॥ सा विद्या या विमुक्तये ॥

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

'ज्ञानतीर्थ', विष्णुपुरी, नांदेड – ४३१ ६०६ (महाराष्ट्र राज्य) भारत

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

'Dnyanteerth', Vishnupuri, Nanded - 431 606 (Maharashtra State) INDIA

Established on 17th September, 1994, Recognized By the UGC U/s 2(f) and 12(B), NAAC Re-accredited with 'B++' grade

स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

Fax : (02462) 215572

Phone: (02462)215542

Academic-1 (BOS) Section

website: srtmun.ac.in

E-mail: bos@srtmun.ac.in

एनईपी–२०२० सुधारित श्रेयांक आराखडयानुसार विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी प्रथम वर्षाचे अभ्यासक्रम शैक्षणिक वर्ष २०२६–२७ पासून लागू करण्याबाबत.

प रि प त्र क

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, दिनांक २२ एप्रिल २०२६ रोजी संपन्न झालेल्या मा.विद्यापरिषद बैठकीतील विषय क्र.०४/६४–२०२६ च्या ठरावानुसार विज्ञान व तंत्रज्ञान विद्याशाखेतील राष्ट्रीय शैक्षणिक धोरण–२०२० सुधारित श्रेयांक आराखडयानुसार पदवी प्रथम वर्षाचे अभ्यासक्रम शैक्षणिक वर्ष २०२६–२७ पासून लागू करण्यास मा.विद्यापरिषदेने मान्यता प्रदान केली आहे. त्यानुसार विज्ञान व तंत्रज्ञान विद्याशाखेतील बी.एस्सी. प्रथम वर्षाचे खालील विषयाचे अभ्यासक्रम शैक्षणिक वर्ष २०२६–२७ पासून लागू करण्यात येत आहे.

01	B.Sc. I Year Botany	06	B.Sc. I Year Geology
02	B.Sc. I Year Chemistry	07	B.Sc. I Year Enviornment & Earth Science
03	B.Sc. I Year Mathematics	08	B.Sc. I Year Statistics
04	B.Sc. I Year Zoology	09	B.Sc. I Year Dairy Science
05	B.Sc. I Year Microbiology	10	B.Sc. I Year Agrochemical & Fertilizers

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या www.srtmun.ac.in या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी, ही विनंती.

'ज्ञानतीर्थ' परिसर,
विष्णुपुरी, नांदेड – ४३१ ६०६.
जा.क्र.:शै–१/परिपत्रक/पदवी/बीएस्सी/२०२६–२७/ 66
दिनांक : २२.०६.२०२६

सहा.कुलसचिव
शैक्षणिक (१–अभ्यासमंडळ) विभाग

प्रत माहिती व पुढील कार्यवाहीस्तव :–
१) मा. कुलगुरू महोदयांचे कार्यालय, प्रस्तुत विद्यापीठ.
२) मा. प्र.कुलगुरू महोदयांचे कार्यालय, प्रस्तुत विद्यापीठ
३) मा. अधिष्ठाता, विज्ञान व तंत्रज्ञान विद्याशाखा,प्रस्तुत विद्यापीठ.
४) मा. संचालक, परिक्षा व मुल्यमापन मंडळ, प्रस्तुत विद्यापीठ.
५) मा. प्राचार्य, सर्व संबंधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
६) सिस्टीम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ. यांना देवून कळविण्यात येते की, परिपत्रक अभ्यासक्रम संकेतस्थळावर प्रसिध्द करण्यात यावेत.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED - 431 606 (MS)

(Credit Framework and Structure of Four Year UG Program with Multiple Entry and Exit Option as per NEP-2020)

UNDERGRADUATE PROGRAMME OF SCIENCE & TECHNOLOGY

Major in **DSC** and Minor in **DSM** (Subject)

(B.Sc. Environmental Science – I Year)

Under the Faculty of Science & Technology

2026-2027

From the Desk of the Dean, Faculty of Science and Technology

Swami Ramanand Teerth Marathwada University, Nanded, enduring to its vision statement "***Enlightened Student: A Source of Immense Power***", is trying hard consistently to enrich the quality of science education in its jurisdiction by implementing several quality initiatives. Revision and updating curriculum to meet the standard of the courses at national and international level, implementing innovative methods of teaching-learning, improvisation in the examination and evaluation processes are some of the important measures that enabled the University to achieve ***the 3Es, the equity, the efficiency*** and ***the excellence*** in higher education of this region. To overcome the difficulty of comparing the performances of the graduating students and also to provide mobility to them to join other institutions the University has adopted the cumulative grade point average (CGPA) system in the year 2014-2015. Further, following the suggestions by the UGC and looking at the better employability, entrepreneurship possibilities and to enhance the latent skills of the stakeholders the University has adopted the Choice Based Credit System (CBCS) in the year 2018-2019 at graduate and post-graduate level. This provided flexibility to the students to choose courses of their own interests. To encourage the students to opt the world-class courses offered on the online platforms like, NPTEL, SWAYM, and other MOOCS platforms the University has implemented the credit transfer policy approved by its Academic Council and also has made a provision of reimbursing registration fees of the successful students completing such courses.

SRTM University has been producing a good number of high calibre graduates; however, it is necessary to ensure that our aspiring students are able to pursue the right education. Like the engineering students, the youngsters pursuing science education need to be equipped and trained as per the requirements of the R&D institutes and industries. This would become possible only when the students undergo studies with an updated and evolving curriculum to match global scenario.

Higher education is a dynamic process and in the present era the stakeholders need to be educated and trained in view of the self-employment and self-sustaining skills like start-ups. Revision of the curriculum alone is not the measure for bringing reforms in the higher education, but invite several other initiatives. Establishing industry-institute linkages and initiating internship, on job training for the graduates in reputed industries are some of the important steps that the University would like to take in the coming time. As a result, revision of the curriculum was the need of the hour and such an opportunity was provided by the New Education Policy 2020. National Education Policy 2020 (NEP 2020) aims at equipping students with knowledge, skills, values, leadership qualities and initiates them for lifelong learning. As a result the students will acquire expertise in specialized areas of interest, kindle their intellectual curiosity and scientific temper, and create imaginative individuals.

The curriculum given in this document has been developed following the guidelines of NEP-2020 and is crucial as well as challenging due to the reason that it is a transition from general science based to the discipline-specific-based curriculum. All the recommendations of the ***Sukanu Samiti*** given in the **NEP Curriculum Framework-2023** have been followed, keeping the disciplinary approach with rigor and depth, appropriate to the comprehension level of learners. All the Board of Studies (BoS) under the Faculty of Science and Technology of this university have put

in their tremendous efforts in making this curriculum of international standard. They have taken care of maintaining logical sequencing of the subject matter with proper placement of concepts with their linkages for better understanding of the students. We take this opportunity to congratulate the Chairman(s) and all the members of various Boards of Studies for their immense contributions in preparing the revised curriculum for the benefits of the stakeholders in line with the guidelines of the **Government of Maharashtra regarding NEP-2020**. We also acknowledge the suggestions and contributions of the academic and industry experts of various disciplines.

We are sure that the adoption of the revised curriculum will be advantageous for the students to enhance their skills and employability. Introduction of the mandatory ***On Job Training, Internship program*** for science background students is praise worthy and certainly help the students to imbibe firsthand work experience, team work management. These initiatives will also help the students to inculcate the workmanship spirit and explore the possibilities of setting up of their own enterprises.

