

| Effective  | from Ses  | ssion : 2   | 024-202   | 5  |   |  |                                |                                  |                                 |                         |                          |                           |                            |                           |                              |                        |                       |                    |                    |
|--|---|---|---|--|---|--|--------------------------------|----------------------------------|---------------------------------|-------------------------|--------------------------|---------------------------|----------------------------|---------------------------|------------------------------|------------------------|-----------------------|--------------------|--------------------|
| Course C   | ode   |   |   | B1503  | 01T /ES   | 5218   | Title                          | of the G                         | Course                          | Biodi                   | iversity a               | nd its Cor                | iservation                 |                           |                              | L                      | Т                     | Р                  | С                  |
| Year   |   |   |   | 2 <sup>nd</sup>  |   |  | Seme                           | ester                            |                                 | Ш                       |                          |                           |                            |                           |                              | 3                      | 1                     | 0                  | 4                  |
| Pre-Requ   | isite   |   |   | 10+2   |   |  | Co-r                           | equisite                         |                                 | NIL                     |                          |                           |                            |                           |                              |                        |                       |                    |                    |
| Course O   | bjective  | S   |   | 1.To d<br>3.Explo<br>forms t   | evelop<br>oration o<br>hrough   | critical<br>of biodiv<br>various i   | underst<br>versity a<br>method | anding<br>and imp<br>s           | of the ortance                  | theory and of biodiv    | nd princi<br>versity. 4. | ples of bi<br>To identif  | odiversity.<br>y various t | 2.To pre<br>hreats rela   | edict patter<br>ated to biod | n of bio<br>liversity. | diversity<br>5.To cor | distrib<br>serve a | ution.<br>.ll life |
| CO1  | Gain kn   | owledg  | e on hio  | divorsity  | u ite vol   | 10 and w   | arious a                       | nnroach                          | for con                         | rse Outco               | omes                     |                           |                            |                           |                              |                        |                       |                    |                    |
| CO1  | Biodive   | ersity of   | India an  | d role o   | f local c   |  | ties and                       | traditic                         | nal kno                         | wledge it               | s.<br>1 conserv          | ation                     |                            |                           |                              |                        |                       |                    |                    |
| CO3  | Develop   | p knowl   | edge abo  | out biod   | iversity  | identific  | ation a                        | nd distri                        | bution.                         | in leage li             | r comper :               |                           |                            |                           |                              |                        |                       |                    |                    |
| CO4  | Underst   | tand the  | various   | conserv  | ation pr  | ocess.   |                                |                                  |                                 |                         |                          |                           |                            |                           |                              |                        |                       |                    |                    |
| CO5  | Learn w   | vildlife i  | ts impor  | tance, t   | hreat an  | d manag  | ement.                         |                                  |                                 |                         |                          |                           |                            |                           |                              |                        |                       |                    |                    |
| Unit<br>No.  | Title   | e of the  | Unit  |  |   |  |                                |                                  |                                 | Content                 | of Unit                  |                           |                            |                           |                              | Co<br>H                | ntact<br>Irs.         | Mapj<br>CO         | ped<br>D           |
| 1  | Introd<br>Biodiv  | uction<br>ersity  | to  | Bas<br>Biol<br>Spec  | ic conc<br>ogical l<br>ciation.   | epts; Ty<br>Diversity  | vpes (Sj<br>v; Biolo           | pecies o<br>gical a              | diversity<br>nd Phyl            | , Geneti<br>ogenetic    | c diversi<br>Species     | ty, Ecosys<br>Concept;    | stem diver<br>Basic Cor    | sity); Me<br>cept of S    | asurement<br>Species and     | of                     | 8                     | CO1<br>CO2         | &                  |
| 2  | Biodiv  | ersity P  | atterns   | Grac<br>patte  | lient of<br>erns: sea   | Biodive<br>sonal flu   | ersity, S<br>Ictuatio          | Spatial p<br>ns in bio           | oatterns:<br>odiversi           | latitudir<br>y pattern  | nal and e<br>is.         | levational                | trends in                  | biodivers                 | ity. Tempor                  | ral                    | 8                     | CO                 | 13                 |
| 3  | Biodiv  | ersity o  | f India   | India<br>of id   | a as a m<br>lentifica   | ega dive<br>tion of E  | rsity na<br>Biodiver           | tion; Bi<br>sity Ho              | ogeogra<br>tspots               | phic zone               | es of cou                | ntry; Eco-s               | ensitive zo                | one; Conce                | ept and basi                 | is                     | 8                     | CO<br>CO           | )2<br>)3           |
| 4  | Impor<br>Biodiv   | tance<br>ersity   | of  | Econ<br>and  | nomic v<br>ethical v  | values–m<br>values of  | edicina<br>biodive             | l plants<br>ersity. E            | s, drugs<br>cologica            | , fisherie<br>1 service | es and li<br>s.          | velihoods.                | Social, a                  | esthetic, c               | consumptive                  | e,                     | 8                     | CO<br>CO           | )1<br>)5           |
| 5  | Threat  | ts Ident  | ificatior   | Fact<br>IUC  | ors for I<br>N categ  | Decline<br>orizatior   | of Biolo<br>1                  | ogical D                         | oiversity                       | , Concep                | t of Exti                | nction, Thi               | reatened an                | nd Endang                 | gered Specie                 | es;                    | 6                     | CO                 | )5                 |
| 6  | Wildli  | fe Mana   | agemen  | t Gen<br>Prot  | eral inti<br>ection o   | roduction<br>f Wild F  | n; Defii<br>Iora, Fa           | nition,I<br>una and              | mportai<br>Natura               | nce; Reas<br>l Habitats | son for v<br>s.          | vildlife De               | pletion; W                 | /ildlife M                | anagement                    | ;                      | 6                     | CO                 | )5                 |
| 7  | Conser<br>biodive   | rvation<br>ersity   | of  | App<br>of lo<br>and  | roaches<br>cal com<br>national  | for Con<br>munities<br>efforts t   | servations and tra             | on of Bi<br>ditional<br>rve bioc | ological<br>knowle<br>liversity | Diversit<br>dge in co   | y: In-situ<br>nservatio  | i conservat<br>n; Biodive | ion, Ex-si<br>rsity conve  | tu conserv<br>ention; Int | ation; Role<br>ernational    | •                      | 8                     | CC<br>CC           | )1<br>)4           |
| 8  | Protec<br>Netwo   | ted A<br>rk   | rea   | Con-<br>grov   | cept of<br>es; imp  | pt of Biosphere Reserve; Structure and function of BR, National parks, Sanctuaries, and Sacred 8 CO2 CO4 |                                |                                  |                                 |                         |                          |                           |                            |                           |                              |                        |                       |                    |                    |
| Reference  | e Books:  |   |   |  |   | rity An Introduction Plackwell Science London LIV  |                                |                                  |                                 |                         |                          |                           |                            |                           |                              |                        |                       |                    |                    |
| <ol> <li>Gaston,</li> <li>Krishna</li> <li>Pandit,</li> <li>26:106</li> <li>Primack</li> <li>Singh, J</li> <li>Singh, J</li> <li>Sodhi, I</li> <li>Sodhi, I</li> </ol> | K J. & S<br>murthy, 1<br>M.K. &<br>1-1071.<br>c, R.B. 20<br>J. S. & Si<br>J. S., Sing<br>N.S. & EI<br>N.S., Gib | Spicer, J.<br>K.V. 20<br>Grumbin<br>002. Ess<br>ngh, S. I.<br>gh, S.P. 4<br>hrlich, P<br>oson, L. | I. 1998.<br>04. An .<br>entials c<br>P. 1987.<br>& Gupta<br>P.R. (Eds.<br>& Raver | . Biodive<br>Advance<br>2012. O<br>of Conse<br>. Forest<br>a, S. 200<br>s). 2010.<br>n, P.H. 2 | <ul> <li>Inversity: An Introduction. Blackwell Science, London, UK.</li> <li>Inced Text Book of Biodiversity - Principles and Practices. Oxford and IBH Publications Co. Pvt. Ltd. New Delhi.</li> <li>Ongoing and proposed hydropower development in the Himalaya and its impact on terrestrial biodiversity. Conservation Biology</li> <li>Inservation Biology (3rd edition). Sinauer Associates, Sunderland, USA.</li> <li>Inservation of the Himalaya. The Botanical Review 53: 80-192.</li> <li>Event Conservation Biology for All. Oxford University Press.</li> <li>In Conservation Biology: Voices from the Tropics. Wiley-Blackwell, Oxford, UK</li> </ul> |  |                                |                                  |                                 |                         |                          |                           |                            |                           |                              |                        |                       |                    |                    |
| e-Learn  | ing Sour  | rce:  |   |  |   |  |                                |                                  |                                 |                         |                          |                           |                            |                           |                              |                        |                       |                    |                    |
| 1. https://r<br>2. https://v<br>3 .https://v<br>4.https://o<br>5.https://o   | ncert.nic.i<br>www.cbd<br>www.iucr<br>nlinecour<br>nlinecour  | in/textbo<br>l.int/<br>n.org/reg<br>rses.npte<br>rses.swa   | ook/pdf/<br>gions/eu<br>el.ac.in/n<br>ayam2.ac                                    | /lebo115<br>rope/our<br>noc20_b<br>c.in/cec2   | 5.pdf<br>r-work/b<br>ot39/pre<br>21_ge31  | biodivers<br>view<br>/previev  | ity-cons                       | servation                        | n                               |                         |                          |                           |                            |                           |                              |                        |                       |                    |                    |
|  |   |   |   |  |   | C  | ourse A                        | Articula                         | tion Ma                         | atrix: (M               | apping o                 | of COs wit                | h POs and                  | 1 PSOs)                   |                              |                        |                       |                    |                    |
| PO-PSO<br>CO   | PO1   | PO2   | PO3   | PO4  | PO5   | PO6  | PO7                            | PO8                              | PO9                             | PO10                    | PO11                     | PO12                      | PSO1                       | PSO2                      | PSO3                         | PSO4                   | PSO                   | 5 P                | SO6                |
| CO1  | 3   |   |   |  |   |  | 2                              |                                  |                                 |                         |                          |                           | 3                          | 1                         |                              |                        | 1                     |                    |                    |
| CO2  |   |   |   | 3  |   |  | 2                              |                                  |                                 |                         |                          |                           | 3                          | 1                         |                              |                        | 1                     |                    |                    |
| CO3  |   |   | 1   |  |   |  | 2                              |                                  |                                 |                         |                          |                           | 3                          | 1                         |                              |                        | 1                     |                    |                    |
| CO4  |   |   |   |  |   | 3  | 2                              |                                  |                                 |                         |                          |                           | 3                          | 1                         |                              |                        | 1                     |                    |                    |
| CO5  |   |   |   |  |   | 3  | 2                              |                                  |                                 |                         |                          |                           | 3                          | 1                         | 2                            |                        | 1                     |                    |                    |
|  |   |   |   | 1- Lo  | ow Cori   | relation;  | 2- Mo                          | lerate (                         | Correlat                        | ion; 3- <mark>S</mark>  | ubstanti                 | al Correla                | tion                       |                           |                              |                        |                       |                    |                    |

Name & Sign of Program Coordinator



| Effectiv  | e from Session: 2024   | -2025                     |                              |   |      |           |      |     |  |  |  |  |
|---|--|---------------------------|------------------------------|---|------|-----------|------|-----|--|--|--|--|
| Course  | Course Code:B150302P/ES219Title of the CoursePractical on Understanding BiodiversityLTPCYear2 <sup>nd</sup> SemesterIII0042  |                           |                              |   |      |           |      |     |  |  |  |  |
| Year  |  | 2 <sup>nd</sup>           | Semester                     | ш   | 0    | 0         | 4    | 2   |  |  |  |  |
| Pre-Req   | luisite  | 10+2                      | Co-requisite                 | NIL   |      |           |      |     |  |  |  |  |
| Course  | Objectives   | This course provides      | students the knowledge a     | nd understanding of lab related to Biodiversity     |      |           |      |     |  |  |  |  |
|   |  |                           | Course                       | Outcomes  |      |           |      |     |  |  |  |  |
| CO1   | CO1 Learn to prepare the field report and herbarium sheet.   |                           |                              |   |      |           |      |     |  |  |  |  |
| CO2   | CO2 Practical skills about analyses of primary productivity by light and dark bottle method.   |                           |                              |   |      |           |      |     |  |  |  |  |
| CO3   | Coin knowledge on  | the analyses of number    | of species in a given area   | and chlorophyll content of plant.                   |      |           |      |     |  |  |  |  |
| Unit  | Gain knowledge on  |                           | ion of different physical p  | roperties of soil.                                  | Cont | act       | Manı | ned |  |  |  |  |
| No.   | Title of the Unit  |                           | Co                           | ntent of Unit                                       | Hrs  | acı<br>5. | CC   | )   |  |  |  |  |
| 1Field VisitField study on ecology and biodiversity of flora and fauna of a local area/ex-situ conservation<br>site and field report submission.<br>Preparation of field report based on the survey of local flora (herbarium sheet).15CO1      |  |                           |                              |   |      |           |      |     |  |  |  |  |
| 2   | 2Ecosystem<br>ProductivityTo determine the primary productivity by light and dark bottle method.<br>Measure the rate of respiration in an aquatic environment using dissolve oxygen probe.15CO2  |                           |                              |   |      |           |      |     |  |  |  |  |
| 3   | 3Study of SpeciesTo find out the reproductive capacity of species.<br>To determine the minimum size of quadrate by Species area curve method.<br>To determine the density/ abundance of various species occurring in a given area.<br>To study the species richness in a given area.<br>To determine chlorophyll content of the given plant material.15CO3 |                           |                              |   |      |           |      |     |  |  |  |  |
| 4       Soil Analysis       To study pore space, water holding capacity and bulk density of soil.<br>Qualitative analysis of soil organic carbon, Soil PH.<br>To study the texture of soil depending upon the particle size.       15       CO4 |  |                           |                              |   |      |           |      |     |  |  |  |  |
| Referen   | ce Books:  |                           |                              |   |      |           |      |     |  |  |  |  |
| 1. Anne<br>ISI  | E. Magurran, Brian J.<br>BN: 9780199580675.  | McGill (2011) Biologi     | cal Diversity: Frontiers in  | n Measurement and Assessment. Oxford University Pre | ess. |           |      |     |  |  |  |  |
| <ol> <li>Loreau, M. &amp; Inchausti, P. 2002. Biodiversity and Ecosystem functioning: Synthesis and Perspectives. Oxford University Press, Oxford, UK</li> </ol>  |  |                           |                              |   |      |           |      |     |  |  |  |  |
| 3. Pandey, P.N. (2017). Biodiversity Environmental Science Forestry, Narendra Publication house.  |  |                           |                              |   |      |           |      |     |  |  |  |  |
| 4. Rao I  | K.S, K.S. Rao (1993). I  | Practical Ecology. Anm    | ol Publication, 190 pages    |   |      |           |      |     |  |  |  |  |
| 5. Singh  | , J. S. & Singh, S. P. 1   | 987. Forest vegetation    | of the Himalaya. The Bot     | anical Review 53:80-192.                            |      |           |      |     |  |  |  |  |
| 6. Dane   | , J.H. & Topp, G.C. (2   | 2004). (eds) Methods of   | Soil Analysis: Part 4, Ph    | ysical Methods. SSSA                                |      |           |      |     |  |  |  |  |
| 7. Kaus   | hik, Anubha and Kausl  | hik, C.P. (2018) Perspec  | ctives in Environmental S    | tudies.   |      |           |      |     |  |  |  |  |
| e-Lear  | ming Source:   |                           |                              |   |      |           |      |     |  |  |  |  |
| 1. Stud   | ly of soil pH, https://yo  | outu.be/ViWCoeFwH91       | М.                           |   |      |           |      |     |  |  |  |  |
| 2. Prep   | paration of herbarium s  | heets, https://youtu.be/0 | CK4vepuWzrM                  |   |      |           |      |     |  |  |  |  |
| 3. Herl   | oarium - CSIR-NBRI,  | https://youtu.be/6tJdvD   | zPzR8.                       |   |      |           |      |     |  |  |  |  |
| 4. Prin   | nary productivity, https   | ://youtu.be/9LpMskfU      | gz0.                         |   |      |           |      |     |  |  |  |  |
| 5. Ligh   | nt-Dark bottle method,   | https://youtu.be/i5Tit41  | BgfIE.                       |   |      |           |      |     |  |  |  |  |
| 6. AM   | RITA, OLABS, Study   | of Physical Properties    | of Soil. http://amrita.olabs | .edu.in/?sub=79&brch=18∼=235&cnt=1                  |      |           |      |     |  |  |  |  |
|   |  |                           |                              |   |      |           |      |     |  |  |  |  |

|                  |     |         |         |         |     | Cou | ırse Ar | ticulat | ion Mat | rix: (Maj | pping of | COs with | POs and I | PSOs) |      |      |          |
|------------------|-----|---------|---------|---------|-----|-----|---------|---------|---------|-----------|----------|----------|-----------|-------|------|------|----------|
| PO-<br>PSO<br>CO | PO1 | РО<br>2 | PO<br>3 | PO<br>4 | PO5 | PO6 | PO<br>7 | PO<br>8 | PO9     | PO10      | PO11     | PO12     | PSO1      | PSO2  | PSO3 | PSO4 | PS<br>O5 |
| CO1              | 1   | -       | 1       | -       | 1   | 2   | 2       |         |         |           |          |          | 2         | 2     | 2    | 2    | 2        |
| CO2              | 1   | 1       | -       | -       | 1   | 2   | 2       |         |         |           |          |          | 2         | 2     | 2    | 2    | 2        |
| CO3              | 2   | 1       | -       | -       | -   | 1   | 2       |         |         |           |          |          | 2         | 1     | 2    | 2    | 2        |
| CO4              | 2   | -       | -       | -       | -   | 2   | 2       |         |         |           |          |          | 2         | 1     | 1    | 2    | 2        |

