SIES College of Arts, Science & Commerce (Autonomous)
RISE WITH EDUCATION

SIES Indian Institute of Environment Management
RISE WITH EDUCATION

Syllabus

Faculty: Science

Program: B.Sc.

Subject: ENVIRONMENTAL SCIENCE

Academic Year: 2023-2024

FYBSc Class

Choice based Credit system Semester and Grading Syllabus to be brought into effect from 2023- 2024 as per NEP pattern

PREAMBLE

Environmental Sustainability is one of the dominant issues and challenges of the 21st century, as the over growing needs of the galloping global population increasingly pressing up against the limits of the earth's resources and ecosystems. At the same time, policy makers increasingly believe that an environmentally literate workforce is critical to the long-term success and profitability, with better environmental practices and improved efficiencies impacting positively on the bottom line while helping to better position the country and conserve the natural resources for the future. A key component of an environmentally sustainable country is a highly educated work force, with thorough knowledge of theoretical and practical aspects of environmental sciences.

B.Sc. in Environmental Science is an undergraduate, interdisciplinary course wherein learning is imparted to eligible candidates in concepts such as sustainable resource development, environmental pollution control and, management among others. This 4- year course is divided into eight semesters, with each semester lasting for a period of six months. The students opting for four years will graduate with Bachelor's Degree (in Research) as per the new NEP pattern with effect from 2023-24.

The course combines aspects of Biology, Ecology, Geography, Chemistry, Natural Resource Management, Environment Management etc. Students are taught to develop scientific knowledge and techniques needed to understand environmental patterns and processes to investigate ecosystems and address local and global environmental issues, besides investigating how Environmental Science is directly related to the human society.

Structure of FYBSc Environmental Science program under NEP from 2023-24

Semester-I

Subject 1 Mandatory (Ecosystem, Ecology and Biodiversity) SIUESMJ111	Unit I (1 credit) Ecosystem	Unit II (1 credit) Ecology	Unit III (1 credit) Biodiversity And Conservation	Practicals (1 credit) [Ecology, Ecosystem and Biodiversity]	**(3+1) credits**
Subject 2 (Basic Chemistry-I) SIUESMN111	Unit I (1 credit) Nomenclature, Classification & Solutions, Buffers	Unit II (1 credit) Chemical bonding	Unit III (1 credit) Stereochemistry	Practicals (1 credit) [Basic Chemistry-I]	**(3+1) credits**
OE (Environment & Society) SIUESOE111	Unit I (1 credit) Environment and Social inequalities	Unit II (1 credit) Impact of Anthropogenic activities on environment and society	Unit III (1 credit) Man and Environment Management	Unit IV (1 credit) Environment – Society Relationship	**4 credits**
VSC (Fundamentals of Computers) SIUESVS111	Unit I (1 credit) Fundamentals of Computers	Tutorial (1 credit) Fundamentals of Computers	-	-	**(1 + 1) Credits**
SEC (Introduction to good laboratory practices) SIUESSE111	Unit I (1 credit) Good laboratory practices	Tutorial (1 credit) Good laboratory practices	-	-	**(1 + 1) Credits**

Semester-II

Subject 1 Mandatory (Meteorology and Global Environmental Issues) SIUESMJ121	Unit I (1 credit) Meteorology	Unit II (1 credit) Pollution and Environmental Degradation	Unit III (1 credit) Global Environmental Issues	Practicals (1 credit) Meteorology and Global Environmental Issues)	**(3+1) credits**
Subject 2 (Basic Life Science-I) SIUESMN121	Unit I (1 credit) Plant diversity	Unit II (1 credit) Animal diversity	Unit III (1 Credit) Cell Biology and Microscopy	Practicals (1 credit) [Basic Life Science-I]	**(3+1) credits**
OE (Ecotourism) SIUESOE121	Unit I (1 credit) History, nature and scope of ecotourism	Unit II (1 credit) Types and importance of ecotourism	Unit III (1 credit) Potential and challenges of Ecotourism	Unit IV (1 credit) Ecotourism policy of India and major ecotourism destinations	**4 credits**
VSC (Sustainable tourism) SIUESVS121	Unit I (1 credit) Sustainable Tourism	Tutorial (1 credit) Sustainable Tourism	-	-	**(1 + 1) Credits**
SEC (Indian Geography and Map studies) SIUESSE121	Unit I (1 credit) Study of Indian Geography with maps	Tutorial (1 credit) Study of Indian Geography with maps	-	-	**(1 + 1) Credits**