Dr. M. K. Patil
Dean
Faculty of Science and Technology

From Desk of Chairman, Board of Studies of the Subject Environmental Science and Earth Science

PREAMBLE

Introduction:

The National Education Policy 2020 (NEP 2020) is formulated to revamp education system and lay down road map for new India. This policy is framed based on the fundamental pillars of access, equity, quality, affordability, and accountability and seeks to transform India into a thriving knowledge society and a global knowledge superpower.Some of the important features of National Education Policy are Increasing GER in higher education, Holistic and multidisciplinary education with multiple entry/exit options, Establishment of academic bank of credit, Setting up of multidisciplinary education and research Universities and National Research Foundation, Expansion of open and distance learning to increase gross enrolment ratio, Internationalization of education, Motivated, energized and capable faculty, Online and digital education and Effective governance and leadership.

As per the National Education Policy, the Government of Maharashtra has proposed a model curriculum framework and an implementation plan for the State of Maharashtra. It is to suggest and facilitate the implementation of schemes and programs, which improve not only the level of academic excellence but also improve the academic and research environment in the state. The proposed curriculum framework endeavours to empower the students and help them in their pursuit for achieving overall excellence.

In view of NEP priority and in-keeping with its vision and mission, process of updating the curriculum is initiated and implemented in SRTM University at UG and PG level from the academic year 2023-2024.Keeping in mind, BOS in Environmental and Earth Science has prepared the curriculum to ensure up-to-date level of understanding of Environmental Science. Studying Environmental Science prepares the students for their career working either in educational institutions or industries in which they can be directly involved in the teaching, research and development. Also, to ensure uniform curriculum and its quality at UG/PG level, curriculum of different Indian Universities, syllabus of NET, SET, MPSC, UPSC, and the UGC model curriculum are referred to serve as a base in updating the same.The comments or suggestions from all teachers, students and other stakeholders are welcome for upbringing this curriculum.

Salient Features:

The syllabus of B.Sc. Environmental Science has been framed to meet the requirement of Choice Based Credit System under NEP 2020. The courses offered here in will train and orient the students in the specific fields of Environmental Science. This would help students to lay a strong foundation in the field of Environmental Science.

Overall, after completion of this course, students will also acquire fundamental knowledge and applications in Environmental Science and also understand that Environmental Science is an integral part of the human life and developments.

Program Educational Objectives:

The Objectives of this program are:

PEO1: To expose themselves to the diversity amongst life forms and their interactions.

PEO2: To make aware of natural resources and environment and the importance of conserving the same.

PEO3: To update curriculum by introducing recent advances in the subject and enable the students to face NET, SET, UPSC and other competitive examinations successfully.

PEO4: To train and orient the students so as to develop human resource for the educational institutes, industries and other organizations.

PEO5: To develop specific skills amongst students for employability for the development of their own enterprises.

PEO6: To develop ability for the application of the acquired knowledge in the fields of life so as to make our country self-reliant and self-sufficient.

Program Outcomes:

The Outcomes of this program are:

PO1: This program will expose the students to the diversity amongst different life forms.

PO2: This program shall also make aware the students about natural resources and environment and the importance of conserving the same.

PO3: This will provide updated curriculum with recent advances in the subject and enable the students to face NET, SET, UPSC and other competitive examinations successfully.

PO4: This program shall train and orient the students so as to develop human resource for the educational institutes, industries and other organizations.

PO5: This will also develop specific skills amongst students for employability and for the development of their own enterprises.

PO6: This shall develop ability in the students for the application of the acquired knowledge in the fields of life so as to make our country self-reliant and self-sufficient.

Prerequisite:

The students seeking admission to B.Sc. Environmental Science should have passed plus two examinations. The optional courses are offered to the students registered for graduate and post-graduate programs. Such students should have the basic knowledge of Environmental Science and willing to gain additional knowledge in the field of Environmental Science. Admissions to this program are given as per the University rules.

Dr. Vasant Madhav Wagh
Associate Professor,
Chairman, BOS Environmental & Earth Science,
Swami Ramanand Teerth Marathwada University, Nanded.
Mobile: 9881737252
E- Mail: wagh.vasant@gmail.com

Details of the Board of Studies Members in the subject Environmental Science and Earth Science under the Faculty of Science & Technology, S.R.T.M. University, Nanded.

Dr. Vasant Madhav Wagh **Chairman** School of Earth Sciences, Swami Ramanand Teerth Marathwada University, Nanded 431606.	Dr. Sudhir Vishwambhar Shivanikar **Member** Netaji Subhashchandra Bose College, Nanded
Dr. Raju Kashinath Narkhede **Member** Maharashtra Udaygiri Mahavidyalaya, Udgir, Tq. Udgir Dist. Latur	Dr. Kedar Ramkrishna Solunke **Member** Indira Gandhi Senior College, CIDCO, Nanded
Dr. Vinod K Mukke **Member** Shivneri Mahavidyalaya, Shirur Anantpal, Tq. Shirur Anantpal Dist. Latur	Dr. Jayprakash Manoharrao Patwari **Member** Maharashtra Udaygiri Mahavidyalaya, Udgir, Tq. Udgir Dist. Latur
Dr. Rajkumar Govindrao Pawale **Member** Indira Gandhi Senior College, CIDCO, Nanded	Dr. Satish Sudhakarrao Patil **Member** Dr. B A Marathwada University, Aurangabad (Chh. Sambhajinagar)
Dr. Ravindra S. Gavali **Member** Centre for Natural Resource Management, (CNRMCC & DM) National Institute of Rural Development & Panchayati Raj, Rajendra Nagar, Hyderabad	Dr. Pravin U. Meshram **Member** Sevadal Mahila Mahavidyalaya & Research Academy, Sakkardara Square, Umrer Road, Nagpur- 440009
As Per MPUA u/s 40(2)(d)(E) Invitee Member 2023 UG and PG Students	
Shaikh Humedsalman Shaikh Aminullah C/o Yeshwant Mahavidyalaya, Nanded	Maniyar Fatema Ismail C/o Maharashtra Udaygiri Mahavidyalaya, Udgir, Tq. Udgir Dist. Latur

Swami Ramanand Teerth Marathwada University, Nanded

Faculty of Science and Technology

General Guidelines for Selection of Courses

i. The **Major subject** is the discipline or course of main focus, bachelors' degree shall be awarded in that Discipline / subject.

ii. **Minor Subject(s)** is/are the subjects from the same discipline / faculty and shall act as supporting subjects to the Major.

iii. At the entry level of the 3/4-year UG program students shall be required to choose any THREE of the available subjects in a college/institute as **Major (Optional 1), Minor 1 (Optional 2) and Minor 2 (Optional 3) subjects, respectively**

iv. No. of credits assigned to the **Major (Optional 1), Minor 1 (Optional 2) and Minor 2 (Optional 3) shall be same in Semesters I and II.**

v. **In the second year of the degree program students shall select one of the three subjects (Optional 1, 2 and 3) as a Major Subject and one as Minor Subject, while third optional shall be discontinued.**

vi. Students shall have an option to switch over from **Major to Minor or vice-versa after first year**.

vii. Once they finalize their **Major subject** in the beginning of the second year of the programme, they shall pursue their further education in that particular subject as the **Major** subject. Therefore, from second year onwards curriculum of the **Major** and **Minor** subjects shall be different.

viii. Students are required to select **Generic /Open Elective** (**vertical 3 in the credit framework**) compulsorily from the **faculties different than that of their Major / Minor subjects** (select from **Basket 3**).

ix. Content and other details of the GE are available in the document prepared by the respective BOS from which the candidate has chosen his/her GE.

x. Students shall be required to complete the Skill based courses of 06 credits in the first two years.

xi. Vocational Courses (VSEC or VSC) shall be related to the **Major** course

xii. Ability Enhancement Courses (AEC):

a) English Communication Course (Language) of 2 credits shall be offered in Semester I and III

b) Modern Indian Languages shall be of 2 credits and shall be offered in Semester II and IV

xiii. Courses marked as VEC, CI, IKS and CCC in Column Nos. 7and 8 shall be common for all the students irrespective of their faculties of studies.

xiv. Curriculum of VEC, CI, IKS and CCC shall be provided by the University separately.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED - 431 606