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



| Effect | tive from | n Sessi    | ion:20             | 24-25            |            |                    | Title          | f the C   | 011750     | Um                    | mon Wil       | dife Co     | nfligt &    | Managar         | nont          | T      | т          | D      |      |
|--------|-----------|------------|--------------------|------------------|------------|--------------------|----------------|-----------|------------|-----------------------|---------------|-------------|-------------|-----------------|---------------|--------|------------|--------|------|
| Cours  | se Code   | 2nd        | 03031/             | ES220            |            |                    | 1 tile o       | tor       | ourse      | Hu                    | man-wi        | diffe Co    | ninct &     | vlanager        | nent          | L<br>2 | 1          | P<br>0 |      |
| Tear   |           | 2<br>10+2  |                    |                  |            |                    | Semes          |           |            | MII NII               |               |             |             |                 |               | 3      | 1          | U      | 4    |
| Pre-   | icito     | 10+2       |                    |                  |            |                    | Co-re          | quisite   |            | Nil                   |               |             |             |                 |               |        |            |        |      |
| Kequi  | site      | Drovi      | ida aa             | noral inte       | oductio    | n abou             | t wildli       | fa mana   | aamant     | To stur               |               | of govern   | mont in s   | vildlife o      | onservation   | and r  | nanaga     | mont   |      |
| Cours  | 0         | The e      | iue gei<br>woluti  | on of w          | ildlife co | n abou             | t whulh        | t nolici  | es regat   | , 10 stut<br>ding pro | tected a      | reas in 21  | th centur   | wiidille o<br>w | JIISEI Vatioi | anu i  | nanage     | ment   | •    |
| Objec  | tives     | To st      | udv di             | fferent t        | vnesof F   | Inviror            | mental         | Act for   | · wild lif | e conser              | vation It     | nnortanc    | e of fores  | st produc       | e to tribal n | onulat | tion and   | l trih | a1   |
| Objec  | tives     | right      | in Ind             | ia               | ypesor L   | 111101             | incinai        | Act. 101  | wnum       | e consei              | vation. n     | nportane    |             | st produc       | c to thoat p  | opula  | lion and   | 1 1110 | ai   |
|        |           | Impa       | ct of h            | uman w           | ildlife co | onflict            | in envir       | onment    |            |                       |               |             |             |                 |               |        |            |        |      |
|        |           |            |                    |                  |            |                    |                |           |            | Course                |               |             |             |                 |               |        |            |        |      |
| ~~~    |           |            |                    |                  |            |                    |                |           | 0          | utcomes               | 3             |             |             |                 |               |        |            |        |      |
| CO1    |           | To Pi      | rovide             | d knowl          | edge of    | govern             | ment in        | Biodiv    | ersity co  | onservat              | ion.          |             |             |                 |               |        |            |        |      |
| CO2    |           | Be at      | ble to e           | explain p        | rotected   | areas              | and Eve        | olution   | of wild l  | ife conse             | ervation.     |             |             |                 |               |        |            |        |      |
| CO3    |           | Tocr       | eate ki            | nowledg          | e Enviro   | onmen              | tal Act.       | tor wild  | llife cor  | iservatio             | n.            |             |             |                 |               |        |            |        |      |
| C04    |           | Topi       | ovide              | d knowle         | edge trit  | bai pop            | ulation        | and trib  | al right   | in India              | •             |             |             |                 |               |        |            |        |      |
| 005    |           | Topi       | ovide              | d knowl          | edge of I  | numan              | Wildlife       | conflic   | et.        |                       |               |             |             |                 |               |        |            |        |      |
| Unit   |           | Title      | of                 | the              |            |                    |                |           |            | Conte                 | nt of Un      | it          |             |                 |               | Ce     | ontact     | Ma     | pped |
| No.    |           | Omt        |                    |                  |            |                    |                |           |            |                       |               |             |             |                 |               |        | nrs.       | Ľ      | .0   |
|        |           | Intro      | ductio             | n to             | Need o     | of Wild            | ilife ma       | inageme   | ent; Rea   | asons of              | Man-wi        | ldlife co   | nflict, In  | portance        | of Wild I     | ife    |            |        |      |
| 1      | 1         | wildli     | ife                |                  | conserv    | ation, l           | Role of g      | overnm    | ent, bio   | logists ar            | nd social s   | scientists  | in Wildlif  | e manage        | ment.         |        | 06         |        | CO1  |
|        |           | mana       | igemei             | nt               |            |                    |                |           |            |                       |               |             |             |                 |               |        |            |        |      |
|        |           | Prote      | ected a            | rea              | Protecte   | ed area            | a: Type        | s of p    | rotected   | areas,                | Wildlife      | Sanctua     | ries, Nati  | onal Par        | ks, Biosph    | ere    |            |        |      |
| 2      | 2         | andty      | pes                |                  | Reserve    | s. IUC             | N categ        | ories. C  | Concept    | of deep a             | and Shall     | ow ecolo    | gy.         |                 | -             |        | 06         |        | CO1  |
|        |           |            |                    |                  | Journe     | ey of n            | nankind        | from pr   | edator t   | o conser              | vator. Pre    | ehistoric a | associatio  | n betweer       | wildlife a    | nd     |            |        |      |
|        |           | Evolu      | ution o            | f                | humar      | ns: reco           | ords from      | n Bhim    | betka w    | all paint             | ings. Con     | servation   | of wildli   | ife in the      | reign of ki   | ng     |            |        |      |
|        | 3         | wildli     | ife                | _ I              | Ashok      | a: exc             | erpts fro      | m rock    | edicts,    | Bishnoi               | commun        | ity. Unde   | erstanding  | g wildlife      | managemen     | nt,    | 08         |        | CO2  |
|        |           | mana       | igemei             | nt               | conser     | rvation            | and poli       | cies reg  | arding p   | rotected              | areas in 2    | 1 st centu  | ry.         | -               | · · ·         |        |            |        |      |
|        |           | 11/1       | l:Co               |                  | Nationa    | I polic            | y govern       | ng wild   | dlife pro  | tection i             | n India, H    | Istorical   | perspecti   | ve evoluti      | on of polici  | es     |            |        |      |
|        |           | wild       | ure<br>muntio      | n                | Concor     | differe            | nt eras.       | ffor oro  | t policy   | , Nation              | al wildli     | ire action  | i pian an   | a its det       | alled revie   | w.     | 08         |        | CO3  |
| 2      | ł         | nolici     | ervauo<br>iesin Ir | ndia             | Concep     |                    | e and bu       | iier area | а шарг     | otected r             | ange.         |             |             |                 |               |        |            |        |      |
|        |           | pone       | com n              | iuu              | Drief in   | troduc             | tion to V      | Vildlife  | Drotacti   | on Acto               | f 1072 E      | oract A at  | 1027 En     |                 | tal Drotacti  |        |            |        |      |
| 4      |           | Wild       | life               |                  | Act 198    | R6 and             | Forest of      | ronserv   | ation Ac   | t 1980 I              | ntroducti     | on of Tig   | er task fo  | arce and N      | Jational Tig  | er     | 08         |        | CO2  |
| -      | ,         | conse      | rvation            | Acts             | Conserv    | vation /           | Authority      | /.        |            | . 1900. 1             | muouueu       | on or rig   | or tubic re | fee and i       | utional 115   |        | 08         |        | 05   |
|        |           | inInd      | ia                 |                  |            |                    |                |           |            |                       |               |             |             |                 |               |        |            |        |      |
| (      | 5         |            |                    |                  | Impact     | of con             | flict on       | humans    | and wi     | ldlife, in            | npact of h    | nabitat fra | agmentati   | on, social      | inequality    | in     |            |        |      |
|        |           | Lega       | l basis            | of               | terms of   | f fores            | t conserv      | vation.   | The natu   | ire and e             | xtent of      | legal and   | illegal tr  | ade in wi       | ldlife specie | es.    | 08         |        | CO4  |
|        |           | wildli     | ife con            | flicts           | Illegal v  | vildlife           | trade in       | India a   | nd diffe   | rent parts            | s of the w    | orld. Maj   | or trade r  | outes and       | trade cente   | rs     |            |        |      |
|        |           |            |                    |                  | with ref   | erence             | to India.      |           |            |                       |               |             |             |                 |               |        |            |        |      |
|        | 7         | <b>.</b> . |                    |                  | Introduc   | ction t            | o tribal       | rights    | in Ind     | ia. Imp               | ortance o     | of forest   | produce     | to triba        | l populatio   | ns.    |            |        |      |
|        |           | Intro      | ductio             | n to             | Schedul    | led trib           | es and of      | her trad  | itional I  | orest dw              | ellers (Re    | ecognition  | 1 of forest | right) Ac       | t, 2006.      |        | 08         |        | CO4  |
|        |           | triba      | irignts            | ;                |            |                    |                |           |            |                       |               |             |             |                 |               |        |            |        |      |
| 8      | 3         |            |                    | _                | Insight    | into th            | e impor        | tant cor  | flicts: I  | Keoladeo              | National      | Park co     | nflict of   | Bharatpur       | , Human a     | nd     |            |        |      |
|        |           | Wild       | life Co            | nflicts          | Elephan    | nt confl           | icts of k      | Cerala ar | nd West    | Bengal,               | Fisherma      | n and tig   | er conflic  | t of Sunda      | arbans Fore   | st,    | 08         |        | CO5  |
|        |           |            |                    |                  | Shifting   | g cultiv           | ation in I     | North ea  | ist India  |                       |               |             |             |                 |               |        |            |        |      |
| Refer  | ence Bo   | ooks:      |                    |                  |            |                    |                |           |            |                       |               |             |             |                 |               |        |            |        |      |
| 1      | Conove    | er M 2     | 001 F              | Resolving        | 9 Huma     | n Wild             | life Cor       | flicts.   | CRC Pre    | 255                   |               |             |             |                 |               |        |            |        |      |
| 2.     | Dickma    | an. A. J   | .2010              | Comple           | x ities of | <sup>2</sup> confl | ct: the i      | mportai   | nce of c   | onsideri              | ng social     | factors f   | or effect   | ively resc      | lving hum     | n–wi   | ldlife co  | onflio | et.  |
|        | Animal    | Consei     | rvatior            | 13:45            | 8-466.     |                    |                | <b>F</b>  |            |                       |               |             |             |                 |               |        |            |        |      |
| 3.     | Messm     | er. T. A   | A. 2000            | ). The e         | nergenc    | e of hu            | ıman–w         | ildlife o | conflict   | manage                | ment: Tu      | rning cha   | allenges i  | nto oppo        | rtunities. Ir | ternat | tional B   | io     |      |
|        | deterio   | ration &   | & Bioc             | legradat         | ion45:97   | 7-102.             |                |           |            | -80                   |               | 8           | 8           | rro             |               |        |            |        |      |
| 4.     | Paty, C   | . 2007.    | Forest             | t Govern         | ment an    | d Trib             | e. Conce       | ept Pub   | lishing    | Compan                | y.            |             |             |                 |               |        |            |        |      |
| 5.     | Treves    | A. &       | Karan              | th, K. U         | . 2003.    | Huma               | ncarni         | vore co   | onflict a  | ind persi             | -<br>pectives | on carniv   | ore man     | agement         | worldwide     | . Cons | servatio   | n      |      |
|        | Biology   | y17: 14    | 91-14              | 199              |            |                    |                |           |            | r er o                |               |             |             | 0               |               |        |            |        |      |
| 6.     | Woodr     | offe, R    | . 2005.            | People           | and Wil    | dlife: (           | Conflict       | and Co    | existen    | ce. Cam               | oridge.       |             |             | -               |               |        |            | -      |      |
| 7.     | Woodr     | offe, R.   | ., Thirg           | good, S.,        | & Rabi     | nowitz             | , A. 200       | 5. Peop   | ole and    | Wildlife.             | , Conflict    | orCoexi     | stence? (   | No. 9). C       | ambridge U    | Jniver | sity Pre   | ss     |      |
| o T    | omi       | Same       |                    |                  |            |                    |                | -         |            |                       |               |             |             |                 |               |        |            |        |      |
| e-Le   | https://  | Sourc      | t:<br>lidesh       | are net/o        | aijadmu    | aha122             | 11 /hum        | an wild   | life co    | flict 75              | 556106        |             |             |                 |               |        |            |        |      |
| 2      | https://  | www.s      | lidech             | are net/b        | nkc162     | 511a133<br>3/h11mr | n_wild1        | ife-cont  | flict_in   | hanke_n               | ational_n     | arknenal    |             |                 |               |        |            |        |      |
| 3      | https://  |            | lidesh             | are net/S        | AISIKA     | NPA'               | TRA/hi         | man-wi    | Idlife-co  | onflict-1             | 5530072       | 9           |             |                 |               |        |            |        |      |
| 4.     | https://  | slidenl    | aver.co            | m/slide          | /489797    | 1/                 | / IIU          |           |            | - mot 1               | 2220012       | -           |             |                 |               |        |            |        |      |
| 5.     | https://  | wwws       | lidesh             | are.net/s        | ubinkme    | ohan/st            | rategies       | -adonte   | ed-to-m    | itigate-h             | umaneler      | phant-co    | uflict-hec  | -in-and-a       | round-kers    | la-    |            |        |      |
| 6.     | https://  | www.s      | lidesh             | are.net/r        | ajatrmr/v  | wildlif            | e-preser       | itation-  | 872416     | 81forest              |               |             |             |                 |               |        |            |        |      |
|        | 1         |            |                    | Course           | Articula   |                    |                |           |            |                       |               |             |             |                 |               |        |            |        |      |
|        |           |            |                    |                  |            |                    |                |           |            |                       |               |             |             |                 |               |        |            |        |      |
| PO-    | POI       | Deea       | DOG                | DOL              | DOG        | DOC                | DOG            | DOO       | DOO        | POIN                  | POIL          | POID        | DOCT        | Dagos           | DCOC          | DOO    | 1          | 05     | 1500 |
| PSO    | POI       | PO2        | PO3                | P04              | P05        | PO6                | P07            | P08       | P09        | PO10                  | POIL          | P012        | PSOI        | PSO2            | PS03          | PS04   | + PS       | 05 1   | -506 |
| C01    | 3         | 1          | 2                  | 1                | 1          | 3                  | 2              |           |            |                       |               |             | 3           | 3               | 2             | n      | -          | 2      |      |
| CO2    | 3         | 1          | 2                  | 1                | 1          | 3                  | 2              |           |            |                       |               |             | 3           | 3               | 3             | 2      |            | 2      |      |
| CO3    | 3         | 1          | 2                  | - 1              | 1          | 3                  | 2              |           |            |                       | <u> </u>      |             | 3           | 3               | 2             | 2      |            | 2      |      |
| CO4    | 3         | 1          | 3                  | 1                | 1          | 3                  | 2              |           |            |                       | <u> </u>      |             | 3           | 3               | 2             | 2      |            | 2      |      |
| CO5    | 3         | 1          | 3                  | 1                | 1          | 3                  | 2              | -         | -          | -                     | -             | -           | 3           | 3               | 3             | 3      |            | 2      | -    |
|        |           | •          | •                  | •                | •          | 1- Lo              | w Corr         | elation:  | 2- Mo      | lerate C              | orrelatio     | on; 3- Su   | bstantia    | l Correla       | tion          |        | - <b>·</b> |        |      |
|        |           |            |                    |                  |            |                    |                |           |            |                       |               | , <b>u</b>  |             |                 |               |        |            |        |      |
|        |           |            |                    |                  |            |                    |                |           |            | 1                     |               |             |             |                 |               |        |            |        |      |
|        |           |            |                    |                  |            |                    |                |           |            |                       |               |             |             |                 |               |        |            |        |      |
|        |           |            | N                  | <u>ame &amp;</u> | Sign of    | Progr              | <u>am Co</u> o | ordinat   | or         |                       |               |             | Sig         | n & Seal        | of HoD        |        |            |        |      |