Detailed Syllabus of FYBSc Environmental Science

SEMESTER – I; Subject 1 Mandatory: Ecosystem, Ecology and Biodiversity

COURSE CODE	TITLE	CREDITS	LECTURES
SIUESMJ111	**Ecosystem, Ecology and Biodiversity**		
Course Objective: To acquaint the students with basic concepts of ecology of ecosystems and their biodiversity. **Learning Outcome:** The learners will attain systematic and updated knowledge about the different components of the ecosystem along with their functioning and gain insight into the biodiversity of India and the world with respect to the threats faced by it and their conservation aspects.			
Unit-I: Ecosystem	• Components of ecosystem • Food chain • Food web • Ecological pyramids • Productivity and decomposition • Functions of ecosystem, energy flow models • Biogeochemical cycles • Types of ecosystems • Biomes and their types	**1**	**15**
Unit II: Ecology	• Introduction to Ecology: Definition, Scope, Relation to Other Disciplines, Subdivisions, Modern Branches of Ecology, Applications and Significance to Human Beings. Evolution and succession. • Ecological adaptations: Adaptations in plants- Hydrophytes, Mesophytes, Xerophytes, Epiphytes, Halophytes; Adaptations in Aquatic and Desert Animals, Adaptations in animals for Flying and Burrowing. • Population Interactions and their types.	**1**	**15**
Unit III: Fundamentals of	• **Biodiversity:** Definition, Types and Levels of Biodiversity, Importance of Biodiversity,	**1**	**15**

Biodiversity and Conservation	Status of Biodiversity (Global and National), Speciation and Extinction, Threats to Biodiversity, IUCN categories of threats to Biodiversity, Endemism; Endemic species and Endangered Species, Exotic species, 'Hotspots' of Biodiversity. • **Biodiversity Conservation: *'In-Situ'*** Conservation, ***'Ex-Situ'*** Conservation.		

Practical– <u>Ecosystem, Ecology and Biodiversity</u> - 1 Credit

COURSE CODE	TITLE	CREDITS	HOURS
SIUESMJ111	**<u>Ecosystem, Ecology and Biodiversity</u>**	**1**	**30**

1. Identification of ecological adaptations in plants and animals across different habitats.
2. Identification of different types of population interactions.
3. Determination of primary productivity of terrestrial ecosystem by chlorophyll method.
4. Determination of primary productivity of aquatic ecosystem by light and dark bottle method.
5. Present biogeographic regions of India on map.
6. Prepare a map of Maharashtra showing Protected Area Network (PAN).
7. Identification of global environmental problems.

References:

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
2. Mishra, D. D., 2008. Fundamental Concepts of Environmental Studies, S. Chand Publishers, N. Delhi, 271.
3. Eugene P. Odum and Gary W. Barrett (1953), Fundamentals of Ecology (5th edn), brooks/cole, US
4. Charles Krebs (2013), Ecology: Pearson New International Edition (6th Edin).
5. Krishnan, M. S. 1982. *Geology of India and Burma*. CBS Publishers & Distributors.
6. Singh K.P. and J.S. Singh (1992). Tropical Ecosystems: Ecology and Management. Wiley Eastern Limited, Lucknow, India.
7. Singh, J.S. (ed.) 1993. Restoration of Degraded Land: Concepts and Strategies. Rastogi Publications, Meerut.
8. Smith, R.L. (1996). Ecology and Field Biology, Harper Collins, New York.
9. Botkin, D.B. and Keller, E.A. 2000. Environment Science: Earth as a living planet. Third Edition. John Wiley and Sons Inc.
10. E. P. Odum (1996) Fundamentals of Ecology, Nataraj Publisher, Dehra Dun.

11. K.M.M. Dakshini (1999) Principle and Practices in Plant Ecology, CRC, Boston.
12. M.C. Dash (1994) Fundamentals of Ecology, Tata McGraw Hill, New Delhi.