Summary of the Credits Assigned to various courses to be proposed by the Board of Studies under the Faculty of Science and Technology

A. No. Of Credits assigned to various courses:

Sr No.	Heads	Credits assigned in each Semester								Total Credits
		I	II	III	IV	V	VI	VII	VIII	
1	Major Subject	4	4	8	8	16	16	18/14	18/14	92/84
2	Minor 1 Subject	4	4	2	2	--	--	--	--	12
3	Minor 2 Subject	4	4	--	--	--	--	--	--	08
3	Generic Electives / Research Methodology	2	2	4	2	--	--	4	--	10 + 4 (14)
4	Vocational and Skill Enhancement Course / Indian Knowledge System	2	2	2	2	4	2	--	--	8+6 (14)
5	Ability Enhancement Course L1 (English)	2	--	2	--	--	--	--	--	4
6	Ability Enhancement Course L2 (SL)	--	2	--	2	--	--	--	--	4
7	Value Added Course /IKS (Constitution of India / EVS)	2	2	--	2	--	--	--	--	6
8	Community Engagement Services NCC/NSS/Sports/Culture	2	2	2	2	--	--	--	--	8
9	Project/ Field Work/ OJT /Internship	--	--	2	2	2	4	--/4	4/8	14/22
10	Total Credits	22	22	22	22	22	22	22	22	176

1. **Major Courses** *(92 / 84 credits, Basket-1)*:Each BOS shall suggest**Major Courses** of 04 credits **(02 credit Theory and 02 credit practical papers)** for semesters I and II

As the University has adopted Three Optional credit framework, therefore, every student have a freedom to chose three courses of his choice from among the options made available by a particular college / institute. As number of credits assigned to all the three optional are same, therefore, he / she have a freedom to select any one of them as Major and one as Minor course from second year onward.

2. **Minor Courses *(20 + 04 credits, Basket-2)*:Total numbers of credits assigned to the Minor Courses are 20** and a course on Research Methodology of 4 credits in VIIth semester.

[Note: *i.* Each Board of studies is required to develop curriculum of **two theory papers and a practical course each of 02 credits**. This would be **common for major and minor courses** during semesters I and II. **No need of preparing Minor courses separately for First Year**.
ii. Students have option to select any of the three optional as **Major** and one **Minor** at the beginning of the **Third Semester (Second Year)** of their degree programme.]

3. **Generic Electives *(10 credits; for students from faculties other than Science and Technology, Basket-3)*:** One paper each of **02/04 credits to be offered in semester I to VI** as Generic Electives. As these papers shall be opted by the students from other faculties; therefore, difficulty level of these courses shall at beginners' level (4.0). Each BOS shall **suggest a minimum of one and a maximum of four Generic Elective papers** to be offered during semesters I to VI. Students have freedom to choose one **Generic Elective** paper from **Basket-3** (common for all faculties) in each semester, provided these GE courses are from other faculty.

4. **Ability Enhancement Course (AEC) *(08 credits; common for all faculty students, Basket-4)*:** One Language course each of 02 credits in the first four semesters.
L1 – First Language English *(Compulsory for all disciplines)* *(02 credits each in semesters I and III)*
L2 – Second Language (Students have option to choose second language from the **Language Basket-IV**) *(02 credits each in semesters II and IV)*

5. **Vocational and Skill Enhancement Courses (VC/SC) *(08 +06 credits, shall be related to the Major Course)*:**
Each BOS shall suggest four Vocational and three Skill Enhancement Courses each of 02 credits to be offered in semesters I to VI. These courses shall be related to the **Major subject**.

6. **Indian Knowledge System (IKS) (Generic) *(02 credits, common for all faculties, Basket-5)*:** Students have a freedom to choose a course on **Indian Knowledge System** of 02 credits from ***Basket-5*** and shall be common for the students from all faculties of study.

7. **Value Education Courses (VEC) *(04 credits, common and compulsory for all faculty students)*:** Students have to complete two Value Added courses each of 02 credits during semester V and VI and are compulsory for students of all faculties.
a*. Constitution of India *(02 credits) – in Semester V
b*. Environmental Studies *(02 credits) – in Semester VI

8. **Community Engagement Services (CES / CCC)*(08 credits, common for all faculty students)*:** Students need to complete four **Community Engagement Services** courses like **NCC, NSS, Sports, Cultural Studies** each of 02 credits in first four semesters I, II, III and IV and are common across the faculty.
Grades of NCC/NSS/Sports/Cultural courses shall be awarded to the students on the basis of their participation in University, Regional, National, International, Inter-University and Intra-University level activities. Guidelines for the award of grades for NCC/NSS/Sports/Cultural studies shall be prepared by a Committee

constituted by the University.

9. **Field Work / Projects/ OJT/ Internship/Apprenticeship related to DSC major subjects *(14 credits for Honours and 22 credits for Honours with Research credits)*:** The students shall have to complete Field Work, Project, Case Study, Internship or Apprenticeship, etc. as per the credit framework.

10. **Bachelor of Science in DSC Honors and Minor in DSM.**

For the award of **Bachelor of Science in DSC Honors and Minor in DSM** students have to complete **92 credits** from Major, **20** credits of Minor and the required number of credits of Field Work / Projects/ Internship/Apprenticeship/Case study **related to Major subject**.

11. **Bachelor of Science in DSC Honors with Research and Minor in DSM.**

For the award of **Bachelor of Science in DSC Honors with Research and Minor in DSM** students have to complete **84 credits** theory courses of Major subject, **20 credits** of Minor and required number of credits of Field Work / Projects/ Internship/Apprenticeship/Case study **related to Major subject**.

12. **These guidelines are as per the present instructions from Government of Maharashtra and are subject to change time-to-time as per the guidelines from Govt. of Maharashtra.**

MULTIPLE EXIT Options for Students:

1. **Exit Option after First year**

Students may take exit after completion of first year with **Certificate in Major (DSC) and Minor (DSM) subject** on completion of minimum 44 credits and additional 4 credits of NSQF skill / vocational in major/minor subject or internship during summer vacation.

2. **Exit Option after Two years**

Students may take exit after completion of second year of the programme with **Diploma in Major (DSC) and Minor (DSM)** subject on completion of minimum 88 credits and additional 04 credits on NSQF skill / vocational or Internship on major/minor courses during summer vacation.

3. **Exit Option after Three years**

Students may take exit with a Degree as **Bachelors of Science in Major (DSC) and Minor (DSM)** after earning minimum of 132 credits.

4. **Exit Option after Four Years** after completing 176 credits

(a) Bachelor of Science in DSC Honours and Minor in DSM.

(b) Bachelor of Science in DSC with Research and Minor in DSM.

Swami Ramanand Teerth Marathwada University, Nanded

Faculty of Science and Technology (Three Optional in the First Year)

Credit Framework for Four Year Multidisciplinary Degree Program with Multiple Entry and Exit

Subject: DSC (Major) /DSM (Minor 1 and Minor 2)

(For illustration ENV SCI, CHE and BOTcombinations are considered, which may change for different combinations)