| Effectiv    | e from Session: 2024   | -2025  |  |  |                  |                  |                     |               |  |  |  |  |
|-------------|--|--|--|--|------------------|------------------|---------------------|---------------|--|--|--|--|
| Course      | Code   | B150304P/ ES221  | Title of the Course  | Wildlife Management Lab  | L                | Т                | Р                   | С             |  |  |  |  |
| Year        |  | 2 <sup>nd</sup>  | Semester   | ш  | 0                | 0                | 4                   | 2             |  |  |  |  |
| Pre-Req     | luisite  | 10+2   | Co-requisite   |  |                  |                  |                     |               |  |  |  |  |
| Course      | Objectives   | This course provides a<br>Additionally, the concept<br>between interlink and its | the concepts, essential elements of agroforestry and its estates structure, functioning aspect | ents and skills related to wildlife conserv<br>blishment. Furthermore, ecosystem studies e<br>s. | vation<br>xplore | and m<br>the dif | nanagem<br>ferences | ent.<br>3, in |  |  |  |  |
|             | Course Outcomes  |  |  |  |                  |                  |                     |               |  |  |  |  |
| CO1         | O1         Student will explore the Sanctuaries / National Park and understand about wildlife. |  |  |  |                  |                  |                     |               |  |  |  |  |
| CO2         | Case study of threats to wetlands  |  |  |  |                  |                  |                     |               |  |  |  |  |
| CO3         | The student will be to understand the principle and component of Agroforestry.                 |  |  |  |                  |                  |                     |               |  |  |  |  |
| CO4         | Student will learn about abiotic and biotic component of terrestrial ecosystem.                |  |  |  |                  |                  |                     |               |  |  |  |  |
| Unit<br>No. | Title of the Unit  | Content of Unit Contact Mapped<br>Hrs. CO  |  |  |                  |                  |                     |               |  |  |  |  |
| 1           | Wild life field Visit  | Visit to Wild life San   | ctuary/National Park.  |  | 1                | 5                | CO                  | 1             |  |  |  |  |
| 2           | Visit to wetlands  | Visit and documentat   | ion of threats to wetlands   |  | 1                | 5                | CO                  | 2             |  |  |  |  |
| 3           | Agroforestry<br>concept/system   | To study about the co  | mponent of Agroforestry syst   | em.  | 1                | 5                | CO                  | 3             |  |  |  |  |
| 4           | Ecosystem Studies  | To study Forest ecosy  | vstem.   |  | 1                | 5                | CO                  | 4             |  |  |  |  |
| Referen     | ce Books:  |  |  |  |                  |                  |                     |               |  |  |  |  |
| 1. B. B. I  | Hosetti, M. Venkatesh  | warlu Wildlife Manageme  | ent and Conservation: Contem   | porary Principles and Practice   |                  |                  |                     |               |  |  |  |  |
| 2. 5 K 0    | upta Textbook of with  | 's Wildlife History Perma  | nont Black New Delhi India   |  |                  |                  |                     |               |  |  |  |  |
| 5. Kaliga   | uajan M. (2001) muta   | s whome History, Fernia  | ment Black, New Denn, mula   | •  |                  |                  |                     |               |  |  |  |  |
| e-Lear      | rning Source:  |  |  |  |                  |                  |                     |               |  |  |  |  |
| 1. https    | ://drive.google.com/fil  | e/d/1izgQNDS-djRymkXZ  | Z9DLvP7N4wQGWoP1i/view   | 7  |                  |                  |                     |               |  |  |  |  |
| 2. https    | ://www.cifor-icraf.org   | /publications/pdf/books/Ag   | groforestry-primer-02.pdf  |  |                  |                  |                     |               |  |  |  |  |
| 3. https:// | 3. https://www.rlbcau.ac.in/pdf/Forestry/FWM-136%20%20Wildlife%20biology.pdf                   |  |  |  |                  |                  |                     |               |  |  |  |  |

|                  |     |     |     |     |     | Cour | se Artio | culation | Matrix | : (Mapp | ing of C | Os with I | POs and l | PSOs) |      |      |      |      |
|------------------|-----|-----|-----|-----|-----|------|----------|----------|--------|---------|----------|-----------|-----------|-------|------|------|------|------|
| PO-<br>PSO<br>CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6  | PO7      | PO8      | PO9    | PO10    | PO11     | PO12      | PSO1      | PSO2  | PSO3 | PSO4 | PSO5 | PSO6 |
| CO1              | 3   | 1   | 1   | 1   | 2   | 3    | 1        | -        | -      | -       | -        | -         | 1         | 2     | 3    | 3    | 3    | -    |
| CO2              | 3   | 1   | 1   | 1   | 2   | 3    | 1        | -        | -      | -       | -        | -         | 1         | 2     | 3    | 3    | 3    | -    |
| CO3              | 3   | 1   | 1   | 1   | 2   | 3    | 1        | -        | -      | -       | -        | -         | 1         | 2     | 3    | 3    | 3    | -    |
| CO4              | 2   | 1   | 1   | 1   | 2   | 3    | 1        | -        | -      | -       | -        | -         | 1         | 2     | 3    | 3    | 3    | -    |

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



| Effect       | tive fr               | om Sess                                 | ion: 202                | 24-25                                   |  |   |   | •   |   |  |   |   |   |  |  |                  |                            |                                     |             |
|--------------|-----------------------|---|-------------------------|---|--|---|---|---|---|--|---|---|---|--|--|------------------|----------------------------|-------------------------------------|-------------|
| Cours        | se Cod                | le                                      | I150                    | 307T/                                   | ES224  | 1   | 1   | Fitle of 1  | the Cou   | rse  | Env   | vironmen  | nt and Eco  | nomics   |  | L                | Т                          | Р                                   | С           |
| Year         |                       |   | 2 <sup>nd</sup>         |   |  |   | S   | Semeste   | r   |  | Ш   |   |   |  |  | 2                | 1                          | 0                                   | 3           |
| Pre-R        | equisi                | ite                                     | 1                       | 0+2                                     |  |   | (   | Co-requ   | isite   |  | Nil   |   |   |  |  |                  |                            |                                     |             |
| Cours        | se Obj                | ectives                                 | The p<br>enhar<br>asses | ourpose<br>ncing ki<br>sment.           | of this<br>nowledg<br>After su   | course i<br>ge of Er<br>Iccessfu                        | is to imp<br>vironme<br>lly com                           | part basi<br>ental Im<br>pletion o                    | ic and ke<br>apact ass<br>of cours                      | ey knowl<br>sessment<br>e, the stu           | edge of E<br>Process,<br>dent will              | Environm<br>methodo<br>be able to                 | ental Impa<br>logies of E<br>o explore s              | ct and Risl<br>nvironmen<br>ubject into              | Assess<br>tal Impac<br>their resp            | ment.<br>et asse | This w<br>essmen<br>e dime | vill help i<br>t and Ris<br>nsions. | n<br>k      |
|              |                       |   |                         |   |  |   |   | Co  | ourse O   | utcomes                                      |   |   |   |  |  |                  |                            |                                     |             |
| C01          | St                    | tudents                                 | will be a               | ble to a                                | nalyse t   | he role o   | of ecolog   | gical eco   | onomics   | in influe                                    | ncing the                                       | demand  | and Supply  | y in Market  | s and env                                    | vironm           | nental p                   | olicy.                              |             |
| CO2          | St                    | tudents v                               | will be al              | ole to ev                               | valuate o  | costs and   | d benefi  | ts of pol   | lution c  | ontrol by                                    | adopting  | market-b  | ased instru   | iments for the form                                  | controllin                                   | g Env            | vironme                    | ental poll                          | ution.      |
|              | de                    | evelopm                                 | ent.                    |   |  | mortan  | ca of str   | now gui   |   | 1 custain                                    | bility in a                                     | developin   | o instrume  | mts for im   |  |                  | toinabi                    | lity                                | lable       |
| U-4          | 51                    | lucents                                 | will be a               |   | liaryse II   | пропан  |   | ategies   |   | 1 Sustaina                                   |   | developin   | ig instrume   | ints for mig   | Jementin                                     | g Sus            |                            | inty.                               | ·           |
| No.          |                       | Title<br>Unit                           | of the                  |   |  |   | Conte   | ent of U  | nit   |  |   |   |   |  |  |                  | ntact<br>Hrs.              | M                                   | appe<br>dCO |
| 1            | In<br>to<br>Ec        | troduct<br>Ecolo<br>conomic             | ion<br>ogical<br>s      | Scope<br>mech<br>and<br>Ecosy           | e and I<br>anisms<br>Quality<br>ystem se   | mportan<br>and cho<br>: Enviro<br>ervices,              | nce of l<br>bices, be<br>onmenta<br>Value A               | Ecologia<br>enefits a<br>al Exte<br>addition          | cal Econ<br>of Enviro<br>rnalities<br>in Agri           | nomics,<br>onmental<br>and<br>culture C      | Economic<br>protectic<br>he prob<br>rops, Agi   | es and E<br>on: Dema<br>blem of<br>ricultural     | Environmer<br>and and su<br>social co<br>Marketing    | ntal Policy<br>pply, mark<br>ost. Valua              | , market<br>et Price<br>ation of             |                  | 10                         |                                     | CO1         |
| 2            | Ec<br>Be              | cologica<br>enefits                     | l Cost                  | Econ<br>Contr<br>Bene<br>Bene           | omic A<br>rolling (<br>fits of<br>fit Anal   | Analysis<br>Green H<br>Pollutic<br>lysis.               | of Cli<br>louse Ga<br>n contr                             | mate c<br>asses, C<br>ol, Ove                         | hange,<br>arbon 7<br>erview (                           | Benefits<br>Trading a<br>of Cost             | of cont<br>nd CDM<br>Benefit                    | rolling C<br>mechani<br>Analysis,                 | Green Hou<br>sms. Meas<br>Economic                    | use Gasses<br>ouring the 0<br>c Principle            | , Cost of<br>Cost and<br>is of Cos           | of<br>st         | 10                         |                                     | CO2         |
| 3            | E:<br>IP:             | nvironr<br>rotectio                     | nenta<br>n              | Meas<br>Meth<br>of Int                  | uremen<br>ods, He<br>tegrated  | t of Ed<br>donic M<br>Environ                           | conomic<br>Market<br>nmental                              | Value<br>Method<br>account                            | of En<br>s, Marl<br>ting, Gre                           | vironmen<br>ket Base<br>een Acco             | nt, contin<br>d Instrum<br>unting.              | ngent val<br>nents for                            | uation me<br>Pollution                                | ethod, Tra<br>Control,                               | vel Cost<br>Systems                          |                  | 10                         |                                     | CO2         |
| 4            | Ec<br>Su              | conomic<br>Istainab                     | ility                   | Defir<br>Ecolo<br>Susta<br>Mode<br>Deve | nition ar<br>ogical F<br>inable 1<br>els of S<br>lopment   | nd Dime<br>Footprin<br>Develop<br>Sustainal<br>t, Educa | ensions<br>t, Globa<br>oment, N<br>oility, E<br>ution for | of Sust<br>al Envir<br>National<br>nvironn<br>Sustain | ainabilit<br>ronment<br>Sustair<br>nental S<br>ability. | y, Globa<br>al Moni<br>aable De<br>ustainabi | l Challen<br>coring an<br>velopmen<br>lity Inde | nges of S<br>ad Assess<br>at Strateg<br>ex, Globa | ustainable<br>sment, Gu<br>gies, Sustai<br>1 Action a | Developm<br>iding Prind<br>nability Ir<br>nd Sustain | ent, The<br>ciples of<br>idicators,<br>iable |                  | 10                         |                                     | CO3         |
| 5            | Sti<br>Gl<br>Su       | rategies<br>lobal<br>ıstainab           | ility                   | An E<br>imple<br>Capit<br>Susta         | An Economic perspective to Sustainability, Strategies for Global Sustainability, Instruments for implementing Sustainability-Finding Right Prices, the Hardwick - Sorrow rule, Critical Rental Capital, Safe minimum Standard, Steady State Principles. Policy Implications for implementing Sustainability.                                   |   |   |   |   |  |   |   |   |  |  | 10 CO4           |                            | CO4                                 |             |
| 6            | Ec<br>So<br>Er<br>IP: | conomic<br>dutions<br>ivironn<br>rogram | to<br>nenta<br>s        | Socia<br>Marg<br>Pollu<br>envire        | Decial Cost and Benefits of Environmental Programs, Marginal Social benefit of Abatement,       10         CO2       CO2         Dulution, Disposal of Toxic and Hazardous Waste –Standards vz. emission charges,       10         Divironmental subsidies, modelling and emission charges, polluter pays principle, pollution permit       10 |   |   |   |   |  |   |   |   |  |  |                  |                            |                                     |             |
| Refer        | ence I                | Books:                                  |                         | IIaul                                   | rading system.   |   |   |   |   |  |   |   |   |  |  |                  |                            |                                     |             |
| 1            | Bhatta                | acharva                                 | RN 20                   | 01 An1                                  | An Economic perspective Owford University Press  |   |   |   |   |  |   |   |   |  |  |                  |                            |                                     |             |
| 2.           | Enviro                | onmenta                                 | 1 Econo                 | mics an                                 | d Susta  | inability   | Jose G  | Vargha  | is-Hern   | andes. M                                     | onowar A  | lam Kha   | lid. Pawan  | Kumar Bh   | arti. 2018                                   | 3. Disc          | overv                      | Publishir                           | ng House    |
|              | Pvt. L                | td ISBN                                 | 978-93                  | -86841                                  | is841-37-7 Pg 202.   |   |   |   |   |  |   |   |   |  |  |                  |                            |                                     |             |
| 3.           | Hanle                 | y, Nick                                 | and Rob                 | erts C.J                                | ts C.J.2002, Issues in Environmental Economics, Black well Publishers, U. K  |   |   |   |   |  |   |   |   |  |  |                  |                            |                                     |             |
| 4.           | Ward                  | F. A. 20                                | 06, Env                 | ironmeı                                 | ntal and   | Natural   | Resour  | ce Econ   | omics, l  | Pearson I                                    | rentice H                                       | Iall, New   | Jersey.   |  |  |                  |                            |                                     |             |
| e-Le         | earnin                | ng Souro                                | e:                      |   |  |   |   |   |   |  |   |   |   |  |  |                  |                            |                                     |             |
| 1-http       | s://ww                | ww.soas                                 | ac.uk/ce                | dep-de                                  | mos/000  | 0_P570_   | IEEP_   | K3736-I   | Demo/m  | odule/pd                                     | fs/p570_  | unit_01.p   | df  |  |  |                  |                            |                                     |             |
| 2-http       | s://ww                | ww.sfu.c                                | a/~wain                 | wrig/Ec                                 | con400/  | docume  | nts/Eco   | n_460_l   | Lecture-  | Notes-pa                                     | rt_One-1  | 0-3.pdf   |   |  |  |                  |                            |                                     |             |
| 3- htt       | ps://oc               | cw.mit.e                                | du/cours                | ses/ecor                                | nomics/1   | 14-42-er  | wironme   | ental-pol   | licy-and  | -econom                                      | cs-spring                                       | -2011/lec   | ture-notes/   |  |  |                  |                            |                                     |             |
| 4- http      | os://np               | tel.ac.in                               | /courses                | /10910                                  | 7171/  |   |   | _   |   |  |   |   |   |  |  |                  |                            |                                     |             |
| PO           |                       |   |                         |   |  |   | Course .  | Articula  | tion Ma   | trix: (Ma                                    | pping of  | COs with  | POs and H   | PSOs)  |  |                  | [                          |                                     |             |
| -<br>PS<br>O | PO1                   | PO2                                     | PO3                     | PO4                                     | PO5  | PO6   | PO7   | PO8   | PO9   | PO10   | PO11  | PO12  | PSO1  | PSO2   | PSO3   | P                | PSO4                       | PSO5                                | PSO6        |
| C01          | 3                     | 1                                       | 2                       | 1                                       | 1  | 1   | 3   |   |   |  |   |   | 3   | 1  | 3  |                  | 2                          | 2                                   |             |
| CO2          | 3                     | 1                                       | 2                       | 1                                       | 2  | 3   | 3   | -   | -   | -  | -   | -   | 2   | 1  | 3  |                  | 2                          | 2                                   | -           |
| CO3          | 3                     | 1                                       | 2                       | 1                                       | 2  | 3   | 3   | -   | -   | -  | -   | -   | 3   | 1  | 2  |                  | 2                          | 2                                   | -           |
| CO4          | 3                     | - 1                                     | 2                       | 1                                       | -  | 3   | 3   | -   | -   | -  | -   | -   | 3   | 1  | 3  |                  | 2                          | 2                                   | -           |
| 201          | 5                     |   | -                       | 1                                       | 5  | 5   |   | -<br>ow Cor   | -<br>relation   | -<br>: 2- Mod                                | -<br>erate Co                                   | -<br>rrelation                                    | 3- Subst  | antial Cor   | ر<br>relation                                |                  | 2                          | 2                                   | -           |