SEMESTER – I; Subject 2: BASIC CHEMISTRY-I

COURSE CODE	TITLE	CREDITS	LECTURES
SIUESMN111	**BASIC CHEMISTRY - I**		
Course Objective: To acquaint the students with basic concepts of chemistry viz., nomenclature chemical bonding and stereochemistry. **Learning Outcome:** The students will learn elaborate concepts of nomenclature of solutions, classification and buffers. They will also be able to elaborate the chemical bonding types in different compounds along with gaining insight into stereochemistry.			
Unit-I: Nomenclature, Classification and Solutions, Buffers	**Nomenclature and Classification of:** 1. **Inorganic Compounds:** Oxides, Salts, Acids, Bases, Ionic, Molecular and Coordination Compounds 2. **Organic Compounds:** Alkanes, Alkenes, Alkynes, Cyclic Hydrocarbons, Aromatic Compounds, Alcohols and Ethers, Aldehydes and Ketones, Carboxylic Acids and its derivatives, Amines, Amides, Alkyl Halides and Heterocyclic Compounds **Solutions:** Normality, Molarity, Mole fraction, ppb, ppm, millimoles, milliequivalents (Numericals expected). **Buffer:** Concept of Buffers, Types of Buffers, Derivation of Henderson equation for Acidic and Basic buffers, Buffer action, Buffer capacity (Numericals expected) pH of Buffer Solution.	**1**	**15**
Unit II: Chemical Bonding	• Bond length, Bond order Ionic Bond- Nature of Ionic Bond, Structure of NaCl, KCl and CsCl, Factors influencing the formation of ionic bond. • Covalent Bond- Nature of covalent bond, Structure of CH_4, NH_3, H_2O, Shapes of $BeCl_2$, BF_3. • Coordinate Bond- Nature of Coordinate Bond.	**1**	**15**

	• Non-Covalent Bonds: Van De Waal's forces: dipole - dipole, dipole – induced dipole, Hydrogen Bond.		
Unit III: Stereochemistry	**Stereochemistry:** Isomerism, Racemic mixtures Cis-Trans, Threo, Erythro and Meso isomers. Conformation: Conformations of Ethane, Difference between Configuration and Conformation. • Configuration: Asymmetric Carbon Atom, Stereogenic/ Chiral Centers, Chirality • Projection formulae – Fischer, Newman and Sawhorse, The Interconversion of the Formulae	**1**	**15**

Practical – Minor – BASIC CHEMISTRY-I – 1 Credit

COURSE CODE	TITLE	CREDITS	HOURS
SIUESMN111	**BASIC CHEMISTRY-I**	**1**	**30**

1. Spot test for compounds belonging to Carboxylic Acid, Phenol, Aldehyde/Ketone, Ester, Alcohol, Amine, Nitro Compounds, Haloalkane, Haloarene.
2. To prepare 0.1 N succinic acid and standardize sodium hydroxide of two different concentrations.
3. Study of neutralization reaction by titration.
4. Estimation of Alcohol by Dichromate method.
5. Preparation of buffers.

References:

- Ahluwalia, V. K., 2010 TEXTBOOK OF ORGANIC CHEMISTRY, VOL.III, S. Chand Publishers, Ane Books Pvt. Ltd.
- Arun Bahl and B. S. Bahl: Advanced Organic Chemistry, S. Chand
- Atkins P.W. and Paula J.de, Atkin's Physical Chemistry, 10th Ed., Oxford University 12 Press (2014).
- Ball D.W., Physical Chemistry, Thomson Press, India (2007).
- Castellan G.W., Physical Chemistry, 4th Ed., Narosa (2004).
- Mortimer R.G., Physical Chemistry, 3rd Ed., Elsevier: NOIDA, UP (2009).
- Kalsi, P. S. Stereochemistry Conformation and Mechanism, New Age International, 2005
- Garland C. W., Nibler J.W. and Shoemaker D.P., Experiments in Physical Chemistry, 8th Ed., McGraw-Hill, New York (2003).

- Halpern A.M. and McBane G.C., Experimental Physical Chemistry, 3rd Ed., W.H. Freeman and Co., New York (2003).