Year & Level	Semester	Optional 1 (Major) *(From the same Faculty)*	Optional 2 (Minor 1) *(From the same Faculty)*	Optional 3 (Minor 2) *(From the same Faculty)*	Generic Elective (GE) (select from Basket 3 of *Faculties other than Science and Technology*)	Vocational & Skill Enhancement Course	Ability Enhancement Course (AEC) (Basket 4) Value Education Courses (VEC) / Indian Knowledge System (IKS) (Basket 5) *(Common across all faculties)*	Field Work / Project/Internship/ OJT/ Apprenticeship / Case Study Or Co-curricular Courses (CCC) (Basket 6 for CCC) *(Common across all faculties)*	Credits
1	2	3	4	5	6	7	8	9	10
1 (4.5)	I	**SENVCT1101** Fundamental of Environmental Science (T 2Cr) **SENVCP1101** Practical Based on **SENVCT1101**(P 2Cr) **4 Credits**	**SCHECT1101** (T 2Cr) **SCHECP1101** (P 2Cr) **4 Credits**	**SBOTCT1101** (T 2Cr) **SBOTCP1101** (P 2Cr) **4 Credits**	**SENVGE1101** Environmental Awareness **2 Credits**	**SENVSC1101** Training Course for Water Quality Assessment **2 Credits**	**AECENG1101** (2Cr) **IKSXXX1101** (2Cr) **4 Credits**	**CCCXXX1101** (2Cr) ***(NCC/NSS/SPT(sports) / CLS(Cultural Studies)/HWS(Health Wellness)/ YGE(Yoga Education) /FIT(Fitness)*** **2 Credits**	22
	II	**SENVCT1151** Basic concepts in Ecology(T 2Cr) **SENVCP1151** Practical Based on **SENVCT1151**(P 2Cr) **4 Credits**	**SCHECT1151** (T 2Cr) **SCHECP1151** (P 2Cr) **4 Credits**	**SBOTCT1151** (T 2Cr) **SBOTCP1151** (P 2Cr) **4 Credits**	**SENVGE1151** Environment & Society **2 Credits**	**SENVSC1151** Soil Quality & Soil Health **2 Credits**	**AECENG1151** (2Cr) **VECCOI1151** (2Cr) ***Constitution of India*** **4 Credits**	**CCCXXX1151** **2 Credits**	22
	Cum. Cr.	08	08	08	04	04	08	04	44

***Exit option*: UG Certificate in Opt 1, Opt 2 and Opt 3 on completion of 44 credits** and additional **4 credits from NSQF / Internship**

2 (5.0)	**III**	**SENVCT1201 Environmental Chemistry (2cr) SENVCT1202 Water & Water Resources (2cr) SENVCP1203 Based on SENVCT1201(2cr) SENVCP1204 Based on SENVCT1202 (2cr) 8 Credits**	**SCHEMT1201 SCHEMP1201 (1T+1P) 2 Credits**		**SPHYGE1201 (2cr) SPHYGE1202 (2cr) 4 Credits**	**SENVSC1201 Rain Water Harvesting 2 Credits**	**ACEXXX1201 (MAR/HIN/URD/KAN/PAL)(2Cr) 2 Credits**	**SPHYFP1201 (2Cr) CCCXXX1201(2Cr) 4Credits**	**22**	
	IV	**SENVCT1251 Atmosphere & Global Climate Change (2cr) SENVCT1252Biodiversity & Conservation (2cr) SENVCP1253 (2cr) SENVCP1254 (2cr) 8 Credits**	**SCHEMT1251 SCHEMP1251 (1T+1P) 2 Credits**		**SPHYGE1251 2 Credits**	**SENVVC1251 Sustainable Agriculture practices 2 Credits**	**ACEXXX1251 (MAR/HIN/URD/KAN/PAL)(2Cr) VECEVS1251(2Cr) 4 Credits**	**SPHYFP1351(2Cr) CCCXXX1151(2Cr) 4 Credits**	**22**	**88**
	Cum. Cr.	**24**	**12**	**08**	**10**	**06**	**14**	**12**	**88**	
***Exit option*: UG Diploma in Major DSCand Minor DSMon completion of 88 credits and** additional **4 credits NSQF / internship in DSC**										
3 (5.5)	**V**	**SENVCT1301 Environmental Biotechnology**(T 3Cr) **SENVCT1302 Waste Water Treatment Technology** (T 3Cr) **SENVIK1303**(T 2Cr) **SENVCP1304**(P 2Cr) **SENVCP1305**(P 2Cr) **12 Credits**	**SENVET1301 Waste Water Treatment Technology** (T 3Cr) **SENVEP1301** (P 1Cr) **4 Cr**	--		--	**SENVVC1301 Waste water Recycling 4 Credits**	--	**SPHYFP1301 (2 Cr) 2 Credits**	**22**	

	VI	**SENVCT1351** (T 3Cr)**Energy Resource Management SENVCT1352 Human- Wildlife conflict & Management** (T 3Cr) **SENVCT1353 Solid Waste Management** (T 2Cr) **SENVCP1354**(P 2Cr) **SENVCP1355**(P 2Cr) **12 Credits**	**SENVET1351 Environmental Management** (T 3Cr) **SENVEP1351** (P 1Cr) **4 Cr**	--		--	**SENVVC1351 Environment impact & Risk Assessment 2 Credits**	--	**SPHYOJ1351 4 Credits**	**22**	
	Cum. Cr.	**56**		**12**	**08**	**10**	**6 + 8 =14**	**14**	**18**		**132**
***Exit option*: B. Sc. (Bachelor in Science) with Major in DSCand Minor in DSM**											
4 (6.0)	**VII**	**SENVCT1401 Environmental Biotechnology**(T 4Cr) **SENVCT1402 Natural Resource Management** (T 4Cr) **SENVCT1403 Environmental Analytical Techniques**(T 2Cr) **SENVCP1404** (P 4Cr) **14 Credits**	**SENVET1401 Indian Environment**(T 3Cr) **SENVEP1401** (P 1Cr) **4 Cr**	*Research Methodology* **SENVRM1401 4 Credits**		--	--	--	--	**22**	
	VIII	**SENVCT1451 Green Technology**(T 4Cr) **SENVCT1452 Applied Microbiology**(T 4Cr) **SENVCT1453 Current Environmental Issues**(T 2Cr) **SENVCP1454** (P 4Cr)	**SENVET1401 Disaster Management & Mitigation** (T 3Cr) **SENVEP1401** (P 1Cr) **4 Cr**	--		--	--	--	**SPHYOJ1451 4 Credits**	**22**	

		14 Credits									
	Cum Cr	**Honours: 92**		**18+4**	**08**	**10**	**V-08 + S-06**	**AEC-4+MIL-4 +VEC-4 +IKS-2**	**22**		**176**
***Exit option*: B. Sc. (Hons) with Major in DSCand Minor inDSM**											
5 (6.0)	**IX**	**SENVCH1501** (T 3Cr) **SENVCH1502** (T 3Cr) **SENVCH1503** (T 4Cr) **(H- Honours) 10 Credits**	**SENVET1501**(T 3Cr) **SENVEP1501** (P 1Cr) **4 Cr**	*Research Methodology* **SENVRM1501 4 Credits**		--	--	--	Research Project **SPHYRP1501 4Credits**	**22**	**44**
	X	**SENVCH1551** (T 3Cr) **SENVCH1552** (T 3Cr) **SENVCH1553** (T 4Cr) **(H- Honours) 10 Credits**	**SENVET1551** (T 3Cr) **SENVEP1551** (P 1Cr) **4 Cr**	--		--	--	--	Research Project **SPHYRP1551 8Credits**	**22**	
***Exit option*: B. Sc. (Hons with Research) in DSCand Minor in DSM**											
Total Credits		**Major – 92 / 84**		**Minor 1 -18 + RM - 04**	**Minor 2 08**	**GE/OE - 10**	**(V-08 + S-06) 14**	**(AEC-8 + VEC-4 + IKS-2)14**	**(CC-08+FP/CS-06+OJT-04+RP-12) 30**	**176**	

Abbreviations:

1. **DSC:** Department/Discipline Specific Core (Major)
2. **DSE:** Department/Discipline Specific Elective (Major)
3. **DSM:** Discipline Specific Minor
4. **GE/OE:** Generic/Open Elective
5. **VSEC:** Vocational Skill and Skill Enhancement Course
6. **VSC:** Vocational Skill Courses
7. **SEC:** Skill Enhancement Courses
8. **AEC:** Ability Enhancement courses
9. **MIL:** Modern Indian languages
10. **IKS:** Indian Knowledge System
11. **VEC:** Value Education Courses
12. **OJT:** On Job Training: (Internship/Apprenticeship)
13. **FP:** Field Projects
14. **CEP:** Community Engagement and Service
15. **CC:** Co-Curricular Courses
16. **RM:** Research Methodology
17. **RP:** Research Project/Dissertation

Swami Ramanand Teerth Marathwada University, Nanded

Assigning TEN DIGIT Codes to the CoursesALPHANUMERIC Coding AAAAAA XXXX

1) First (A) Letter indicate Faculty:H– Humanities; **S** - Science; **C**– Commerce, & Management,**I** - Interdisciplinary Studies and **D** –Distance / External mode .