Name & Sign of Program Coordinator Sign & Seal of HoD



| Effectiv    | e from Session :  | 2024-202   | 25   |  |   |  |  |  |  |  |  |  |
|-------------|---|--|--|--|---|--|--|--|--|--|--|--|
| Course      | Code  | I15030   | 8T/ES226   | Title of the Course  | Environment and Sustainability  | L T  | P  | C  |  |  |  |  |
| Year        |   | 2 <sup>na</sup>  |  | Semester   | 111   | 2 1  | 0  | 3  |  |  |  |  |
| Pre-Req     | luisite   | 10+2   |  | Co-requisite   | Basic knowledge of environment  |  |  |  |  |  |  |  |
| Course      | Objectives  | A sust<br>challen<br>designe<br>involve<br>ecosyst<br>discipli | ainable human society :<br>ge of how we achieve a<br>ed to help the students to<br>ed in formulating and<br>terms. With the common<br>ine can creatively contrib | is one that satisfies its ne<br>sustainable society is a vit<br>b bridge the scientific appre<br>administering environmer<br>goal of defining and unc<br>wite towards this end | eeds without jeopardizing the opportunity of future genera<br>all theme that unites the various disciplines within environme<br>bach to analyzing and solving environmental problems with the<br>ntal policy and the historic and philosophical basis of l<br>derstanding environmental sustainability, the course identified | tions to sat<br>ental studie<br>he socioeco<br>numanity's<br>les how eac | isfy theirs<br>s. This cour-<br>nomic con<br>relationshi<br>th participa | . The<br>rse is<br>cerns<br>ip to<br>ating |  |  |  |  |
|             |   | unserph  |  | Course   | Outcomes  |  |  |  |  |  |  |  |
| CO1         | Understand th   | he basic c   | concept of Sustainable D   | evelopment (SD), the envir   | conmental, social and economic dimensions.  |  |  |  |  |  |  |  |
| CO2         | In depth learn  | ning and   | analysis of factors that su  | apport to achieve sustainab  | ility and resilience in an individual level and in a community  |  |  |  |  |  |  |  |
| CO3         | Develop an er   | ncompas  | sing understanding of su   | stainability issues.   |   |  |  |  |  |  |  |  |
| CO4         | Understand the<br>dynamics of t   | he ember<br>hese sys   | dment of sustainability i tems.  | ssues in environmental, so   | scietal, and economic systems, and the relevance of the con   | ditions, inte  | rrelations,  | and  |  |  |  |  |
| CO5         | Demonstrate   | knowled  | ge and understanding of  | the current sustainable dev  | elopment policies followed by selected countries  |  |  |  |  |  |  |  |
| Unit<br>No. | Title of the  | Unit   |  | Col  | ntent of Unit   | Contact<br>Hrs.  | Mapj<br>C(   | ped<br>D                                   |  |  |  |  |
| 1           | Introduction to<br>Sustainable<br>Development   | 0  | Broad introduction to<br>SD perspectives (ME<br>outcome; later UN su   | SD - its importance, need,<br>DGs AND SDGs) over the<br>mmits (Rio summit, etc.) a   | impact and implications; definition coined; evolution of<br>e years; recent debates; 1987 Brundtland Commission and<br>and outcome.   | 8  | CO1  | &2   |  |  |  |  |
| 2           | Dimensions       to       Society, environment, culture and economy; current challenges - natural, political, socio-economic       8       CO, 2&         Sustainable       imbalance; sustainable development initiatives and policies of various countries: global, regional, national, local; needs of present and future generation - political, economic, environmental.       8       CO, 2&       CO5         Sustainability and development indicators and SDGs. UN's outlook of sustainable development and efforts       Sustainability and environmental.       Sustainability and environmental.       Sustainability and environmental.       Sustainability and environment and efforts |  |  |  |   |  |  |  |  |  |  |  |
| 3           | Gauging<br>Sustainable<br>DevelopmentSustainability and development indicators and SDGs, UN's outlook of sustainable development and efforts,<br>UN SDGs - structure, governance and partnerships; communities / society: ensuring resilience and<br>primary needs in society; biosphere: development within planetary boundaries; strengthening institutions10CO2, 3 &5  |  |  |  |   |  |  |  |  |  |  |  |
| 4           | Challenges for  | r SD   | Climate change, res<br>human/ecosystem tox<br>Environmental manag  | source depletion, food-e<br>cicity, smog, ozone depletic<br>ement in industry-A case s   | energy-water nexus, eutrophication, acidification,<br>on. Concept of Carbon Credit, Carbon Footprint.<br>tudy.  | 10   | CO 2<br>&:   | 2,3,4<br>5                                 |  |  |  |  |
| 5           | Sustainability<br>Practices   |  | Zero waste and R c<br>Environmental Impa<br>efficiency, Sustainal<br>carboncycle, emission<br>and technological cha  | concept, Circular economy<br>ct Assessment. Sustainable<br>ble transports. Sustainable<br>n and sequestration, Green<br>inge.  | y, ISO 14000 Series, Material Life cycle assessment,<br>le habitat: Green buildings, Green materials, Energy<br>e energy: Non-conventional Sources, Energy Cycles,<br>Engineering: Sustainable urbanization-Socioeconomical   | 12   | CO4<br>CC  | &<br>)5                                    |  |  |  |  |
| 6           | Activities  |  | Plantation, best out<br>Composting, Plastic I  | of waste, Determine Yo<br>Pollution strategy, Save En  | ur Carbon Footprint, Visit the Local Recycling Centre, ergy, Inspire Sustainable Attitudes  | 12   | CO1, 1<br>&:   | 2,3,4<br>5                                 |  |  |  |  |
| Referen     | ce Books:   |  |  |  |   |  |  |  |  |  |  |  |
| 1.          | Anubha Kaushi   | ik and C.  | P. Kaushik's "Perspecti  | ves in Environmental Stud  | ies", 6th Edition, New Age International Publishers ,2018.  |  |  |  |  |  |  |  |
| 2.          | Benny Joseph,   | 'Environ   | mental Science and Eng   | ineering', Tata McGraw-H   | ill, New Delhi, 2016.   |  |  |  |  |  |  |  |
| 3.          | Gilbert M.Mast  | ters, 'Inti  | roduction to Environmen  | tal Engineering and Scienc   | e', 2nd edition, Pearson Education, 2004.   |  |  |  |  |  |  |  |
| 4.          | Allen, D. T. and  | d Shonna   | ard, D. R., Sustainability   | Engineering: Concepts, De  | esign and Case Studies, Prentice Hall.  |  |  |  |  |  |  |  |
| 5.          | Bradley. A.S; A   | Adebayo,   | A.O., Maria, P. Enginee  | ring applications in sustain   | able design and development, Cengage learning.  |  |  |  |  |  |  |  |
| 6.          | Environment Ir  | mpact As   | ssessment Guidelines, No   | otification of Government of   | of India, 2006.   |  |  |  |  |  |  |  |
| 7.          | Mackenthun, K   | .M., Bas   | ic Concepts in Environm  | ental Management, Lewis  | Publication, London, 1998.  |  |  |  |  |  |  |  |
| e-Lean      | ning Source:  |  |  |  |   |  |  |  |  |  |  |  |
| SWAN        |   | -Skill Ind   | lia Coursera Udemy N   | ational Digital Library of L   | ndia  |  |  |  |  |  |  |  |

SWAYAM, MOOC, e-Skill India, Coursera, Udemy, National Digital Library of India

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|        | Course Articulation Matrix: (Mapping of COs with POs and PSOs) |     |     |     |     |     |     |      |      |      |      |      |      |
|--------|--|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| PO-PSO | PO1  | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO4 | PSO5 | PSO6 | PSO7 |
| CO     |  |     |     |     |     |     |     |      |      |      |      |      |      |
| CO1    |  | 2   |     |     | 2   |     | 3   |      |      |      | 3    |      | 2    |
| CO2    | 3  |     | 2   |     |     |     |     | 2    | 3    | 2    |      | 2    |      |
| CO3    | 2  |     |     |     | 2   |     |     | 2    |      |      |      |      | 2    |
| CO4    |  |     | 3   |     |     | 2   |     | 2    |      |      | 2    | 3    |      |
| C05    | 3  |     |     |     | 3   | 2   |     |      |      |      | 3    |      | 3    |

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

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



| Effective  | efrom  | Session               | <b>a:</b> 2024-20        | 25                       |                             |  |                           |                      |                          |                             |                               |                              |                           |                  |             |           |              |
|--|--|-----------------------|--------------------------|--------------------------|-----------------------------|--|---------------------------|----------------------|--------------------------|-----------------------------|-------------------------------|------------------------------|---------------------------|------------------|-------------|-----------|--------------|
| Course   | Code   | B                     | 150401T/                 | ES227                    |                             | ]<br>(   | Fitle of the<br>Course    | e                    | Enviro                   | onmental F                  | Pollution &                   | Managem                      | ent                       | L                | Т           | Р         | С            |
| Year   |  | 2                     | nd                       |                          |                             | S  | Semester                  |                      | IV                       |                             |                               |                              |                           | 3                | 1           | 0         | 4            |
| Pre-Req  | uisite   | 1                     | 0+2                      |                          |                             | (  | Co-requis                 | ite                  |                          |                             |                               |                              |                           |                  |             |           |              |
| Course       Objectives         Providing the evidence base to support decision and policy making, students should be able to understand pollution problems, consider ways to respond to them, and propose appropriate solutions/actions to reduce (protect, mitigate or prevent) pollution risks when necessary |  |                       |                          |                          |                             |  |                           |                      | ure to<br>hen            |                             |                               |                              |                           |                  |             |           |              |
| 001  |  |                       |                          |                          |                             |  |                           | Cou                  |                          | comes                       |                               |                              |                           |                  |             |           | -            |
|  | Have gained awareness of current forms of environmental pollution and an overview of both their causes and consequences to social systems.   |                       |                          |                          |                             |  |                           |                      | ces to na                | itural, ec                  | onomi                         | ic and                       |                           |                  |             |           |              |
| CO2  | Stude<br>enviro  | ents und<br>onment    | lerstands ti<br>)        | he fundan                | nental pri                  | nciples §  | governing                 | the inte             | ractions l               | between th                  | ose systems                   | (i.e. transp                 | ort of pollu              | tants in         | the         |           |              |
| CO3  | Have   | been er               | xposed to l              | learning e               | xamples                     | of good  | practice o                | f techno             | ologies an               | d options ı                 | used to reme                  | ediate reduc                 | e/eliminate               | pollutio         | n of the    | enviro    | nment.       |
| CO4  | Be ab<br>atmos   | ole to ar<br>spheric, | alyse, syn<br>water or t | thesize, a<br>errestrial | nd evalua<br>challenge      | ate evide<br>es.                                       | ence to un                | derstand             | l problem                | s and acco                  | ordingly sele                 | ect control n                | neasures and              | d techni         | ques cor    | ncernir   | ıg           |
| Unit<br>No.  |  | Title                 | of the Un                | it                       |                             |  |                           |                      | Co                       | ntent of U                  | nit                           |                              |                           |                  | Cont<br>Hr: | act<br>s. | Mapped<br>CO |
| 1  | Intro<br>Envi  | oductio<br>ironme     | n to<br>ntalPollut       | tion                     | Enviro<br>enviror           | nmental<br>nmental                                     | pollution<br>pollution    | n, types             | s of env                 | vironmenta                  | al pollutant                  | s, basis aı                  | nd challeng               | ges of           | 6           |           | CO1          |
| 2  | Air pollution       Air Pollution- natural and anthropogenic sources, Types of air pollutants, effects of air pollutants- acid rain, greenhouse effect and global warming, air pollution control measures. |                       |                          |                          |                             |  |                           | 8                    |                          | CO1                         |                               |                              |                           |                  |             |           |              |
| 3  | Water Pollution         Sources of surface and ground water pollution, water quality parameters and standards, effect of water contaminants on human health, Water remediation techniques.                 |                       |                          |                          |                             |  |                           | ndards,              | 8                        |                             | CO2                           |                              |                           |                  |             |           |              |
| 4  | Wate<br>andS   | er Trea<br>Strateg    | itment Me<br>ies         | ethods                   | Water<br>treatme            | treatme<br>ents  | ent: Wast                 | ewater               | treatmen                 | t technolo                  | ogies- Prim                   | ary, second                  | lary and t                | tertiary         | 8           |           | CO3          |
| 5  | Soil 1   | Polluti               | on                       |                          | Soil p<br>industr<br>water. | ollution<br>rial efflu                                 | : Sources<br>ents, wast   | - Indus<br>e dispos  | strial, Do<br>sal), Effe | omestic, A<br>cts of soil p | Agricultural<br>pollutants of | (Pesticide<br>n plants, ani  | s, heavy 1<br>imals and g | metals,<br>round | 8           |           | CO4          |
| 6  | Ther   | rmal po               | llution                  |                          | Therm                       | al pollut  | ion: cause                | s, effect            | s and con                | ntrol measu                 | ures                          |                              |                           |                  | 6           |           | CO4          |
| 7  | Nois   | e Pollu               | tion                     |                          | Noise<br>noise p            | Pollution  | n: Source<br>on humar     | s, sound<br>1 and an | pressure<br>imals, no    | e levels, de<br>ise permiss | ecibels, inte<br>sible standa | nsity and d<br>rds, noise co | uration, effort           | ects of<br>ures. | 8           |           | CO5          |
| 8  | Radi   | ioactive              | e pollution              | 1                        | Radioa<br>enviror           | active po<br>nment, F                                  | ollution: S<br>Radioactiv | Sources,<br>e waste  | radioact<br>disposal     | ive element<br>methods      | nts, effects                  | of radiatio                  | n on surrou               | unding           | 8           |           | CO5          |
| 1 Khork  | ce Bool  | KS:                   | Invironmo                | ntal Dally               | tion Are                    | lucie  |                           |                      |                          |                             |                               |                              |                           |                  |             |           |              |
| 2.Saxena   | HM (2  | 2011)E                | nvironmer                | ital Geog                | aphy                        | uy 515   |                           |                      |                          |                             |                               |                              |                           |                  |             |           |              |
| 3. Rao C   | S (1993  | 3) Envi               | onmental                 | Pollution                | Control                     |  |                           |                      |                          |                             |                               |                              |                           |                  |             |           |              |
| e-Lear   | ning S   | ource:                |                          |                          |                             |  |                           |                      |                          |                             |                               |                              |                           |                  |             |           |              |
| 1. https:/   | //www.   | frontie               | sin.org/art              | ticles/10.3              | 389/fput                    | oh.2020.   | 00014/ful                 | 1                    |                          |                             |                               |                              |                           |                  |             |           |              |
| 2. https:/   | //www.   | hindaw                | i.com/jour               | mals/jeph                | /2012/34                    | 1637/  |                           |                      |                          |                             |                               |                              |                           |                  |             |           |              |
| 3. https:/   | //www.   | epa.go                | v/air-qualit             | ty-manage                | ement-pro                   | ocess/ma   | anaging-ai                | ir-qualit            | y-human                  | -health-env                 | vironmental                   | -and-econor                  | mic                       |                  |             |           |              |
|  |  |                       |                          |                          |                             |  |                           |                      |                          |                             |                               |                              |                           |                  |             |           |              |
| PO-PS  | 0  |                       |                          |                          | Course A                    | Arucula  | uon Matr                  | 1x: (1VIa            | pp mg of                 | COs with                    | r Os and I                    | 3 <b>0</b> \$)               |                           |                  | PS          |           |              |
| CO   |  | PO<br>1               | PO2                      | PO3                      | PO4                         | PO5  | PO6                       | PO7                  | PO8                      | PO9                         | PSO1                          | PSO2                         | PSO3                      | PSO4             | 05          |           | PSO6         |
| C02  | 2  | 2                     | 1                        | 1                        | 1                           |  |                           |                      |                          |                             | 2                             | 2                            | 2                         | 2                |             |           |              |
| C03  | 3  | 2                     | 1                        | 1                        | 1                           | $\begin{array}{c c c c c c c c c c c c c c c c c c c $ |                           |                      |                          |                             |                               |                              |                           | L                |             |           |              |
| CO4  | ł  | 2                     | 1                        | 1                        | 1                           |  |                           |                      |                          |                             | 2                             | 2                            | 2                         | 2                |             |           |              |
| COS  | 5  |                       |                          |                          |                             | 2.34   |                           |                      |                          |                             |                               |                              |                           |                  |             |           |              |