SEMESTER I: OE– ENVIRONMENT AND SOCIETY

COURSE CODE	TITLE	CREDITS	LECTURES
SIUESOE111	**ENVIRONMENT AND SOCIETY**		
Course Objective: To acquaint the students with concepts of societal movements for the environment. **Learning Outcome:** The students will be made aware of environmental issues at society level and also about the role of society in environment management.			
Unit-I: Environment and Social Inequalities	• Social and cultural construction of 'environment'; • Environmental thought from historical and contemporary perspective. • Inequalities of race, class, gender, region, and nation-state in access to healthy and safe environments. • Concept of ecological and social justice; • Environmental ethics.	**1**	**15**
Unit II: Impact of anthropogenic activities on environment and society	Impact of following anthropogenic activities on environment and society: • Pollution • Industrialization • Urbanization • Deforestation • Mining • Developmental projects • Reclamation • Tourism	**1**	**15**
Unit III: Man and Environment Management	• State, corporate, civil society, community, and individual-level initiatives to ensure sustainable development. • Case studies of environmental movements (Chipko Movement, Appiko Movement, Narmada Bachao Andolan). • Corporate responsibility movement. • Appropriate technology movement. • Environmental groups and movements, citizen groups	**1**	**15**

Unit IV: Environment-society relationship	• Environment-society relationship; Development-induced displacement, resettlement, and rehabilitation: problems, concerns, and compensative mechanisms; discussion on Project Affected People (PAPs). • Impact of technology on environment; • Conflict between economic and environmental interests; • Community participation. • Environmental education and awareness.	**1**	**15**

References:

- Chokkan, K.B., Pandya, H. & Raghunathan, H. (eds). 2004. Understanding Environment. Sagar Publication India Pvt. Ltd., New Delhi.
- Pandit, M.K. 2013. Chipko: Failure of a Successful Conservation Movement. In: Sodhi, N.S., Gibson, L. & Raven, P.H. Conservation Biology: Voices from the Tropics. pp. 126-127. Wiley Blackwell, Oxford, UK.

SEMESTER I: VSC

COURSE CODE	TITLE	CREDITS	LECTURES
SIUESVS111	**Fundamentals of Computers**		
Course objective: To acquaint the students with Microsoft office and its various tools. **Learning outcomes**: Students will learn the basics of computers and to use various toolbars in Microsoft Word, Microsoft Excel and Microsoft PowerPoint.			
Unit I: Fundamentals of Computers	• **Microsoft Word** – Creating new document; Page Layout; Styles and Themes; Columns and Ordering; Working with Text; Format Text; Text boxes; Listing of Text; Use of various shapes; Use of Tables; SmartArt Graphics; Saving documents. • **Microsoft Excel –** Starting a workbook; Modifying columns,	**1**	**15**

	rows and cells; Formatting cells; Creating formulas; Formatting Tables; Aligning Texts; Working with Worksheets; Freezing worksheet panes; Use of Charts; Conditional Formatting. ● **Microsoft PowerPoint –** Uses of PowerPoint presentations; Basics of Presentation slides; Text Basics; Themes and Background styles; Pictures and Clip Art; Viewing and Printing slides; Animating Texts and Objects; Use of Slide Transitions; Slide Show options.		
Tutorials	**Tutorials based on Fundamentals of Computers**	**1**	**15**

References:

1. Maluth, J. (2016). Basic Computer Knowledge. (n.p.): Amazon Digital Services LLC - Kdp.
2. Wempen, F. (2014). Computing Fundamentals: Introduction to Computers. Germany: Wiley.
3. Thareja, R. (2019). Fundamentals of Computers. India: Oxford University Press.
4. Foulkes, L. (2020). Learn Microsoft Office 2019: A Comprehensive Guide to Getting Started with Word, PowerPoint, Excel, Access, and Outlook. United Kingdom: Packt Publishing.
5. Habraken, J. (2022). Microsoft Office Inside Out (Office 2021 and Microsoft 365). United States: Microsoft Press.

SEMESTER I: SEC

COURSE CODE	TITLE	CREDITS	LECTURES
SIUESSE111	**Introduction to good laboratory practices**		
Course objective: to acquaint the students with basic rules, etiquettes and handling of chemicals in laboratory. **Learning outcomes**: Students will be able to work in the laboratory with confidence and professional diligence required at the industrial level.			