2) Next Three Letters(XXX) indicates Subject (e.g. **ECO** – Economics, **PHY** – Physics, **COM** – Commerce, **CSC** – Computer Sci.) etc.

3) Fourth and Fifth Letters indicate nature of the course : (e.g. **CT** – Core Theory, **CP** – Core Practical, **MT** – Minor Theory, **ET**– BOTctive Theory, **EP** – BOTctive Practical, **FP**– Field Project, **FW** – Field Work, **OJ** – On Job training, **GE** - Generic /open BOTctive, **IN** – Internship, **CS** – Case Study, **VC** -Vocational Skill Courses, **SC** -Skill Enhancement Courses, **AEC** -Ability Enhancement courses, **ML** -Modern Indian languages, **CCC** - Co-Curricular Courses/ Community Engagement and Service, **RM** -Research Methodology,**IKC** - Indian Knowledge System,**VEC** - Value Education Courses, etc.)

4) Sixth Character or First Number: indicate the Centre (**1**- for Affiliated colleges, **2** -Main Campus,**3**- Model Degree College, **4**- Sub-Centre Latur, **5**-Sub-Centre Parbhani, **6** –Sub-Centre Kinwat)

5) Seventh Character or second number indicate -Year of Study.e.g.**1** - First year,**2**- second year.etc.

6) Last Two Numbers indicate Course Number

e.g. **SPHYCT1101**– Faculty of **Science & Technology (S)PHYSICS** (PHY) subject **Core Theory** (**CT**) Course offered in the First Semester inaffiliated colleges

Sr. No	UG/PG	Semester	Affiliated Colleges	Main Campus	Model Degree College	Sub-center Latur	Sub-center Parbhani	Sub-Centre Kinwat
1	First Year	Semester I	1101 to 1150	2101 to 2150	3101 to 3150	4101 to 4150	5101 to 5150	6101 to 6150
2		Semester II	1151 to 1199	2151 to 2199	3151 to 3199	4151 to 4199	5151 to 5199	6151 to 6199
3	Second Year	Semester III	1201 to 1250	2201 to 2250	3201 to 3250	4201 to 4250	5201 to 5250	6201 to 6250
4		Semester IV	1251 to 1299	251 to 2299	3251 to 3299	4251 to 4299	5251 to 5299	6251 to 6299
5	Third Year	Semester V	1301 to 1350	2301 to 2350	3301 to 3350	4301 to 4350	5301 to 5350	6301 to 6350
6		Semester VI	1351 to 1399	2351 to 2399	3351 to 3399	4351 to 4399	5351 to 5399	6351 to 6399
7	Fourth Year	Semester VII	1401 to 1450	2401 to 2450	3401 to 3450	4401 to 4450	5401 to 5450	6401 to 6450
8		Semester VIII	1451 to 1499	2451 to 2499	3451 to 3499	4451 to 4499	5451 to 5499	6451 to 6499
9	Fifth Year	Semester IX	1501 to 1550	2501 to 2550	3501 to 3550	4501 to 4550	5501 to 5550	6501 to 6550
10		Semester X	1551 to 1599	2551 to 2599	3551 to 3599	4551 to 4599	5551 to 5599	6551 to 6599

B. Sc. First Year Semester I *(Level 4.5)*

Teaching Scheme

	Course Code	CourseName	CreditsAssigned			TeachingScheme (Hrs/ week)	
			Theory	Practical	Total	Theory	Practical
Optional 1	SENVCT1101	Fundamentals of Environmental Science	02	--	**04**	02	--
	SENVCP1101	Practical Based on SENVCT 1101	-	02			04
Optional 2	SDSCMT1101	Title of paper 1	02	--	**04**	02	--
	SDSCMP1101	Title of paper 2 (practical)	-	02			04
Optional 3	SDSCMT1101	Title of paper 1	02	--	**04**	02	--
	SDSCMP1101	Title of paper 2 (practical)	-	02			04
Generic Electives *(from other Faculty)*	SENVGE1101	Environmental Awareness (Basket 3 of respective faculty)	02	--	**02**	02	--
Skill Based Course (related to Major)	SENVSC1101	Training course for water Quality Assessment	--	02	**02**	--	04
Ability Enhancement Course	AECENG1101	L1 – Compulsory English	02	--	**02**	02	--
Indian Knowledge System (IKS)	IKSXXX1101	SBOTct from **Basket 5**	02	--	**02**	02	--
Community Engagement Services (CES)	CCCXXX1101	Any one of NCC/ NSS /Sports/ Culture /Health Wellness /Yoga Education / Fitness **(Basket 6)**	-	02	**02**	--	04
Total Credits			**14**	**08**	**22**	**12**	**20**

B. Sc. First Year Semester I *(Level 4.5)*

Examination Scheme

[40% Continuous Assessment (***CA***) and 60% End Semester Assessment (***ESA***)]

(For illustration we have considered a paper of 02 credits, 50 marks, need to be modified depending on credits assigned to individual paper)

Subject (1)	Course Code (2)	CourseName (3)	Theory				Practical		Total Col (6+7) / Col (8+9) (10)
			Continuous Assessment (CA)			ESA			
			Class Test (4)	Assignment/ Presentation/Viva/ Quiz/Open Book etc (5)	Attendance (6)	Total (7)	CA (8)	ESA (9)	
Major	**SENVCC 1101**	Fundamentals of Environmental Science	10	06	04	40	--	--	50
	SENVCC 1102	Water and Water Resources	10	06	04	40	--	--	50
	SENVCP 1103	Practical Based on SENVCC 1101 and SENVCC 1102	--	--	--	--	20	30	50
Minor	**SENVMC 1101**	Basic Concepts of Environmental Science	10	06	04	40	--	--	50
	SENVMC 1102	Basics of Water Sources	10	06	04	40	--	--	50
	SENVMP 1103	Practical Based on SENVMC1101 and SENVMC1102	--	--	--	--	20	30	50
Generic/Other Electives	**SENVGE 1101**	Environmental Awareness (Basket 2)	10	06	04	40	--	--	50
Vocational & SkillEnhancement Course	**SENVSC 1101**	Training course for water Quality Assessment	--	--	--	--	20	30	50
Ability Enhancement Course	AECEN1101	L1 – Compulsory English	10	06	04	40	--	--	50
Value Education Course	VECCI1101	Constitution of India	10	06	04	40	--	--	50
Community Engagement Services (CC)	CCXXX1101	Any one of NCC/ NSS/Sports/ Culture /Health Wellness /Yoga Education / Fitness	--	--	--	--	20	30	50

B. Sc. FIRST YEAR Environmental Science

SEMESTER – I

SENVCT1101: Fundamentals of Environmental Science (2 credit)

Course pre-requisite:

- The paper deals with fundamental knowledge of Environment which include soil and water and circulations of various elements in nature, meteorological phenomena, and atmospheric chemistry.