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| Effective from Session: 2024-2025   |  |  |                                   |                 |             |   |             |            |            |  |                              |                        |                        |          |         |               |            |          |
|---|--|--|-----------------------------------|-----------------|-------------|---|-------------|------------|------------|--|------------------------------|------------------------|------------------------|----------|---------|---------------|------------|----------|
| Course (  | Code   |  | 1                                 | B150402I        | P/ES228     |   | Title of    | the Cou    | rse        | Practica                                 | al on Env                    | ironmenta              | al Pollutio            | n        | L       | Т             | Р          | С        |
| Year  |  |  | 1                                 | nd              |             |   | Semeste     | r          |            | IV                                       |                              |                        |                        |          | 0       | 0             | 4          | 2        |
| Pre-Requ  | uisite   |  | 1                                 | 10+2            |             |   | Co-requ     | isite      |            | NIL                                      |                              |                        |                        |          |         |               |            |          |
| Course Objectives This course provides students with a working knowledge of the determination of water parameters, ai dust (particulate matter) deposition on the leaves of roadside plants, segregating domestic waste into biodegradable components and can Determine the Noise levels of residential, institutional and indust |  |  |                                   |                 |             |   |             |            |            | meters, air<br>aste into l<br>nd industr | r pollu<br>bio-de<br>ial are | tants,<br>gradal<br>a. | amount o<br>ble and no | f<br>>n- |         |               |            |          |
|   | Course Outcomes  |  |                                   |                 |             |   |             |            |            |  |                              |                        |                        |          |         |               |            |          |
| CO1   | Practical knowledge for the determination of different water parameters.                                       |  |                                   |                 |             |   |             |            |            |  |                              |                        |                        |          |         |               |            |          |
| CO2   | Practic  | al knowl                                     | ledge f                           | or the ana      | lyses of a  | lifferent   | t air pollu | tants.     |            |  |                              |                        |                        |          |         |               |            |          |
| C03   | Gain k   | nowledg                                      | e on se                           | gregation       | and con     | ponents   | s of waste  | 2.         |            |  |                              |                        |                        |          |         |               |            |          |
| 004   | Learn  | the meas                                     | uremen                            | t of noise      | e levels ir | n differe   | nt areas.   |            |            |  |                              |                        |                        |          |         |               |            |          |
| Unit<br>No.   |  | Title o                                      | f the U                           | Init            |             |   |             |            | 0          | Content of                               | fUnit                        |                        |                        |          | Co<br>H | ntact<br>Irs. | Mapp<br>C( | ped<br>D |
| 1   | Determ<br>Waterp   | ination (<br>aramete                         | of<br>er                          |                 | (           | i) DO (i  | i) BOD (    | iii) Alkal | linity (iv | r) TDS (v)                               | Turbidity                    | 7                      |                        |          |         | 15            | СО         | )1       |
| 2   | Detern<br>And M<br>depositi<br>matter  | nination<br>easurem<br>ionof par<br>on plant | of Air<br>ent of<br>rticu la<br>s | pollutant<br>te | is I        | RSPM, SPM, To estimate the amount of dust (particulate matter) deposition on the leaves of roadside plants. |             |            |            |  |                              |                        |                        | 15       | СО      | )2            |            |          |
| 3   | Segregation of waste         To segregate domestic waste into bio-degradable and non-biodegradable components. |  |                                   |                 |             |   |             |            |            |  | 15                           | СО                     | )3                     |          |         |               |            |          |
| 4   | Determ   | ination t                                    | he Noi                            | se levels       | Ι           | Determi   | nation the  | e Noise le | evels of   | residentia                               | l, instituti                 | onal and in            | dustrial ar            | ·ea.     |         | 15            | СО         | )4       |
| Reference   | e Books  | :  |                                   |                 |             |   |             |            |            |  |                              |                        |                        |          |         |               |            |          |
| 1. AM   | RITA, O  | LABS, S                                      | tudy of                           | pollutant       | s in Air.   |   |             |            |            |  |                              |                        |                        |          |         |               |            |          |
| 2. AM   | RITA, O  | LABS, S                                      | tudies                            | on Turbid       | ity, pH a   | nd Micr   | obial Pre   | sence in   | Water.     |  |                              |                        |                        |          |         |               |            |          |
| o Loom  | ning Sou   | rco.   |                                   |                 |             |   |             |            |            |  |                              |                        |                        |          |         |               |            |          |
| 1. http   | ://amrita.   | olabs.edu                                    | ı.in/?su                          | b=79&br         | ch=18&      | sim=240   | )&cnt=1.    |            |            |  |                              |                        |                        |          |         |               |            |          |
| 2. http   | ://amrita.   | olabs.edu                                    | ı.in/?su                          | b=79&br         | ch=18&s     | sim=229   | &cnt=1.     |            |            |  |                              |                        |                        |          |         |               |            |          |
| 3. PM   | - Particul   | ate Matte                                    | er, http:                         | s://youtu.l     | be/ZUsN     | Cq8acY  | ΥM.         |            |            |  |                              |                        |                        |          |         |               |            |          |
| 4. Mor  | nitoring n   | nethods f                                    | or Air                            | – PM, http      | os://youtu  | ı.be/-uZ  | URNKE       | 4z8.       |            |  |                              |                        |                        |          |         |               |            |          |
| 5. Nois   | se pollutio  | on measu                                     | iremen                            | t by sound      | l level m   | eter, httj  | ps://youtu  | ı.be/j4sq  | 4CmGV      | 50.                                      |                              |                        |                        |          |         |               |            |          |
|   |  |  |                                   | (               | Course      | Articu  | lation N    | latrix:    | (Mapp      | ing of C                                 | Os with                      | POs and                | PSOs)                  |          |         |               |            |          |
| PO- PSO   | PO1  | PO2  | PO3                               | PO4             | PO5         | PO6   | PO7         | PO8        | PO9        | PO10                                     | PSO1                         | PSO2                   | PSO3                   | PSO4     | PSO     | 6 P           | PSO7       |          |
| СО  |  |  |                                   |                 |             |   |             |            |            |  |                              |                        |                        |          |         |               |            |          |
| CO1   | 2  | 1  | 1                                 | 1               |             |   |             |            |            |  | 2                            | 2                      | 2                      | 2        |         |               |            |          |
| CO2   | 2  | 1  | 1                                 | 1               |             |   |             |            |            |  | 2                            | 2                      | 2                      | 2        |         |               |            |          |
| CO3   | Ĩ.   |  |                                   |                 |             |   |             |            |            |  | <u> </u>                     | Ē.                     | [                      | Ĺ        | 1       |               |            |          |
| CO4   | 2  | 1  |                                   |                 |             |   |             |            |            |  |                              |                        |                        |          |         |               |            |          |
|   | 2  | 1  |                                   |                 |             |   |             |            |            |  |                              |                        |                        |          |         |               |            |          |

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



| Effective from Session: 2024-2025 |                             |                                   |  |        |    |   |   |  |  |  |  |
|-----------------------------------|-----------------------------|-----------------------------------|--|--------|----|---|---|--|--|--|--|
| Course Code                       | B150403T/ES229              | Title of the Course               | Basics of Environmental Methods<br>and Analytical Techniques | L      | Т  | Р | С |  |  |  |  |
| Year                              | 2 <sup>nd</sup>             | Semester                          | IV   | 4      | 0  | 0 | 4 |  |  |  |  |
| Pre-Requisite                     | 10+2                        | Co-requisite                      | NIL  |        |    |   |   |  |  |  |  |
| Course Objectives                 | This subject enables the st | udents to learn the different par | ameters of Environmental methods for a                       | nalysi | 8. |   |   |  |  |  |  |

|     | Course Outcomes   |  |  |  |  |  |  |  |
|-----|---|--|--|--|--|--|--|--|
| CO1 | Student gain an insight about different aspects of analytical environmental methods and soil analysis |  |  |  |  |  |  |  |
| CO2 | Demonstrate extensive knowledge of the ecological instrumentation and spectrophotometry               |  |  |  |  |  |  |  |
| CO3 | Students can describe the most common methods of electrophoresis and instrumental analysis            |  |  |  |  |  |  |  |
| CO4 | Students will be able to explain the general parameters of water analysis                             |  |  |  |  |  |  |  |
| CO5 | Students will be able to explain different air sampling equipments                                    |  |  |  |  |  |  |  |

| Unit<br>No. | Т  | itle of t        | he Unit   | Unit Content of Unit |                                  |   |                     |                   |                  |                                    |             |            | Con<br>H    | ntact<br>rs. | Mappe<br>d CO |          |            |            |
|-------------|--|------------------|-----------|----------------------|----------------------------------|---|---------------------|-------------------|------------------|------------------------------------|-------------|------------|-------------|--------------|---------------|----------|------------|------------|
|             | Intr   | oductio          | n         | Se                   | oil collec                       | ction an  | d preser            | vation,           | Signific         | ance, Im                           | portance    | of Water   | , soil and  | air analy    | sis           |          | 8          | CO1        |
| 1           | Soil   | Analys           | sis       | A<br>ca<br>ch        | nalysis o<br>lcium a<br>lorides, | lysis of particle size, water holding capacity, temperature, pH, conductivity, exchangeable<br>ium and Magnesium, sodium and potassium, available phosphorus, nitrogen, alkalinity,<br>rides, sulphates, organic matter |                     |                   |                  |                                    |             |            |             |              |               | 8        | CO1        |            |
| 3           | Ecolo<br>Instru  | ogical<br>Imenta | tion      | H<br>ch              | umidity<br>romatog               | idity measurement, rainfall measurement, pH meter, calorimeter, Principles of natography  |                     |                   |                  |                                    |             |            |             |              |               |          | 6          | CO2        |
| 4           | Spect  | rophot           | ometry    | SI<br>sp             | ectroph<br>ectroph               | ctrophotometer, Principle, Spectroscopy, UV-visible spectrophotometer, Atomic absorption strophotometer   |                     |                   |                  |                                    |             |            |             |              | 1             | 8        | CO2        |            |
| 5           | Electi   | ophore           | esis      | El                   | ectroph                          | oresis, I   | Paper El            | ectroph           | oresis, O        | Gel Elect                          | rophores    | is, Applio | cation of   | Electroph    | oresis        | (        | 5          | CO3        |
| 6           | Inst<br>Ana  | rument<br>lysis  | al        | H                    | igh-perf<br>romatos              | ormanco<br>graphy,  | e liquid<br>Applica | chroma<br>tion of | atograph<br>HPLC | y (HPLC                            | C), Thin la | ayer chro  | matograp    | hy Gas       |               |          | 8          | CO3        |
| 7           | Wa<br>Ana  | ter<br>lysis     |           | Ch<br>Wa             | nemical<br>ater testi            | water qu<br>ing metl  | uality pa<br>10ds   | aramete           | rs: chloi        | ride, Am                           | monium,     | Nitrite, I | Nitrate, Pl | hosphate,    | Hardness      | 8,       | 8          | CO4        |
| 8           | Air  | Analys           | is        | Em<br>Sa             | iission s<br>mpling I            | ources:<br>Equipm   | Particul<br>ent     | ates, Le          | ead, Asł         | ı, Nanop                           | articles, C | Gaseous I  | Pollutants  | , Types o    | fAir          |          | 8          | CO5        |
|             | Reference Books:   |                  |           |                      |                                  |   |                     |                   |                  |                                    |             |            |             |              |               |          |            |            |
| 1.          | 1. Chapin, F.S., Matson, P.A. and Mooney, H.A. 2002. Principles of Terrestrial Ecosystem Ecology. Springer-Verlag, New York. |                  |           |                      |                                  |   |                     |                   |                  |                                    |             |            |             |              |               |          |            |            |
| 2.          | 2. Clark, R.N. 1999. Spectroscopy of Rocks and Minerals, and Principles of Spectroscopy.                                     |                  |           |                      |                                  |   |                     |                   |                  |                                    |             |            |             |              |               |          |            |            |
| 3.          | U.S.   | Geolog           | ical Sur  | vey, De              | nver                             |   | 2004 5              |                   |                  | <b>A</b> = 1 = 11 <sup>2</sup> = - |             | - C' 1'-   | : : C       |              | T-1 XV:1      | 0 C      |            | I <b>V</b> |
| 4.          | John   | wainw            | right and | Enviro               | Muinga                           | n (Eds)   | .2004. E            | uonth E           | dition I         |                                    | g: Finding  | g Simplic  | ity in Co   | mplexity.    | John Wil      | ey & Sor | is inc., r | New York.  |
| 5.          | Odu  | n F P            | (1971) 1  | Sundam               | entals o                         | f Ecolor  | w Sau               | nders P           | biladelr         | bia                                | unshers,    |            |             |              |               |          |            |            |
| 0.          | Ouu  | II, D.I          | (1771),1  | unuan                | ientais o                        | 1 Leolog  | 5y. 5au             | lucis, 1          | e-Leari          | ning Sour                          | ce:         |            |             |              |               |          |            |            |
| 1.          | httj   | os://ww          | w.slides  | hare.ne              | t/joy_jn                         | u/enviro  | nment-              | analy             |                  |                                    |             |            |             |              |               |          |            |            |
| 2.          | <u>htt</u>   | os://slid        | eplayer.  | com/sli              | de/2745                          | 33/   |                     |                   |                  | • • • • •                          |             |            | IDCO        | >            |               |          |            |            |
| PO-         |  |                  |           |                      | Cot                              | irse Art  |                     | n watr            |                  | ipping o                           |             | un POS 8   | na PSOS     | 5)           |               |          |            |            |
| PS<br>O     | PO<br>1  | PO<br>2          | PO<br>3   | PO<br>4              | PO<br>5                          | PO<br>6   | PO<br>7             | PO<br>8           | PO<br>9          | PO1                                | PO1         | PO1 2      | PSO<br>1    | PSO<br>2     | PSO 3         | PSO<br>4 | PSO<br>5   | PSO        |
| CO          |  | -                | 5         | •                    | 5                                | ÿ   |                     | 0                 |                  | 0                                  |             | _          | •           | -            | -             |          | 0          | 0          |
| CO1         | 2  |                  |           |                      |                                  |   |                     |                   |                  |                                    |             |            | 1           | 2            |               |          |            | _          |
| CO2         | 2  |                  |           |                      |                                  |   |                     |                   |                  |                                    |             |            | 2           | 1            |               |          |            |            |
| CO3         | 2  |                  |           |                      |                                  |   |                     |                   |                  |                                    |             |            | 2           | 2            |               |          |            | -          |
| CO4         | 11   |                  |           |                      |                                  |   |                     |                   |                  |                                    |             |            | 2           | 2            |               |          |            | -          |
| CO5         |  |                  |           |                      |                                  |   |                     |                   |                  |                                    |             |            | 2           | 2            |               |          |            |            |