Unit I: Good Laboratory Practices	• Basic rules and etiquettes to be followed in a laboratory. • Types of glasswares used. • Storage and labelling of chemicals. • Handling of chemicals. • Transfer of chemicals; Use of pipettes. • Disposal of chemicals and housekeeping practices. • Measures to follow in case of accidents and injuries.	**1**	**15**
Tutorials	**Tutorials based on Good laboratory practices**	**1**	**15**

References:

1. Seiler, J. P. (2012). Good Laboratory Practice: The Why and the How. Germany: Springer Berlin Heidelberg.
2. Good Laboratory Practice Regulations, Revised and Expanded. (2002). United States: CRC Press.
3. Good Laboratory Practice Regulations. (1989). Switzerland: M. Dekker.
4. Anderson, M. A. (2002). GLP Essentials: A Concise Guide to Good Laboratory Practice. United Kingdom: Interpharm Press.

SEMESTER – II; Subject 1: Meteorology and Global Environmental Issues

COURSE CODE	TITLE	CREDITS	LECTURES
SIUESMJ121	**Meteorology and Global Environmental Issues**		
Course Objective: This paper will enable the students to gain in-depth knowledge of rising environmental issues at global level in the context of meteorological concepts. **Learning Outcome:** The learners will become aware about the detailed reasons behind environmental issues globally and contribute to their resolving by putting use of the knowledge of meteorology.			
Unit I: Meteorology	• Basic knowledge of climatological parameters for environmental study; • Weather and climate; • Classification of Climate;	**1**	**15**

	• Concept of heat transfer - conduction, convection; • Fundamentals of temperature, pressure, relative humidity, rainfall and wind speed; • Concept of atmospheric stability; • Environmental lapse rate, Temperature inversion, Mixing height.		
Unit II: Pollution and Environmental Degradation	• Environmental pollution: Sources and Effects of Air, Water, Soil/Land, Noise, Light pollution. • Environmental degradation • Deforestation • Soil erosion • Desertification.	**1**	**15**
Unit III: Global Environmental Issues	• Climate change • Global warming • Ozone hole • Loss of Biodiversity • Water crisis • Natural resource depletion • Diseases in humans	**1**	**15**

Practical – Subject 1– Meteorology and Global Environmental Issues – 1 Credit:

COURSE CODE	TITLE	CREDITS	HOURS
SIUESMJ121	**Meteorology and Global Environmental Issues**	**1**	**30**

1. Estimation of air-borne particulate matter in different areas with personalized air sampler.
2. Determination of relative humidity of air by whirling psychrometer.
3. Measurement of light intensity using lux meter.
4. Identification of meteorological instruments.
5. Survey and report on environmental awareness- Questionnaire method.
6. Identification of global environmental problems.

References:

1. Mishra, D. D., 2008. Fundamental Concepts of Environmental Studies, S. Chand Publishers, N. Delhi, 271.
2. Krishnan, M. S. 1982. *Geology of India and Burma*. CBS Publishers & Distributors.

SEMESTER – II; Subject 2: BASIC LIFE SCIENCES – I

COURSE CODE	TITLE	CREDITS	LECTURES
SIUESMN121	**BASIC LIFE SCIENCES - I**		
Course Objective: The students will get acquainted with the plant and animal world with respect to their evolution and diversity along with ultrastructure of living cell and their studies through microscopy techniques. **Learning Outcome:** The learners will be able to observe and appreciate the diversity of plants and animals. They will also be able to understand the ultrastructure of prokaryotic and eukaryotic cells by different types of microscopy techniques.			
Unit-I: Plant Diversity	• **Introduction to Plant Diversity:** General Characteristic Features with Examples and Ecological significance of - Algae, Bryophyta, Pteridophyta, Gymnosperms and Angiosperms (Dicotyledons and Monocotyledons). • Structure and Ecological significance of **Fungi and Lichens**.	**1**	**15**
Unit II: Animal Diversity	• **Introduction to Animal Diversity:** General Characteristic Features with Examples of different groups of animals under Non-Chordates and Chordates. • **Ecological roles of various animals.**	**1**	**15**
Unit II: Cell Biology and Microscopy	• **Ultrastructure of Prokaryotic Cell**: Bacterial cell and Cyanobacterial cell. • **Ultrastructure of Eukaryotic Cell** – Plant cell and Animal cell. • **Comparison of Prokaryotic and Eukaryotic Cells**.	**1**	**15**

	• **Microscope**: Simple and Compound – Principle, Parts and types, Aberration, Functions and Applications; Dark Field, Phase Contrast.		