Course Objectives:

- To built-up scientific approach towards Environment.
- To acquire the knowledge necessity of elements and its circulations in nature
- To built-up scientific approach towards Environment

Course Outcomes:

- To built-up scientific approach towards Environment.
- To acquire the knowledge necessity of elements and its circulations in nature
- To built-up scientific approach towards Environment

Curriculum Details:

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.0		**Origin & Evolution of Biosphere**	**07**
	1.1	Introduction to Origin& Evolution of Biosphere	
	1.2	Early Lifeforms: fossils	
	1.3	Origin of life Chemical Basis	
	1.4	Evolution of Lifeforms through Ages	
2.0		**Concept & Scope**	**08**
	2.1	Concept, Principle and Scope of environment	
	2.2	Global environmental problems	
	2.3	Need of Environmental Education & awareness	
	2.4	Interaction between Earth, Man and Environment	
3.0		**Structure & Composition**	**07**
	3.1	Biosphere: Introduction, components	
	3.2	Hydrosphere: Structure of water, properties of water	
	3.3	Lithosphere: Origin, Soil Formation, Soil Properties	
	3.4	Atmosphere: Structure, composition	
4.0		**Biogeochemical Cycles**	**08**
	4.1	Introduction & Types of Biogeochemical cycles	
	4.2	Significance of Biogeochemical Cycles	
	4.3	Gaseous cycles: Nitrogen, Carbon, Oxygen, Water	
	4.4	Sedimentary Cycles: Phosphorus and Sulphur	
		Total	**30**

TextBooks:

- Principles of Ecology: P. S. Verma, V. K. Agarwal S. Chand and Co. New Delhi .
- Environmental Biology : P. D. Sharma Rastogi Publications, Meerut .
- Ecology and Environment : P. D. Sharma Rastogi Publications, Meerut .

- Principles of Environmental Biology : P. K. G. Nair Himalaya Publishing House, New Delhi .
- Environmental Biology : M. P. Arora Himalaya Publishing House, New Delhi
- General Ecology : H. D. Kumar , Vikas Publishing house, New Delhi
- BOTments of Ecology : Brijgopal, N. Bharadwaj Vikas Publishing house, New Delhi.
- Concepts of Ecology : N. Arumugam Saras Publication, Kottar, Dist. Kanyakumari .
- Plant Ecology : P. L. Kochhar
- A textbook of Environmental Studies : G. R. Chatwal, Harish Sharma, Himalaya Publishing House, New Delhi

ReferenceBooks:

- *Fundam*entals of Ecology: Eugene P. Odum, Natraj Publishers, Dehradun…
- Ecology and Field Biology : Robert Leo Smith Harper Collins college publication
- Environmental Ecology : Bill Freedman Academic Press, New York
- Environmental Science :New Central Book Agency ,Kolkata

SENVCP 1101: Practical Based on (SENVCT 1101)Fundamentals of Environmental Science (2 credits)

Course pre-requisite:

- Basic knowledge of components of Environment
- Must have knowledge of different environmental processes
- Student must know and aware about water resources

Course objectives:

- To develop an understanding of the interdisciplinary and holistic nature of the environment;
- To develop knowledge and understanding of environmental issues and principles and the ability to apply these to environmental management;
- To develop the ability to collect, collate, analyze and interpret environmental data;
- To assess physicochemical and biological water quality assessment and indices
- It will also highlight the problems associated with water shortages in India and familiarizes students with case studies on international and national conflicts on water

Course outcomes:

- To develop the ability to analyze water quality parameters;
- To study the sampling techniques of water collection, analysis and interpretation
- To foster positive attitudes, values and commitment to identifying, solving and preventing environmental problems;
- To resolve or give solution to the problems associated with water shortages in India

CurriculumDetails:SENVCP 1101: Practical Based on SENVCT 1101

Sr. No	Practical Exercises	Hrs. Required to cover the contents
1	Collection & Preservation of Water Samples	4
2	Measurement of rain fall by rain gauge.	4
3	Determination of wind velocity by anemometer.	4
4	Determination of wind direction by wind vane	4
5	Determination of the Color of given Water Sample	4
6	Determination of the odour of given Water Sample	4
7	Determination of the pH of given Water Sample	4
8	Determination of Residual chlorine from provided water sample	4
9	Determination of Turbidity from provided water sample by Turbidity meter.	4
10	Determination of conductivity by conductivity meter.	4
11	Determination of TDS of water.	4
12	To study the water sampling methods	4
13	Determination of Oil & Grease from Water sample	4
14	Estimation of Dissolved Oxygen from water by Winkler's method	4
15	Visit to Water reservoirs/Lakes/Rivers and water treatment plants and submission of Report	4

	Total	**60**

Text Books and Reference Books:

- EnvironmentalChemistry:B.K.Sharma,and H. Kaur,GoelPublishing House.
- EnvironmentalChemistrybyAK.De,NewAge InternationalPublishers
- BOTmentsof EnvironmentalChemistry: H.V.Jadhav.

SENVGE 1101: Environmental Awareness (2 credits)

Course pre-requisite:

- The course is offered for a student registered for undergraduate programme in the Faculty of Science and Technology who had primary training in the field of Environmental Science at higher secondary school level evident in terms of certificate by CBSC/ ICSC/HSC for entry level core courses in Environmental Science as Major subject.
- The students should have basic knowledge of Environment science.

Course objectives:

- To aware about Environmental issues.
- To Understand Man and Environment
- To create Environmental Awareness

Course outcomes:

- Students will know how to protect our Environment.
- Students will understand Environmental processes.
- Students will able to communicate among the Society about Environmental awareness.

CurriculumDetails:

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.0		**Introduction**	**07**
	1.1	Environment,Ecology,Ecosystems.	
	1.2	Importance of Biogeochemical Cycles.	
	1.3	Concept of Biodiversity,Indiaas a megadiversenation.	
	1.4	Biotic-Producers, Consumers and Decomposers.	
2.0		**Environmental Pollution**	**08**
	2.1	Definition of Pollution; Causes and effects.	
	2.2	Air Water, Soil and Noise pollution.	
	2.3	Solid waste: causes, effects.	
	2.4	Nuclear hazard causes, effects.	
3.0		**Global Issues**	**07**
	3.1	PhotochemicalSmog	
	3.2	Ozone layer depletion and Climate Change	
	3.3	Greenhouse effect and Global Warming.	
	3.4	Acid rain, deforestation etc	
4.0		**Role of an Individual in Pollution Mitigation**	**08**
	4.1	EnvironmentalEducation&Sensitization, Role of an Individual	
	4.2	Environmental summits and issues	
	4.3	Environmental Laws	
	4.4	Sustainable Development, Environmental policies and planning	

		Total	**30**

Text Books:

1. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.
2. Rosencranz, A., Divan, S., & Noble, M.L. 2001. Environmental law and policy in India. Tripathi 1992.
3. Sengupta, R. 2003. Ecology and economics: An approach to sustainable development. OUP.
4. Thapar, V. 1998. Land of the Tiger: A Natural History of the Indian Subcontinent. Warren, C. E. 1971. Biology and Water Pollution Control. WB Saunders.
5. World Commission on Environment and Development. 1987. Our Common Future. Oxford University Press.
6. A textbook of Environmental Chemistry and Pollution Control S.Chand and Company Ltd. 1998.
7. Environmental Chemistry by B.K. Sharma Krishna Prakashan 2014.

Reference Books:

1. Essentials of Ecology and Environmental Science Third Edition S.V.S. Rana Prentice Hall India New Delhi.
2. Environmental Pollution and Health hazards in India R. Kumar Efficient Offset Printers New Delhi.
3. Principles of Environmental Science, William P. Cunningham, Marry Ann Cunningham.Tata Mc Graw Publishing Company Ltd. New Delhi.
4. Environmental Encyclopedia William P Cunningham, Terence H Cooper , Eville Gorham and Malcolm T HepworthJaico Publishing Chennai

SENVSC 1101: Training course for water Quality Assessment (2 credits)

Sr. No	Practical Exercises	Hrs. Required
1	Collection of Water Sample	4

Course pre-requisite:

- The course is offered for a student registered for undergraduate program in the Faculty of Science and Technology who had primary training in the field of Environmental Science at higher secondary school level evident in terms of certificate by CBSC/ ICSC/HSC for entry level core courses in Environmental Science as Major subject.
- The students should have basic knowledge of Environment science.