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



| Effectiv | e from Session: 2024  | -25  |  |  |   |            |          |            |           |  |  |  |  |
|----------|---|--|--|--|---|------------|----------|------------|-----------|--|--|--|--|
| Course   | rse Code B150404P//ES230 Title of the Course Analytical Techniques Labs L T P |  |  |  |   |            |          |            | С         |  |  |  |  |
| Year     |   | 2 <sup>nd</sup>  |  | Semester   | IV  | 0          | 0        | 4          | 2         |  |  |  |  |
| Pro. D   | oquisito  | 10+2   |  | Co-requisite   | NIL   |            |          |            |           |  |  |  |  |
| Cours    | e Objectives  | To know th<br>Students w<br>Students w   | he basic guid<br>vill be able to<br>vill learn and | e basic guidelines and working of Laboratory Instruments<br>ill be able to learn and perform various analytical experiments<br>ill learn and perform NPK determination through kit method. |   |            |          |            |           |  |  |  |  |
|          |   |  |  | Course Outcome   | S   |            |          |            |           |  |  |  |  |
| C01      | To develop the  | knowledge o  | of Analytical                                      | Instruments  |   |            |          |            |           |  |  |  |  |
| CO2      | Students will le  | Students will learn the the principles and methodology of analyte determination techniques |  |  |   |            |          |            |           |  |  |  |  |
| CO3      | Students will be  | Students will be able to perform hands on experiments on simple chromatography techniques  |  |  |   |            |          |            |           |  |  |  |  |
| CO4      | To understand t<br>determination pr   | the soil primar  | y nutrients and                                    | alysis through kit method an   | d develop the practical skills of basic Physico-o | chemical p | arameter | rs and th  | eir       |  |  |  |  |
| UnitN    | No. Title of th   | e Unit   |  | Content of Un  | it  | Cont       | act Hrs  | . Ma<br>CO | pped<br>) |  |  |  |  |
| 1        | Instrumentation   | l  | Principle and<br>Conductivity                      | 1  | 2   | C          | 201      |            |           |  |  |  |  |
| 2        | Classification of<br>Techniques   | Analytical   | Gravimetry,  | Volumetry, Potentiometry   | у   | 1          | 2        | С          | 202       |  |  |  |  |
| 3        | Principle & Tec<br>of Chromatogra   | hniques<br>Iphy  | Thin Layer (                                       |  | 12  | c          | 203      |            |           |  |  |  |  |
| 4        | Study of nutrier<br>soil  | ıts in   | To study the                                       |  | 12  | C          | 204      |            |           |  |  |  |  |
| 5        | Determination of specific gravity   | of   | Determinatio                                       | on of specific gravity, acic   | l value, peroxide value in vegetable oil          | 1          | 2        | C          | 204       |  |  |  |  |
| Refere   | ence Books:   |  |  |  |   |            |          |            |           |  |  |  |  |
| 1.       | Rao M. N and H.V.N.   | Rao,1989: A  | ir pollution,                                      | Tata McGraw Hill Publis  | hing Co. Ltd., New Delhi                          |            |          |            |           |  |  |  |  |
| 2.       | Misra, R,1986. Ecolog   | gy workbook  | Oxford and   | IBH Publishing Co., New  | Delhi.  |            |          |            |           |  |  |  |  |
| 3.       | Khopkar S.M.,1993; I  | Environment  | Pollution An                                       | alysis, Eastern Limited, N   | ew York   |            |          |            |           |  |  |  |  |
| e-Le     | arning Source:  |  |  |  |   |            |          |            |           |  |  |  |  |
| 1.       | https://www.youtube.  | .com/watch?v   | v=mDIVpJgj   | oXQ&ab_channel=Urban   | Gardening   |            |          |            |           |  |  |  |  |
| 2.       | https://www.youtube.  | .com/watch?v   | v=5fvWhCk7   | 7x6U&ab_channel=Edmen  | rls   |            |          |            |           |  |  |  |  |
| 3.       | https://www.youtube.  | .com/watch?v   | v=-a5NT4-6c  | gSE&ab_channel=krishiva  | lley  |            |          |            |           |  |  |  |  |
|          |   | 1- Low Cor   | relation; 2-1                                      | Moderate Correlation; 3  | - Substantial Correlation                         |            |          |            |           |  |  |  |  |
|          |   |  |  |  |   |            |          |            |           |  |  |  |  |

Name & Sign of Program Coordinator



| Effective from Session: 2022-2023 |  |  |   |                               |                                  |                                |                    |  |  |  |  |
|-----------------------------------|--|--|---|-------------------------------|----------------------------------|--------------------------------|--------------------|--|--|--|--|
| Course Code                       | A070401T/SS211   | Title of the Course  | Social Problems & Issues of Development in India  | L                             | Т                                | Р                              | С                  |  |  |  |  |
| Year                              | II   | Semester   | IV  | 4                             | 0                                | 0                              | 4                  |  |  |  |  |
| Pre-Requisite                     | Intermediate   | Co-requisite   | None  |                               |                                  |                                |                    |  |  |  |  |
| Course Objectives                 | Course Outcomes:<br>development in Ind<br>other disorganization<br>the social problems | The syllabus is designed<br>ian Society. The course<br>onal and structural probl<br>and developmental issu | ed to introduce students to the emerging social problems, t<br>intends to focus upon the deviant and delinquent behaviour<br>ems of Indian Society. The endeavour of the course is to ma<br>es in the Indian Society. | he cor<br>r, issue<br>ake lea | cept an<br>of corr<br>or of corr | d issues<br>ruption<br>ware ab | s of<br>and<br>out |  |  |  |  |

|     | Course Outcomes   |  |  |  |  |  |  |  |  |
|-----|---|--|--|--|--|--|--|--|--|
| CO1 | Basic understanding of deviance.                        |  |  |  |  |  |  |  |  |
| CO2 | Explore the different social problem and behavior.      |  |  |  |  |  |  |  |  |
| CO3 | Understanding socio-structural tribulations.            |  |  |  |  |  |  |  |  |
| CO4 | Understanding the problems at family level.             |  |  |  |  |  |  |  |  |
| CO5 | Conceptual understanding differences of development.    |  |  |  |  |  |  |  |  |
| CO6 | To expand knowledge about theories on development.      |  |  |  |  |  |  |  |  |
| CO7 | Issues of Development from agrarian to advancement era. |  |  |  |  |  |  |  |  |
| CO8 | To know about relation between Ecology and Development. |  |  |  |  |  |  |  |  |

| Unit<br>No. | Title of the Unit         | Content of Unit  | Contact<br>Hrs. | Mapped<br>CO |
|-------------|---------------------------|--|-----------------|--------------|
| 1           | Introduction              | Deviance: Concept & Meaning, Definition. Crime and, Juvenile Delinquency, White Collar crime, Social Disorganization and Social Problem                    | 07              | CO1          |
| 2           | Social Problem            | Corruption in Public life, Cyber Crime Drug Addiction, Drug Abuse, Suicide, Terrorism  | 07              | CO2          |
| 3           | Structural Problems       | Poverty, Unemployment Caste Inequality, Problems: Religious, Ethnic and Regional, Minorities, Backward Classes and Dalits.                                 | 08              | CO3          |
| 4           | Familial Problems         | Dowry, Domestic Violence, Divorce, Intra and Inter-Generational Conflict, Problem of Elderly.  | 08              | CO4          |
| 5           | Concept of<br>Development | Concept of Development, Economic Vs Social Development, Human Development (HDI), Social Development  | 06              | CO5          |
| 6           | Theories of Development:  | Smelser, Lerner, Rostow. Under Development Dependency: Centre Periphery (Frank),<br>Uneven Development (Samir Amin); Globalization and Development Society | 08              | CO6          |
| 7           | Issues of<br>Development  | Agrarian Crisis, Human Resource Development & Skilled Unemployment, Inclusive Development  | 08              | CO7          |
| 8           | Ecology and Development:  | Development and Displacement, Rehabilitation and Resettlement Policy, Sustainable development, Global Warming and Climate Change.                          | 08              | CO8          |
| Referen     | ce Books:                 |  |                 |              |

Cloward, R., 1960. Delinquency and Opportunity.

Charles, L.C., Michael, W.F., 2000. Crime and Deviance: Essays and Innovations of Edwin M Lemert

Eade D and Ligteringen E, Debating Development, 2006. - NGOs and the Future

Desai A.R, 1971: Essays on Modernization of Underdeveloped Societies.

#### e-Learning Source:

#### Egyankosh and NCERT

|        | Course Articulation Matrix: (Mapping of Cos with POs and PSOs) |     |     |     |     |     |     |     |      |      |      |      |      |  |
|--------|--|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|--|
| PO-PSO | PO1  | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | P08 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |  |
| CO     |  |     |     |     |     |     |     |     |      |      |      |      |      |  |
| CO1    | 1  | 1   | 3   | 1   | 1   | 3   | 2   | 3   | 2    | 2    | 2    | 2    | 2    |  |
| CO2    | 1  | 2   | 3   | 2   | 1   | 3   | 3   | 2   | 2    | 1    | 1    | 2    | 3    |  |
| CO3    | 1  | 2   | 1   | 2   | 2   | 3   | 2   | 3   | 1    | 2    | 2    | 2    | 2    |  |
| CO4    | 1  | 2   | 2   | 1   | 3   | 2   | 3   | 3   | 2    | 2    | 3    | 1    | 2    |  |
| CO5    | 2  | 2   | 1   | 2   | 3   | 3   | 2   | 2   | 2    | 2    | 2    | 1    | 2    |  |
| CO6    | 3  | 2   | 3   | 2   | 1   | 2   | 3   | 3   | 2    | 3    | 3    | 3    | 3    |  |
| CO7    | 1  | 3   | 3   | 2   | 3   | 3   | 3   | 2   | 3    | 3    | 2    | 3    | 3    |  |
| CO8    | 1  | 3   | 2   | 1   | 2   | 1   | 2   | 3   | 2    | 3    | 3    | 3    | 2    |  |



| Effective from Session: 2022-2023 |   |  |   |                            |                    |                    |            |  |  |  |
|-----------------------------------|---|--|---|----------------------------|--------------------|--------------------|------------|--|--|--|
| Course Code                       | A070401T/SS212  | Title of the<br>Course   | Project on Sustainable Society  | L                          | Т                  | Р                  | С          |  |  |  |
| Year                              | II  | Semester   | IV  | 0                          | 0                  | 2                  | 2          |  |  |  |
| Pre-Requisite                     | Intermediate  | Co-requisite   | None  |                            |                    |                    |            |  |  |  |
| Course Objectives                 | Course Outcomes: T<br>issues of developme<br>the conducting rese<br>sustainability. | The syllabus designed t<br>ent in Indian Society. T<br>arch project. This proj | o introduce students to the emerging social probler<br>he project work will engage students directly in pra<br>ject work will help learners to know about the iss | ns and<br>ctical<br>sue of | l the co<br>knowle | oncept :<br>edgeab | and<br>out |  |  |  |

|     | Course Outcomes   |  |  |  |  |  |  |  |  |
|-----|---|--|--|--|--|--|--|--|--|
| CO1 | Basic understanding of research work in development and social problem. |  |  |  |  |  |  |  |  |
| CO2 | Develop skill to improve research understanding.                        |  |  |  |  |  |  |  |  |
| CO3 | To improve skill of using different techniques and methods.             |  |  |  |  |  |  |  |  |
| CO4 | To enhance the skill of research writings.                              |  |  |  |  |  |  |  |  |

| Unit<br>No. | Title of the Unit           | Content of Unit  | Contact<br>Hrs. | Mapped<br>CO |
|-------------|-----------------------------|--|-----------------|--------------|
| 1           | Introduction to research    | Research Project: Definition & Concept, Selection of Research Topic related to Social Problems and Social Development, Sustainable Development | 07              | CO1          |
| 2           | Research<br>Proposal        | How to develop Research Proposal and its Implementation  | 07              | CO2          |
| 3           | Methods &<br>Techniques     | Methods & Techniques for conducting scientific study. Writing of Bibliography.   | 08              | CO3          |
| 4           | Research Project<br>writing | Research Project final draft and writing of findings, Presentation of Research Project.  | 08              | CO4          |
| Referen     | nce Books:                  |  |                 |              |
| Goode       | and Hatt, 2006: Meth        | ods in Social Research   |                 |              |
| Young       | Pauline, 1988 Scienti       | fic Social Surveys and Research Practice   |                 |              |
| Silverm     | an David, 1985 Gowo         | er, Vermont Qualitative Methodology and sociology.   |                 |              |
| Sachder     | v Meetali, 1987: Qual       | itative Research in Social Sciences  |                 |              |
| e-Lea       | rning Source:               |  |                 |              |
| •           | Egyankosh<br>NCERT          |  |                 |              |

|        | Course Articulation Matrix: (Mapping of Cos with POs and PSOs) |     |     |     |     |     |     |     |      |      |      |      |      |  |  |
|--------|--|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|--|--|
| PO-PSO | PO1  | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | P08 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |  |  |
| CO     |  |     |     |     |     |     |     |     |      |      |      |      |      |  |  |
| C01    | 1  | 1   | 3   | 1   | 1   | 3   | 2   | 3   | 2    | 2    | 2    | 2    | 2    |  |  |
| CO2    | 1  | 2   | 3   | 2   | 1   | 3   | 3   | 2   | 2    | 1    | 1    | 2    | 3    |  |  |
| CO3    | 1  | 2   | 1   | 2   | 2   | 3   | 2   | 3   | 1    | 2    | 2    | 2    | 2    |  |  |
| CO4    | 1  | 2   | 2   | 1   | 3   | 2   | 3   | 3   | 2    | 2    | 3    | 1    | 2    |  |  |

| Name & Sign of Program Coordinator | Sign & Seal of HoD |
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| Effective from Session: 2024-2025 |  |                                   |   |         |         |       |   |  |  |  |  |
|-----------------------------------|--|-----------------------------------|---|---------|---------|-------|---|--|--|--|--|
| Course Code                       | B150405T/ES231   | Title of the Course               | Soil Conservation and its<br>Management   | L       | Т       | Р     | С |  |  |  |  |
| Year                              | 2 <sup>nd</sup>  | Semester                          | IV  | 4       | 0       | 0     | 4 |  |  |  |  |
| Pre-Requisite                     | 10+2   | Co-requisite                      | NIL                                       |         |         |       |   |  |  |  |  |
| Course Objectives                 | To develop the scientific attitude among the students for land and soil conservation. To develop attitude towards the fundamental education of soil among the students. To develop clear thinking about land use pattern awareness among the students. |                                   |   |         |         |       |   |  |  |  |  |
|                                   | To provide knowledge to s  | students about rational and scien | ntific thinking about the measures to aba | te soil | degrada | ation |   |  |  |  |  |

|     | Course Outcomes  |
|-----|--|
| C01 | Students can enhance their knowledge about soil erosion and conservation.  |
| CO2 | Students can increase their knowledge about soil and its related parameter in sustained manner without deteriorating soil health.          |
| CO3 | Students can get efficient prospect to know about soil health and nature with development of new agricultural practices and technology.    |
| CO4 | Restoration of ecological balance by harnessing, conserving and developing natural resources.  |
| CO5 | To minimize soil erosion in the biodiversity rich areas and farm lands by implementing advance sustainable and government green practices. |