Practical – Subject 2– Basic Life Sciences-I – 1 Credit

COURSE CODE	TITLE	CREDITS	HOURS
SIUESMN121	**Basic Life Sciences-I**	**1**	**30**

1. Observation of *Nostoc* under compound microscope.
2. Identification and classification of plant species into respective groups with the help of specimens / photographs / slides.
3. Identification and classification of animal species into respective groups with the help of specimens / photographs / slides.
4. Study of lichens with the help of specimens / photographs.
5. Study of *Rhizopus* with the help of fresh / preserved material and / or photomicrographs.
6. Identification of parts of cell and cell organelles with the help of photomicrographs.
7. Components and working of simple, compound, dark field and phase contrast microscope.

References:

- Gangulee, Das and Dutta, 2015. College Botany Volume I and II latest edition. Central Education enterprises.
- Sharma, OP, 2002. Textbook of Thallophytes, Tata McGraw Hill Publishing Co. New Delhi
- Sharma, PD, 2005. Fungi and Allied Organisms, Narosa Publishing House, New Delhi.
- G M Smith Cryptogamic Botany Volume I and II by McGraw Hill.
- Campbell, N.A. and Reece, J. B. (2008) Biology 8th edition, Pearson Benjamin Cummings, San Francisco.
- Raven, P.H et al (2006) Biology 7th edition Tata McGraw Hill Publications, New Delhi
- Dubey and Maheshwari, General Microbiology, S. Chand, New Delhi.
- Modi HA, Handbook of Elementary Microbiology, Shanti Prakashan
- Pelczar et al., Microbiology, Tata Mc Graw Hill Publishing Co.
- Stanier et al., General Microbiology, Printice Hall of India Pvt. Ltd., New Delhi

SEMESTER II: OE– Ecotourism

COURSE CODE	TITLE	CREDITS	LECTURES
SIUESOE121	**ECOTOURISM**		
Course Objective: To introduce the learners to the concept of ecotourism and impart environmental importance to them as a tourist. **Learning Outcome:** The course will make the students aware about the rich heritage of our country and instill a sense of responsibility towards conserving the ancient ecology of such tourist places, besides introducing them to the concerned policies followed in our country.			
Unit-I: History, Nature and Scope of Ecotourism	• Definition and concept of Ecotourism; • History of ecotourism; • Nature of tourism; • Ecotourism and Ecotourists; • Natural resources and heritage sites; Conservation and Protected areas; • Significance and scope of ecotourism;	**1**	**15**
Unit II: Types and Importance of Ecotourism	• Types of ecotourism – self-guided tours, guided tours. • Social and ecological impacts of ecotourism; Role of ethics in ecotourism; Benefits of ecotourism – educational, promotional, economical; recreational; • Ecotourism and local communities.	**1**	**15**
Unit III: Potential and Challenges of Ecotourism	• Economics, marketing and management of ecotourism; • Ecotourism development; • Ecotourism programme planning; • Carrying capacity of ecotourism destinations; • Recreation Opportunity Spectrum (ROS); • Limits of Acceptable change (LAC); • Sustainable tourism development. • Case studies.	**1**	**15**

Unit IV: Ecotourism Policy of India and Major ecotourism destinations	• Planning and policy frameworks; National Strategy for Ecotourism drafted in 2022 under Incredible India. • Major Ecotourism destinations in India – Jim Corbett National Park (Uttarakhand), Kerala backwaters, Thenmala (Kerala), Coorg (Karnataka), Maredumilli (Andhra Pradesh), Sunderbans (West Bengal), Khangchendzonga (Sikkim), Namdapha (Arunachal Pradesh), Tsomoriri Wetland Conservation Reserve (Ladakh), Andaman Islands, Chilika lake (Odisha), Matheran (Maharashtra), Malvan Marine Sanctuary (Maharashtra).	**1**	**15**

References:

1. Fennell, D. A. (2004). Ecotourism: An Introduction. United Kingdom: Taylor & Francis.
2. Buckley, R. (2009). Ecotourism: Principles and Practices. United Kingdom: CABI.
3. Wearing, S., Neil, J. (2009). Ecotourism: Impacts, Potentials and Possibilities. Netherlands: Routledge.
4. Routledge Handbook of Ecotourism. (2021). United Kingdom: Taylor & Francis.
5. Liyakhat, S., Bhatt, S. (2008). Ecotourism Development in India: Communities, Capital, and Conservation. India: Cambridge University Press.