Objectives:

The main objective of course is to improve the awareness and skills of the studentsin modern techniques of analysis of water for research and extension activities. Use of instruments and their general upkeep / maintenance, interpretation of analytical data and formulation of reports / recommendations...

Learning Outcomes

- Acquire the skill of water quality testing.
- It helps to get knowledge of equipment required for water quality testing.
- This course helps to file written reports on their findings of water analysis.
- This course gives the skill of survey, Laboratory analysis and interpretation of results

2	Preservation of Water Sample	4
3	Determination of the pH of given Water Sample	4
4	Determination of Electrical conductivity from provided water sample	4
5	Determination of Turbidity from provided water sample by Turbidity meter.	4
6	Determination of conductivity from provided by conductivity meter.	4
7	Determination of TDS from provided water sample	4
8	Estimation of CO2from provided water sample	4
9	Determination of Oil & Grease from Water sample	4
10	Estimation of Dissolved Oxygen from water by Winkler's method	4
11	Estimation of Alkalinity of provided water sample.	4
12	Estimation of Acidity from provided water sample.	4
13	Estimation of total hardness from water sample by E. D. T. A. method.	4
14	Estimation of calcium and magnesium from water samples	4
15	Estimation of chlorides from water sample by Argentometric method.	4
	Total	**60**

CurriculumDetails: SENVSC 1101: Training course for water Quality Assessment

Reference Books:

- Hand Book of Methods in Env. Studies by S. K. MAITI, ABD Publishers, Jaipur, India.
- Instrumental Methods of Chemical Analysis G. R. Chatwal and Anand Himalaya Publishing house, New Delhi.
- Environmental Science Principle & Pract. R. C. Das & Behera Prentice Hall of India Pvt. Ltd. New Delhi

ENVIRONMENTAL SCIENCE- CURRICULUM

B. Sc. FIRST YEAR

SEMESTER – II

B. Sc. First Year Semester II *(Level 4.5)*

Teaching Scheme

	Course Code	CourseName	CreditsAssigned			TeachingScheme (Hrs/ week)	
			Theory	Practical	Total	Theory	Practical
Major	**SENVCC 1151**	Basic Concepts in Ecology	02	--	**02**	02	--
	SENVCC 1152	Introduction to Water Pollution	02	--	**02**	02	--
	SENVCP 1153	Practical Based on SENVCC 1151 and SENVCC 1152	-	02	**02**		04
Minor	**SENVMC 1151**	Introduction of Ecology	02	--	**02**	02	
	SENVMC 1152	Basics of Water Pollution	02	--	**02**	02	
	SENVMP 1153	Practical Paper based on SENVMC1151 and SENVMC1152	-	02	**02**		04
Generic/Open Electives	**SENVGE 1151**	Environment and society	02	--	**02**	02	--
SkillEnhancement Course	**SENVSC 1151**	Soil Quality & Soil Health	--	02	**02**	--	04
Ability Enhancement Course	AECXX1151	L1 – Compulsory English	02	--	**02**	02	--
Value Education Course (VEC)	VECCI1151	IKS	02	-	**02**	02	--
Community Engagement Services (CES)	CCXXX1151	Any one of NCC/ NSS /Sports/ Culture /Health Wellness /Yoga Education / Fitness	-	02	**02**	--	04
Total Credits			**14**	**08**	**22**	**14**	**16**

B. Sc. First Year Semester I *(Level 4.5)*

Examination Scheme

[40% Continuous Assessment (***CA***) and 60% End Semester Assessment (***ESA***)]

(For illustration we have considered a paper of 02 credits, 50 marks, need to be modified depending on credits assigned to individual paper)

Subject	Course Code	CourseName	Theory				Practical		Total Col (6+7) / Col (8+9)
			Continuous Assessment (CA)			ESA			
			Class Test	Assignment/ Presentation/Viva/ Quiz/Open Book etc	Attendance	Total	CA	ESA	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Major	**SENVCC 1151**	Basic Concepts in Ecology	10	06	04	40	--	--	50
	SENVCC 1152	Introduction to Water Pollution	10	06	04	40	--	--	50
	SENVCP 1153	Practical Based on SENVCC 1151 and SENVCC 1152	--	--	--	--	20	30	50
Minor	**SENVMC 1151**	Introduction of Ecology	10	06	04	40	--	--	50
	SENVMC 1152	Basics of Water Pollution	10	06	04	40	--	--	50
	SENVMP 1153	Practical Paper based on SENVMC1151 and SENVMC1152	--	--	--	--	20	30	50
Generic/Other Electives	**SENVGE 1151**	Environment and society	10	06	04	40	--	--	50
Vocational & SkillEnhancement Course	**SENVSC 1151**	Soil Quality & Soil Health	--	--	--	--	20	30	50
Ability Enhancement Course	AECXX1151	L1 – Compulsory English	10	06	04	40	--	--	50
Value Education Course	VECCI1151	IKS	10	06	04	40	--	--	50
Community Engagement Services (CC)	CCXXX1151	Any one of NCC/ NSS/Sports/ Culture /Health Wellness /Yoga Education / Fitness	--	--	--	--	20	30	50

SENVCT1151: Basic Concepts in Ecology (2 credits)

Course pre-requisite:

- The course is offered for a student registered for undergraduate programme in the Faculty of Science and Technology who had primary training in the field of Environmental Science at higher secondary school level evident in terms of certificate by CBSC/ ICSC/HSC for entry level core courses in Environmental Science as Major subject.
- The students should have basic knowledge of Environment science.

Course objectives:

- To get familiarity with the basic concepts of Ecology.
- To understand the relationship of Abiotic and biotic factors.
- To know how the nature is working in all together.

Course outcomes:

- Students will know how both the factors are important for living system.
- Students will understand the benefits of adaptations. They will learn how important is species diversity to maintain the ecological balance

CurriculumDetails SENVCT1151: Basic Concepts in Ecology

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.0		**Introduction**	**07**
	1.1	Introduction of Ecology: Definition, Scope, Relation to Other Disciplines	
	1.2	Applications and Significance to Human Beings	
	1.3	Environmental Factors: A biotic- water, sunlight, temperature, soil, Humidity, wind	
	1.4	Biotic-Producers, Consumers and Decomposers.	
2.0		**Ecosystems**	**08**
	2.1	Aquatic ecosystem: Pond, Lake, River, Marine	
	2.2	Terrestrial ecosystem. biome. Deforestation; Desertification; Afforestation, Conservation of forest	
	2.3	Food chain: Grazing food chain, Detritus food chain; Food web,	
	2.4	Ecological pyramids: Pyramid of Number, Biomass and Energy.	
3.0		**Ecological Relationship and Adaptations**	**07**
	3.1	Ecological Relationship: Inter specific and intra-specific relationships- Neutralisms, Mutualism, Commensalisms, Ammensilism, Antagonisms,	

	3.2	Antagonistic Relationships, Symbiosis, Parasitism, Competition, Predation	
	3.3	Ecological adaptations: Adaptations in plants- Hydrophytes, Mesophytes, Xerophytes.	
	3.4	Adaptations in Animals- Aquatic and desert.	
4.0		**Community Ecology and Ecological Succession**	
	4.1	Community Ecology: Introduction and Definition,	
	4.2	Characteristics – Species Diversity, Growth Form, Dominance, Tropic Structure, Density. Frequency, Abundance.	**08**
	4.3	Ecological Niche, Eco-tone and Edge Effect.	
	4.4	Ecological Succession: Definition, Types of Ecological Succession.	
		Total	**30**

TextBooks:

1.. Principles of Ecology: P. S. Verma, V. K. Agarwal S. Chand and Co. New Delhi .