| Unit<br>No. | Title of the Unit                               | Content of Unit   | Contact<br>Hrs. | Mappe<br>d CO |
|-------------|---|---|-----------------|---------------|
| 1           | Introduction                                    | Land as a resource, soil health, types and causes of soil degradation; impact of soil degradation on agriculture and food security; need for soil conservation and restoration of soil fertility.   | 6               | CO1           |
| 2           | Fundamenta<br>ls of soil<br>science             | Soil formation, classification of soil, physical properties of soil, soil texture, soil water holding capacity, soil temperature; soil colloids, soil acidity and alkalinity. soil organic matter, nutrients in soil: nitrogen, sulphur, potassium and phosphorus, soil biodiversity. | 8               | CO2           |
| 3           | Soil degradation                                | Soil resistance and resilience, nature and types of soil erosion, losses of soil moisture and its regulation, nutrient depletion in soil, soil degradation due to mining and mineral extraction, toxic organic chemicals and organic contaminants in soils.                           | 8               | CO3           |
| 4           | Land use pattern<br>changes                     | Land resources: types and evaluation; biological and physical phenomena in land degradation; visual i n d i c a t o r of land degradation; drivers of land degradation-deforestation, desertification; babitat loss loss of biodiversity, range land degradation land selinization    | 8               | CO4           |
| 5           | Human Activities                                | Human population pressure, poverty, socio-economic and institutional factors. Drivers of land<br>use and land cover change in major geographic zones and biodiverse regions with particular<br>reference to the Himalaya and the Western Ghats  | 8               | CO4           |
| 6           | Soil<br>Conservation<br>Practices               | Crop Rotation, Contour ploughing, Cover cropping and Mulching, Conservation Tillage, Afforestation, Fertilizers and its management, Improving agricultural practices.   | 6               | CO2           |
| 7           | Sustainable<br>Practices                        | Sustainable land use planning, role of databases and data analysis in land use planning control<br>and management, land policy, Institutional and sociological factors, participatory land<br>degradation assessment, integrating land degradation assessment into conservation.      | 8               | CO5           |
| 8           | Advanced<br>methods for<br>soil<br>conservation | Organic farming, Grassed waterways, Chemical free farming, Integrated pest management,<br>Government schemes- Rashtriya Krishi Vigyan Yojana, Cherrapunjee Ecological Project-<br>Restoration of Degraded Lands under Sohra Plateau.  | 8               | CO5           |
|             |   | Reference Books:  |                 |               |
| 1.          | .Brady, N.C. & We                               | ell, R.R. 2007. The Nature and Properties of Soils (13th edition), Pearson Education Inc.   |                 |               |
| 2.          | Gadgil, M. 1993. Biodiv                         | versity and India' s degraded lands. Ambio 22: 167-172.   |                 |               |
| 3.          | Jonnson, D.L. 2006. La                          | e-Learning Source:  |                 |               |
| 1.          | https://www.youtube.co                          | om/watch?v=RWw09HU5n2I  |                 |               |
| 2.          | https://www.youtube.co                          | om/watch?v=b3V988XYD-I  |                 |               |

|                      |         | Course Articulation Matrix: (Mapping of COs with POs and PSOs) |         |         |         |         |         |         |         |          |          |          |          |          |          |          |          |          |
|----------------------|---------|--|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| PO-<br>PS<br>O<br>CO | РО<br>1 | PO<br>2  | PO<br>3 | PO<br>4 | PO<br>5 | PO<br>6 | PO<br>7 | PO<br>8 | PO<br>9 | PO1<br>0 | PO1<br>1 | PO1<br>2 | PSO<br>1 | PSO<br>2 | PSO<br>3 | PSO<br>4 | PSO<br>5 | PSO<br>6 |
| C01                  | 3       | 2  | 3       | 1       | -       | -       | -       | -       | -       | -        | 3        | 3        | 3        | 3        | -        | -        |          |          |
| CO2                  | 3       | 2  | 3       | 1       | -       | -       | -       | -       | -       | -        | 3        | 2        | 2        | 3        | -        | -        |          |          |
| CO3                  | 3       | 2  | 3       | 1       | -       | -       | -       | -       | -       | -        | 3        | 3        | 3        | 2        | -        | -        |          |          |
| CO4                  | 2       | 2  | 3       | 1       | -       | -       | -       | -       | -       | -        | 3        | 2        | 2        | 3        | -        | -        |          |          |
| CO5                  | 3       | 2  | 2       | 3       | -       | -       | -       | -       | -       | -        | 2        | 3        | 2        | 2        | -        | -        |          |          |

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



| Effective from Session: 2024-2025 |  |  |                   |   |   |   |   |  |  |  |  |
|-----------------------------------|--|--|-------------------|---|---|---|---|--|--|--|--|
| Course Code                       | B150406P/ES232                                     | Title of the Course  | Soil Analysis Lab | L | Т | Р | С |  |  |  |  |
| Year                              | 2 <sup>nd</sup>                                    | Semester   | IV                | 0 | 0 | 4 | 2 |  |  |  |  |
| Pre-Requisite                     | 10+2   | Co-requisite   | NIL               |   |   |   |   |  |  |  |  |
| Course Objectives                 | This course provides an in experiments and perform | is course provides an introduction to the basic laboratory principles. Furthermore, students will have hands on periments and perform laboratory work in analyzing different parameters of soil. |                   |   |   |   |   |  |  |  |  |

|     | Course Outcomes  |  |  |  |  |  |  |  |
|-----|--|--|--|--|--|--|--|--|
| C01 | The student will understand about Good Laboratory Practice (GLP).  |  |  |  |  |  |  |  |
| CO2 | The student will develop practical knowledge on Measurement of different physical parameters of soil                 |  |  |  |  |  |  |  |
| CO3 | The student will develop practical knowledge on qualitative determination of primary nutrient of soil by testing kit |  |  |  |  |  |  |  |
| CO4 | The student will be able to perform Basic soil microbiology  |  |  |  |  |  |  |  |

| Unit<br>No.          | Т  | itle of t                   | he Unit                                       |           |                   | Content of<br>Unit   |                |          |          |             |            |             | Co<br>H     | ntact<br>Irs. | Mappe<br>d CO |          |          |          |
|----------------------|--|-----------------------------|---|-----------|-------------------|--|----------------|----------|----------|-------------|------------|-------------|-------------|---------------|---------------|----------|----------|----------|
| 1                    | Goo<br>Pra   | od Labo<br>ctices           | oratory                                       |           | All La<br>Instrui | iborator<br>nents, e   | y Rules<br>tc. | and R    | egulatio | ons, Safe   | ty Preca   | utions, I   | ntroductio  | on to Lab     | ooratory      |          | 15       | CO1      |
| 2                    | Soil<br>(Ph<br>Par   | Analys<br>ysical<br>ameters | sis<br>s)                                     |           | Deterr            | nination   | of pH,         | Electric | al cond  | uctivity, ] | Moisture   | content,    | Bulk den    | sity of so    | il            |          | 15       | CO2      |
| 3                    | Soil   | Analys                      | sis (NPI                                      | K)        | Analys            | sis of N   | itrogen,       | Phosph   | orus, Po | otassium    | content o  | f soil usiı | ng soil tes | ting kit.     |               |          | 15       | CO3      |
| 4                    | Bas<br>Mic   | ic Soil<br>robiolo          | gy  |           | Isolati           | on and Enumeration of soil microflora using serial dilution method. 15 |                |          |          |             |            |             |             | 15            | CO4           |          |          |          |
| Referen              | nce Bo   | oks:                        |   |           |                   |  |                |          |          |             |            |             |             |               |               |          |          |          |
| 1. Odun              | n, E.P.  | (1983),                     | (1983), Basic Ecology, Sanders, Philadelphia. |           |                   |  |                |          |          |             |            |             |             |               |               |          |          |          |
| 2. The C             | he Chemistry of Soils 3rd Edition by Garrison Sposito                      |                             |   |           |                   |  |                |          |          |             |            |             |             |               |               |          |          |          |
| 3. Pract             | 3. Practical Manual for Soil, Plant, Water and Seed Testing. P. Gurumurthy |                             |   |           |                   |  |                |          |          |             |            |             |             |               |               |          |          |          |
| e-Lea                | rning  | Source                      | :   |           |                   |  |                |          |          |             |            |             |             |               |               |          |          |          |
| 1. https://          | /www   | docsity.                    | .com/en                                       | /enviror  | nmental-          | science  | -enviror       | nmental- | biology  | -lecture-   | notes/233  | 3205/       |             |               |               |          |          |          |
| 2 http://w           | www.rl   | bcau.ac                     | .in/pdf/I                                     | Horticul  | ture/HN           | R%201  | 31%20          | %20Fun   | dament   | als%20of    | %20Soil    | %20Sciei    | nce.pdf     |               |               |          |          |          |
| 3. https://          | krishi.io  | car.gov.ii                  | n/jspui/bi                                    | itstream/ | 12345678          | 39/12719   | /1/Print-      | PDF-IIP  | R-Pocket | %20Guide    | e-1-3-2018 | 3.pdf       |             |               |               |          |          |          |
|                      |  | 1                           | 1   | 1         | Cou               | ırse Ar  | ticulatio      | on Matı  | rix: (Ma | apping o    | f COs wi   | ith POs a   | nd PSOs     | 5)            |               |          |          | 1        |
| PO-<br>PS<br>O<br>CO | Р<br>О<br>1  | PO<br>2                     | PO<br>3                                       | PO<br>4   | PO<br>5           | PO<br>6  | PO<br>7        | PO<br>8  | PO<br>9  | PO1<br>0    | PO1<br>1   | PO1<br>2    | PSO<br>1    | PSO<br>2      | PSO<br>3      | PSO<br>4 | PSO<br>5 | PSO<br>6 |
| C01                  | 3  | 1                           | 1   | 2         | 1                 | 1  | 2              | -        | -        | -           | -          | -           | 3           | 1             | 1             | 1        | 3        | -        |
| CO2                  | 3  | 1                           | 1   | 1         | 1                 |  |                |          |          |             |            |             | 1           | 3             | -             |          |          |          |
| CO3                  | 3  | 1                           | 1   | 1         | 1                 | 2  | 2              | -        | -        | -           | -          | -           | 3           | 1             | 2             | 1        | 3        | -        |
| CO4                  | 3  | 1                           | 1   | 1         | 2                 | 1  | 2              | -        | -        | -           | -          | -           | 3           | 1             | 2             | 1        | 3        | -        |
|                      |  | •                           | •   | •         | •                 |  |                | -        | -        |             |            |             |             |               |               |          |          | •        |

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

Name & Sign of Program Coordinator



| Effective from Ses | Strective from Session: 2023-24 |   |                           |   |   |   |   |  |  |
|--------------------|---------------------------------|---|---------------------------|---|---|---|---|--|--|
| Course Code        | B190404P/CH243                  | Title of the Course   | Industrial Waste Analysis | L | Т | Р | С |  |  |
| Year               | Second                          | Semester  | Fourth                    |   |   | 4 | 2 |  |  |
| Pre-Requisite      | -                               | Co-requisite  | -                         |   |   |   |   |  |  |
| Course             | Students gain knowled           | dents gain knowledge and skills related to this paper as follows: instrumental methods of analysis, material testing, water |                           |   |   |   |   |  |  |
| Objectives         | analysis, and use of trai       | alysis, and use of transducers for measuring flow control, and flow measuring devices (floats).                             |                           |   |   |   |   |  |  |

|     | Course Outcomes  |
|-----|--|
| CO1 | Student will be able to determine phenolphthalein alkalinity, methyl alkalinity; total alkalinity, total hardness, calcium hardness, and acidity of the given water sample and express the results in moles per liter and mg/L as CaCO <sub>3</sub> for hardness parameters, and in equivalence/L and mg/L |
|     | as CO <sub>2</sub> for acidity.  |
| CO2 | Student will be able to determine the available chlorine percentage, chloride content, and pH of the given chlorine solution sample and each   |
| 02  | water sample.  |
| CO3 | Student will be able to determine the dissolved oxygen, 3-day BOD, and COD of the given sample of water.   |
| CO4 | Student become able to measure the total solids (T.S.) and total dissolved solids (T.D.S.) as well as the conductivity of a given water sample.  |
| CO5 | Student will be able to determine the potassium content in the provided water sample and to measure the amount of matter present in the air.   |

| Unit<br>No.           | Title of the Unit  | Content of Unit   | Contact<br>Hrs. | Mapped<br>CO |  |  |  |  |  |
|-----------------------|--|---|-----------------|--------------|--|--|--|--|--|
| 1                     | Alkalinity<br>determination  | <ul> <li>i. To determine phenolphthalein alkalinity, methyl alkalinity, and total alkalinity in the given sample.</li> <li>ii. To determine total hardness and calcium hardness in the given water. Express your result in moles per liter and mg/L as CaCO<sub>3</sub>.</li> <li>iii. To determine the acidity of the given sample of water. Express your result in equivalence/L and mg/L as CO<sub>2</sub>.</li> </ul> | 15              | 1            |  |  |  |  |  |
| 2                     | 2 Chloride content<br>determination i. To determine the percentage of available chlorine in the given chlorine solution<br>sample.<br>ii. To determine the chloride content in each sample of water.<br>iii. To determine the pH of the given sample of water.   |   |                 |              |  |  |  |  |  |
| 3                     | DO, BOD, and<br>COD  | <ul><li>i. To determine the dissolved oxygen in the given sample of water.</li><li>ii. To determine the 3-day BOD of the given sample of water.</li><li>iii. To determine the COD of the given wastewater sample.</li></ul>   | 15              | 3, 4         |  |  |  |  |  |
| 4                     | 4       Total solids, total dissolved solids, and potassium content       iii. To determine the cool of the green wastewater sample.         4       issolved solids, and potassium content       iii. To determine the conductivity of the sample of water.         4       iii. To find out the potassium in the given sample of water.         iii. To find out the potassium in the given sample of water. |   |                 |              |  |  |  |  |  |
| Referen               | ce Books:  |   |                 |              |  |  |  |  |  |
| Advance               | e Practical Chemistry: Ja  | agdamba Singh, L.D.S Yadav, Jaya Singh, I.R. Siddiqui, Pragati Edition.   |                 |              |  |  |  |  |  |
| Practica              | l Organic Chemistry, A.  | I. Vogel.   |                 |              |  |  |  |  |  |
| Practica<br>Europeine | Physical Chemistry: B  | . Viswanathan and P.S. Raghavan.  |                 |              |  |  |  |  |  |
|                       | ing Source:  | uy - w. G. Palmer.  |                 |              |  |  |  |  |  |
| bttps://u             | ung Source.  | /files/70645701812570720 conchem reference for web adf  |                 |              |  |  |  |  |  |
| http://fil            | http://file.akfarmahadhika.ac.id/E-BOOK/12-1213-akfarmahad-16-1-yogelgu.d.ndf  |   |                 |              |  |  |  |  |  |
| https://fa            | https://faculty.psau.edu.sa/filedownload/doc-6-pdf-f06110ef2e1e1ae119chacf71dd17732-original.pdf   |   |                 |              |  |  |  |  |  |
| https://w             | ww.stem.org.uk/resour  | ces/collection/3959/practical-chemistry   |                 |              |  |  |  |  |  |

|        |     | Course Articulation Matrix: (Mapping of COs with POs and PSOs) |     |     |     |     |     |     |     |      |      |      |      |      |      |      |      |
|--------|-----|--|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| PO-PSO | PO1 | PO2  | PO3 | PO4 | PO5 | PO6 | PO7 | POS | POQ | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSOA | PSO5 |
| CO     | 101 | 102  | 105 | 104 | 105 | 100 | 10/ | 100 | 109 | 1010 | 1011 | 1012 | 1501 | 1502 | 1505 | 1504 | 1505 |
| CO1    | 3   | 3  | 1   | 1   | -   | -   | -   | -   | -   | -    | -    | -    | -    | 2    | 3    | -    | -    |
| CO2    | 3   | 2  | 2   | 2   | -   | -   | -   | -   | -   | -    | -    | -    | -    | 1    | 2    | -    | -    |
| CO3    | 2   | 3  | 2   | 2   | -   | -   | -   | -   | -   | -    | -    | -    | -    | 2    | 2    | -    | -    |
| CO4    | 2   | 2  | 1   | 1   | -   | -   | -   | -   | -   | -    | -    | -    | -    | 3    | 1    | -    | -    |
| CO5    | 3   | 3  | 1   | 2   | -   | -   | -   | -   | -   | -    | -    | -    | -    | 2    | 2    | -    | -    |

