	3	2	3	3	3	3	N.A.	N.A.	N.A.	N.A.	N.A.	3	3	3	3	3	N.A.
CO5	3	3	3	3	3	3	3	N.A.	N.A.	N.A.	N.A.	N.A.	3	3	3	3	3	N.A.

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Teaching and Learning methods	Flipped Classrooms, Concept Mapping, Information-Based Approach, Personal-Response Approach, Language-Based Approach, Paraphrastic Approach, Moral-Philosophical Approach and Stylistics Approach
List/Topics/Activities Planned that are beyond Syllabus	Information-Based Activities, Personal-Response Activities, Language-Based Activities, Periphrastric Activities, Moral-Philosophical Activities, and Stylistics Activities, Presentations, Small talk, Situational talk, role playing, Group Discussions, Assignments are used as a medium to work on cognitive development/growth.

Name & Sign of Program Coordinator	Sign & Seal of HoD
---	-------------------------------