2. Environmental Biology: P. D. Sharma Rastogi Publications, Meerut .

3. Ecology and Environment: P. D. Sharma Rastogi Publications, Meerut .

4. Principles of Environmental Biology: P. K. G. Nair Himalaya Publishing House, New Delhi .

5. Environmental Biology: M. P. Arora Himalaya Publishing House, New Delhi

6.. General Ecology: H. D. Kumar , Vikas Publishing house, New Delhi

7.. BOTments of Ecology: Brijgopal, N. Bharadwaj Vikas Publishing house, New Delhi.

8. Concepts of Ecology: N. Arumugam Saras Publication, Kottar, Dist. Kanyakumari .

9. Plant Ecology: P. L. Kochhar

10. A textbook of Environmental Studies: G. R. Chatwal, Harish Sharma, Himalaya Publishing House, New Delhi

ReferenceBooks:

1.Fundamentals of Ecology: Eugene P. Odum, Natraj Publishers, Dehradun…

2. Ecology and Field Biology: Robert Leo Smith Harper Collins college publication

3.. Environmental Ecology: Bill Freedman Academic Press, New York

SENVCP1152: Practical Based on SENVCT1151 (2 credits)

Course pre-requisite:

- The course is offered for a student registered for undergraduate programme in the Faculty of Science and Technology who had primary training in the field of Environmental Science at higher secondary school level evident in terms of certificate by CBSC/ ICSC/HSC for entry level core courses in Environmental Science as Major subject.
- The students should have basic knowledge of Environment science.

Course objectives:

- ToenhancetheknowledgeaboutPhysicochemicalAnalysis of Water
- Todevelopnewmethodologies totackleenvironmental Problems.
- Toencouragestudentstodevelopandpromoteawarenessamongthesocietyregarding Ecology
- Tounderstandchemicallaboratorysafetyguidelines.

Course outcomes:

- To develop an understanding of the interdisciplinary and holistic nature of the environment;
- To develop knowledge and understanding of environmental issues and principles and the ability to apply these to environmental management;
- To develop the ability to collect, collate, analyze and interpret environmental data;
- To assess physicochemical and biological water quality assessment

Sr. No	Practical Exercises	Hrs. Required to cover the contents
1	Measurement of Atmospheric Humidity by Psychrometer.	4
2	Measurement of Light intensity by Lux meter.	4
3	Measurement of Relative Humidity	4
4	Determination of Plant population density	4
5	To determine the soil temperature by soil thermometer	4
6	Measurement of turbidity	4
7	Identification and description of Phytoplankton's	4
8	Identification and description of Zooplankton's	4
9	Study of Vegetation density by quadrant method.	4
10	Study of vegetation frequency by quadrant method	4
11	Study of Drinking water Standards	4
12.	Estimation of CO2 from provided water sample	4
13.	Determination of Oil & Grease from Water sample	4
14.	Estimation of Dissolved Oxygen from water by Winkler's method	4
15	Visit to Forest Reserve/National Park/Sanctuaries/Water reservoirs, and submission of Report	4
	Total	**60**

SENVGE 1151: ENVIRONMENTANDSOCIETY (2 credits)

Course pre-requisite:

- The course is offered for a student registered for undergraduate programme in the Faculty of Science and Technology who had primary training in the field of Environmental Science at higher secondary school level evident in terms of certificate by CBSC/ ICSC/HSC for entry level core courses in Environmental Science as Major subject.
- The students should have basic knowledge of Environment science.

Course objectives:

- To aware about Environmental issues.
- To Understand Man and Environment
- To create Environmental Awareness

Course outcomes:

- Students will know issues in Environment.
- Students will understand conflict between development & Environment.

Curriculum details SENVGE1151:EnvironmentandSociety

Module No.	Unit No.	Topic	Hrs. Required to cover the contents
1.0		**Introduction**	**07**
	1.1	Social and cultural construction of environment	
	1.2	Environmental thought from historical and contemporary perspective	
	1.3	Concepts of Gross Net Happiness	
	1.4	Concept of Aldo Leopold's Land Ethic	
2.0		**Issues of Environment**	**07**
	2.1	Significant global environmental issues such as acid rain, climate change, and resource depletion;	
	2.1	Historical developments in cultural, social and economic issues related to land, forest, and water management in a global context;	
	2.2	Interface between environment and society.	
	2.3	National issues of Environment	
3.0		**Development-environment conflict**	**08**
	3.1	Developmental issues and related impacts such as ecological degradation; environmental pollution;	
	3.2	Development-induced displacement, resettlement, and rehabilitation: problems, concerns	
	3.3	Compensative mechanisms; discussion on Project Affected People (PAPs).	
	3.4	Development-environment conflicts in India	
4.0		**Urbanization and environment**	**08**
	4.1	Production and consumption-oriented approaches to environmental issues in Indian as well as global context	
	4.2	Urban sprawl, traffic congestion and social-economic problems;	
	4.3	Impact of industry and technology on environment;	
	4.4	Urbanization and society, Conflict between economic and environmental interests.	
		Total	**30**

Reference Books:

1.Chokkan, K.B., Pandya, H. &Raghunathan, H. (eds). 2004. Understanding Environment. Sagar Publication India Pvt. Ltd., New Delhi.
2.Elliot, D. 2003. Energy, Society and Environment, Technology for a Sustainable Future Routledge Press.
3. Guha, R. 1989. Ecological change and peasant resistance in the Himalaya. Unquiet Woods,Oxford University Press, Delhi.
4.National Research Council (NRC). 1996. Linking Science and Technology to Society'sEnvironmental Goals. National Academy Press.
5.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.
6. Environmental Chemistry : B. K. Sharma Goel Publishing House, Meerut.
7.Environmental Science :Enger Smith, Smith, W. M. C. Brown , Company Publishing.
8.Fundamentals of Environmental Science : G. S. Dahliwal, G. S. Sangha, P. K. ralhan, Kalyani Publishers, New Delhi
9.Textbook of Environmental Studies for Undergraduate Courses: ErachBharucha (Universities Press), 2013.
10.Introduction to Environmental Science: Y. Anjaneyulu (B.S. Publication), 2008.
11.Environmental Science: UGC NET/SET (Danika Publishing Company), 2018.

SENVSC1151:Soil Quality & Soil Health

Objectives of Course:

To provide soil Quality testing for scientific farming withformalized way to build fundamental knowledge and skill in areas of soil sciences & Health

Course Outcomes:

- Acquire the skill of soil Quality testing.
- It helps to get knowledge of equipment required for soil testing.
- This course helps to file written reports on their findings of soil testing.
- This course gives the skill of survey, Laboratory analysis, and interpretation of results

Sr. No	Practical Exercises	Hrs. Required to cover the contents
1	Study of Soil sampling and collection methods	
2	To determine the soil temperature by soil thermometer	4
3	Determination of Total organic matter by Ignition method	4
4	Determination of Soil pH	4
5	Determination of water holding capacity of soil.	4
6	Determination of N. P. K.	4
7	Determination of bulk density of soil.	
8	Determination of soil conductivity.	4
9	Determination of Sodium from soil sample.	4
10	Determination of carbonates and Bicarbonates from soil sample	4
11	Determination of specific gravity of soil.	4
12	To identify the soil profile in the field	4
13	Determination of Texture from soil.	4
14	Identification of soil colour using Munshell Chart	4
15	Field visit to Agricultural area/Forest area/Grass-land and submission of Report	4
	Total	**60**

Reference Books:

• The Nature and Properties of Soils (Brady and Weil; Pierson/Prentice Hall Publisher) The current edition is the 14th edition.
• Hand Book of Methods in Env. Studies by S.K. MAITI ABD Publishers, Jaipur, India
• Environmental Science Principle & Pract. R.C. Das & Behera Prentice Hall of India Pvt. ltd. New Delhi 978-81-203-3330-7