SEMESTER II: VSC

COURSE CODE	TITLE	CREDITS	LECTURES
SIUESVS121	**Sustainable Tourism**		
Course objectives: To introduce the students to the concept of sustainable tourism and impart the importance of sustainable tourism for conservation of environment. **Learning outcomes**: Students will be aware about the various sectors involved in tourism and impacting environment and how sustainable tourism helps to conserve the environment.			
Unit I: Sustainable Tourism	• Introduction and Emergence of sustainable tourism • Dimensions of sustainable tourism – environmental, social, economic	**1**	**15**

	• Importance of sustainable tourism • Components/subsets of sustainable tourism- Ecotourism, geotourism, responsible tourism and cultural tourism • Principles of sustainable tourism management		
Tutorials	**Tutorials based on Sustainable Tourism**	**1**	**15**

References:

1. Cooper, C., Fennell, D. A. (2020). Sustainable Tourism: Principles, Contexts and Practices. United Kingdom: Channel View Publications.
2. Sustainable Tourism Development: Futuristic Approaches. (2019). United States: Apple Academic Press.
3. Edgell Sr, D. L. (2019). Managing Sustainable Tourism: A Legacy for the Future. United Kingdom: Taylor & Francis.
4. Reframing Sustainable Tourism. (2015). Netherlands: Springer Netherlands.
5. Swarbrooke, J. (1999). Sustainable tourism management. United Kingdom: CABI Pub.

SEMESTER II: SEC

COURSE CODE	TITLE	CREDITS	LECTURES
SIUESSE121	**Indian Geography and Map studies**		
Course objectives: To acquaint the students with the Indian geography with the help of maps. **Learning outcomes**: The knowledge of student will be upgraded in the area of physical, political divisions of India and its natural wealth.			
Unit I: Study of Indian Geography with Maps	• Political divisions of India – States and Union territories • Variations in climate across different regions of India • Physical features of India – rivers, mountain ranges, forests, deserts across India • Other natural wealth of India • Indian Heritage sites	**1**	**15**
Tutorials	**Tutorials based on Study of Indian Geography with Maps**	**1**	**15**

References:

1. Geography Of India. (2012). India: McGraw-Hill Education (India) Pvt Limited.
2. Karuṇākaran, S. K. (2012). The Ailing Forests of India. India: National Book Trust, India.
3. The Indian Rivers: Scientific and Socio-economic Aspects. (2017). Singapore: Springer Nature Singapore.
4. Bhatt, S. C. (2005). Land and people of Indian states and union territories: (in 36 volumes). India: Kalpaz Publications.
5. Kapur, A. (2019). Mapping Place Names of India. United Kingdom: Taylor & Francis.
6. Gupta, A. (2019). India - Map Practice Book: Set of 150 Blank Outlined Map. (n.p.): Independently Published.

Course codes and Evaluation pattern:

Course Code	Total Credits	Exam Conduction Type	Continous Evaluation Passing Cut Off	Continous Evaluation Marks Out Off	External Passing Cut Off	External Marks Out Off	Practical Passing Cut Off	Practical Marks Out Off
SIUESMJ111	4 (3L + 1P)	INTERNAL, EXTERNAL, PRACTICAL	10	25	20	50	10	25
SIUESMN111	4 (3L + 1P)	INTERNAL, EXTERNAL, PRACTICAL	10	25	20	50	10	25
SIUESOE111	4(4L)	INTERNAL, EXTERNAL,	16	40	24	60	NA	NA
SIUESVS111	2 (1L + 1T)	INTERNAL, TUTORIAL	10	25	NA	NA	10	25
SIUESSE111	2 (1L + 1T)	INTERNAL, TUTORIAL	10	25	NA	NA	10	25
SIUESMJ121	4 (3L + 1P)	INTERNAL, EXTERNAL, PRACTICAL	10	25	20	50	10	25
SIUESMN121	4 (3L + 1P)	INTERNAL, EXTERNAL, PRACTICAL	10	25	20	50	10	25
SIUESOE121	4(4L)	INTERNAL, EXTERNAL,	16	40	24	60	NA	NA
SIUESVS121	2 (1L + 1T)	INTERNAL, TUTORIAL	10	25	NA	NA	10	25
SIUESSE121	2 (1L + 1T)	INTERNAL, TUTORIAL	10	25	NA	NA	10	25

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