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

Name & Sign of Program Coordinator



| Effective from Ses | Session: 2023-24          |  |   |   |   |   |   |  |  |  |
|--------------------|---------------------------|--|---|---|---|---|---|--|--|--|
| Course Code        | B190403T/CH242            | Title of the Course  | Industrial Waste Treatment & Management | L | Т | Р | С |  |  |  |
| Year               | Second                    | Semester   | Fourth                                  | 3 | 1 |   | 4 |  |  |  |
| Pre-Requisite      | -                         | Co-requisite   | -                                       |   |   |   |   |  |  |  |
| Course             | Basic knowledge of i      | ic knowledge of industrial waste management technologies, acquaintance with basic waste treatment technologies and |   |   |   |   |   |  |  |  |
| Objectives         | environmental legislation | vironmental legislations to curb hazardous wastes will be taught to students.                                      |   |   |   |   |   |  |  |  |

|     | Course Outcomes   |
|-----|---|
| COI | Students understand sources, characteristics, and waste treatment flow sheets for selected industries such as textiles, tanneries,                |
| COI | pharmaceuticals, dairy, sugar, paper, distilleries, steel plants, and thermal power plants; wastewater reclamation concepts.                      |
|     | Students understand physical and chemical treatment, solidification, incineration, and secure landfills. Types of waste, management of solid      |
| CO2 | waste, treatment, and disposal of non- toxic solid waste (landfills, scrubbing, flue gas cleaning, incineration, heat drying, wet oxidation,      |
|     | biodegradation, etc.), treatment of hazardous waste, and e-waste treatment.   |
| CO3 | Students know heavy metals, biosorption by fungi, algae, and bacteria; factors affecting biosorption; bioreactors for biosorption: packed bed     |
| 005 | reactor, fluidized bed reactor, rotating disc reactor, sequential reactor.  |
|     | Student will be able to understand biotechnological applications for environmental management cover various areas, including composting,          |
| CO4 | carbon sequestration, bioenergy and biofuels, anaerobic digestion for methane production, as well as the assessment and feasibility of            |
|     | industrial pollution prevention, waste management, and recycling, waste disposal by incineration, and ultimate disposal.                          |
|     | Students will be understand the toxic chemicals in the environment including fertilizers, insecticides, pesticides, plastics, toxic metals, dyes, |
| CO5 | surfactants, and their toxicity; international and national standards and control; biochemical effects of mercury and lead, carcinogens, vector-  |
|     | borne and water-borne diseases, pollution, and public health issues.  |

| Unit<br>No.  | Title of the Unit  | Content of Unit  | Contact<br>Hrs. | Mapped<br>CO |  |  |  |  |  |
|--|--|--|-----------------|--------------|--|--|--|--|--|
| 1  | Pollution From Major<br>Industries                                 | Sources, characteristics, and waste treatment flow sheets for selected industries such as textiles, tanneries, pharmaceuticals, dairy, sugar, paper, distilleries, steel plants, and thermal power plants; wastewater reclamation concepts.                | 8               | 1            |  |  |  |  |  |
| 2  | Hazardous Waste<br>Management                                      | Hazardous wastes: physical and chemical treatment, solidification, incineration, secures landfills.  | 7               | 2            |  |  |  |  |  |
| 3  | Solid Waste<br>Management  | Types of waste, management of solid waste, treatment, and disposal of non-hazardous solid waste (landfills, scrubbing, flue gas cleaning, incineration, heat drying, wet oxidation, biodegradation etc.), treatment of hazardous waste, E-waste treatment. | 8               | 2            |  |  |  |  |  |
| 4  | Biosorption of Metals  | Introduction, heavy metals, Biosorption by fungi, algae and bacteria, factors affecting biosorption, bioreactors for Biosorption- Packed bed reactor, fluidized bed reactor, rotating disc reactor, sequential reactor.                                    | 7               | 3            |  |  |  |  |  |
| 5  | Biotechnological<br>Intervention in<br>Environmental<br>Management | Biotechnological application to the management of the environment: composting, carbon sequestration, bioenergy and biofuels, anaerobic digestion for methane production, factors affecting biogas production.  | 8               | 4            |  |  |  |  |  |
| 6  | Industrial Pollution<br>Prevention                                 | Assessment of Industrial Pollution Prevention, Feasibility of Industrial Pollution Prevention,<br>Feasibility Implementation, Waste Management, Recycling, Waste Disposal by Incineration,<br>Ultimate Disposal  | 8               | 4            |  |  |  |  |  |
| 7  | Agricultural Pollutants  | Fertilizers, insecticides, pesticides, plastics, toxic metals, dyes, surfactants, and their toxicity; international and national standards; control.   | 7               | 5            |  |  |  |  |  |
| 8  | Chemical Toxicology  | Toxic chemicals in the environment, biochemical effects of mercury and lead, carcinogens, vector-borne disease, water-borne disease, pollution, and public health issues.  | 7               | 5            |  |  |  |  |  |
| Referen  | ce Books:  |  |                 |              |  |  |  |  |  |
| Chemica  | al Thermodynamics by R.I   | P.Rastogi et al; Simplified course in Physical Chemistry, Madan&Tuli, S. Chand & Co. Ltd.  |                 |              |  |  |  |  |  |
| Principle  | es of physical chemistry by  | y Puri Sharma and Pathan; Atkin's Physical Chemistry, Atkin, Oxford Press.   |                 |              |  |  |  |  |  |
| Essentials of Physical Chemistry, Bahl&Tuli, S. Chand & Co. Ltd.; Principles of Physical Chemistry, Puri, Sharma & Pathania, Vishal Publishing Co. |  |  |                 |              |  |  |  |  |  |
| e-Learn  | e-Learning Source:   |  |                 |              |  |  |  |  |  |
| https://condorchem.com/en/industrial-wastewater-treatment/; https://www.water.wa.gov.au/ data/assets/pdf_file/0008/4040/89343.pdf                  |  |  |                 |              |  |  |  |  |  |
| https://w  | ww.chemicalprocessing.c  | om/articles/2018/understand-industrial-wastewater-treatment/   |                 |              |  |  |  |  |  |

https://www.encyclopedia.com/environment/encyclopedias-almanacs-transcripts-and-maps/industrial-waste-treatment

|        |     | Course Articulation Matrix: (Mapping of COs with POs and PSOs) |     |     |     |     |     |     |     |      |      |      |      |      |      |      |      |
|--------|-----|--|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| PO-PSO | PO1 | PO2  | PO3 | PO4 | PO5 | PO6 | PO7 | POS | POQ | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| СО     | 101 | 102  | 105 | 104 | 105 | 100 | 10/ | 100 | 109 | 1010 | 1011 | 1012 | 1501 | 1502 | 1505 | 1504 | 1505 |
| CO1    |     |  |     |     |     |     |     |     |     |      |      |      |      |      |      |      |      |
| CO2    |     |  |     |     |     |     |     |     |     |      |      |      |      |      |      |      |      |
| CO3    |     |  |     |     |     |     |     |     |     |      |      |      |      |      |      |      |      |
| CO4    |     |  |     |     |     |     |     |     |     |      |      |      |      |      |      |      |      |
| CO5    |     |  |     |     |     |     |     |     |     |      |      |      |      |      |      |      |      |



| Effective from Ses   | sion: 2024-25  |   |   |                            |   |   |                              |  |  |  |  |
|----------------------|--|---|---|----------------------------|---|---|------------------------------|--|--|--|--|
| Course Code          | Z040401T/PH201   | Title of the Course   | Physical Education and Yoga   | L                          | Т                                       | Р                                       | С                            |  |  |  |  |
| Year                 | 2 <sup>nd</sup>  | Semester  | Fourth  | 2                          |   |   | 2                            |  |  |  |  |
| Pre-Requisite        | -  | Co-requisite -  |   |                            |   |   |                              |  |  |  |  |
| Course<br>Objectives | Equip students with a<br>education, fitness, well<br>Emphasize the value of<br>physical fitness, menta<br>skills, and appreciation | comprehensive unders<br>ness, weight manageme<br>education. Delve into t<br>al well-being, and a ba<br>for traditional games as | tanding of physical education, fitness, and wellness. Gain<br>ent, and lifestyle choices. Explore the relationship between<br>raditional games, their cultural significance, and their benef<br>lanced lifestyle. Develop critical thinking, problem-solvin<br>part of cultural heritage and physical activity promotion. | yoga<br>its. Ap<br>ig skil | vledge<br>and mer<br>ply kno<br>ls, com | in phys<br>ntal hea<br>wledge<br>munica | ical<br>alth.<br>for<br>tion |  |  |  |  |

Course Outcomes

| CO1 | Students understand the fundamental concepts and principles of physical education and can explain the concept of fitness and wellness and its significance in maintaining a healthy lifestyle.   |
|-----|--|
| CO2 | Students can demonstrate knowledge of weight management techniques and strategies for maintaining optimal body weight as well as identify and analyze various aspects of an individual's lifestyle and its impact on overall health and well-being.  |
| CO3 | Students can recognize the relationship between yoga and mental health and understand how yoga practices contribute to mental well-being.<br>Comprehend the importance of value education and its role in personal and social development.   |
| CO4 | Students can evaluate the traditional games of India and their cultural significance, highlighting their physical and mental benefits. Apply theoretical knowledge and practical skills acquired during the course to promote physical fitness, mental well-being, and a balanced lifestyle. Develop critical thinking and problem-solving abilities related to physical education and wellness.   |
| CO5 | Students can communicate effectively about the importance of physical education, fitness, wellness, and traditional games, both orally and in written form. Foster an appreciation for Indian traditional games and their role in preserving cultural heritage and promoting physical activity. Engage in teamwork, cooperation, and leadership skills through practical activities and group projects related to physical education and wellness. |

| Unit<br>No. | Title of the Unit   | Content of Unit  | Contact<br>Hrs. | Mapped<br>CO |  |  |  |  |  |
|-------------|---|--|-----------------|--------------|--|--|--|--|--|
| 1           | Physical Education  | <ul> <li>Meaning, Definition, Aim and Objective.</li> <li>Misconception About Physical Education.</li> <li>Need, Importance and Scope of Physical Education in Modern Society.</li> <li>Physical Education Relationship with General Education.</li> <li>Physical Education in India before Independence.</li> <li>Physical Education in India after Independence.</li> </ul>  | 15              | 1            |  |  |  |  |  |
| 2           | Concept of<br>Fitness and<br>Wellness, Weight<br>Management, and<br>Lifestyle   | <ul> <li>i. Meaning, Definition and Importance of Fitness and Wellness.</li> <li>ii. Components of Fitness.</li> <li>iii. Factor Affecting Fitness and Wellness.</li> <li>i. Meaning and Definition of Obesity.</li> <li>ii. Causes of Obesity.</li> <li>iii. Management of Obesity.</li> <li>iv. Health problems due to Obesity.</li> <li>i. Meaning, Definition, Importance of Lifestyle.</li> <li>ii. Factor affecting Lifestyle.</li> <li>iii. Role of Physical activity in the maintains of Healthy Lifestyle.</li> </ul>   | 15              | 2, 3         |  |  |  |  |  |
| 3           | Yoga and<br>Meditation  | <ol> <li>Historical aspect of yoga.</li> <li>Definition, types of scopes &amp; importance of yoga.</li> <li>Voga is related to mental health and value education.</li> <li>Yoga is related to Physical Education and sports.</li> <li>V. Definition of Asana, differences between asana and physical exercise.</li> <li>Definition and classification of pranayama.</li> <li>Vi. Definition and classification of pranayama.</li> <li>Vii. Difference between pranayama and deep breathing.</li> <li>Viii. Practical: Asana, Suraya-Namaskar, Bhujang Asana, Naukasana, Halasana,</li> <li>ix. Vajrasan, Padmasana, Shavasana, Makrasana, Dhanurasana, Tad Asana.</li> </ol> |                 |              |  |  |  |  |  |
| 4           | Traditional<br>Games of India<br>and Recreation in<br>Physical<br>Education   | i.Meaning.Traditionalii.Types of Traditional GamesGilli- Danda, Kanche, Stapu, Gutte, etc.iii.Importance/ Benefits of Traditional Games.Games of Indiaiv.How to Design Traditional Games.i.Meaning, Definition of Recreation.ii.Scope and Importance of Recreation.iii.General Principles of Recreation.iv.Types of Recreation.iv.Ypes of Recreation.iv.Aerobics and Zumba (Fir India Movement).   |                 |              |  |  |  |  |  |
| Referen     | ce Books:   |  |                 |              |  |  |  |  |  |
| 1.          | Singh, Ajmer, Physica<br>Physical Education "   | ll Education and Olympic Abhiyan, "Kalayani Publishers", New Delhi, Revised Addition, 2006;  | Patel, Shri k   | rishna,      |  |  |  |  |  |
| 2.          | Panday, Preeti, Sharir  | ik Shiksha Sankalan, "Khel Sanskriti Prakashan, Kanpur   |                 |              |  |  |  |  |  |
| 3.          | Kamlesh M.L., "Phys   | cal Education, Facts and foundations", Faridabad P.B. Publications; B.K.S. Yengar, "Light  | and Yog. Y      | oga          |  |  |  |  |  |
| 4           | Deepika", George Allen of Unwin Ltd., London, 1981.   |  |                 |              |  |  |  |  |  |
| -+.<br>5    | 5 Indira Devi & duot Yoga for You&duot: Gibbs Smith Publishers Salt Lake City 2002 Domenand Publishers New Delhi - 2001 |  |                 |              |  |  |  |  |  |
| 5.<br>6     | 6 Jack Peter & monte Yours Master the Your Powers & monte Abhishek Publications Chandigath 2001                         |  |                 |              |  |  |  |  |  |



#### Department of Environmental Science Integral University

| Effective from Session:2024-2025 |   |                        |                            |   |   |   |   |  |
|----------------------------------|---|------------------------|----------------------------|---|---|---|---|--|
| Course Code                      | B150407R/ES237  | Title of the<br>Course | Internship/Apprenticeship, | L | Т | Р | С |  |
|                                  |   |                        | (Research Project I)       |   |   |   |   |  |
| Year                             | $2^{nd}$  | Semester               | IV                         | 0 | 0 | 0 | 3 |  |
| Pre-Requisite                    | 10+2 Botany, Physics, Chemistry   | Co-requisite           | Nil                        |   |   |   |   |  |
| Course Objectives                | Objectives Upon finishing the course students will be able to come up with a gain of professional work in industry and research project experience. |                        |                            |   |   |   |   |  |

| Course Outcomes |   |  |  |  |  |  |  |
|-----------------|---|--|--|--|--|--|--|
| CO1             | CO1 To apply theoretical concepts learned in degree course work to a practical situation                                    |  |  |  |  |  |  |
| CO2             | To obtain experience with relevant materials and methodologies.   |  |  |  |  |  |  |
| CO3             | Achieve/complete assigned target(s)/ task(s) given by the person to whom the intern or apprentice is reporting (Supervisor) |  |  |  |  |  |  |

| Unit<br>No. |  | Ti  | itle of th | e Unit |       | Content of unit |            |            |           |               |                 |               | Map<br>C(     | ped<br>D        |      |      |      |      |
|-------------|--|-----|------------|--------|-------|-----------------|------------|------------|-----------|---------------|-----------------|---------------|---------------|-----------------|------|------|------|------|
| 1           | Internship/Apprenticeship  |     |            |        |       |                 |            |            |           |               | CO1,            | ,2,3,         |               |                 |      |      |      |      |
| 1           | (Research Project I) consumary, research adorbary, institute, i force a reason of the state of t |     |            |        |       |                 |            |            |           |               |                 |               |               |                 |      |      |      |      |
|             | bi corporate environmental management and of natural natural. Calificates will write a field   |     |            |        |       |                 |            |            |           |               |                 |               |               |                 |      |      |      |      |
|             | project report on issues related to Environmental Science under the guidance of their respective   |     |            |        |       |                 |            |            |           |               |                 |               |               |                 |      |      |      |      |
|             | guides. Each student will work independently on the topic. The field project must consist of a   |     |            |        |       |                 |            |            |           |               |                 |               |               |                 |      |      |      |      |
|             | review of the interature and produce a deep insight of the subject based on personal research.   |     |            |        |       |                 |            |            |           |               |                 | fieldwork in  |               |                 |      |      |      |      |
|             | project work will be initiated at the start of Semester. The students will undertake fieldwork is terms of the collection of data and surveys. The field project will have to be submitted for apprais   |     |            |        |       |                 |            |            |           |               | for appraisal   |               |               |                 |      |      |      |      |
|             | terms of the collection of data and surveys. The field project will have to be submitted for appraisa  |     |            |        |       |                 |            |            |           |               |                 | report in the |               |                 |      |      |      |      |
|             | and acceptance by the University. The students should submit their field project report in t<br>following format:  |     |            |        |       |                 |            |            |           |               |                 | report in the |               |                 |      |      |      |      |
|             |  |     |            |        | Cha   | oter I: In      | troduction | n with A   | ims and ( | Objectives:   | A backgro       | und with h    | istorical inf | ormation and    |      |      |      |      |
|             |  |     |            |        | a rev | view of ex      | isting m   | aterial or | data on t | he subject a  | along with t    | he aims an    | d objectives  | s of the study. |      |      |      |      |
|             |  |     |            |        | Cha   | pter II: N      | Methodol   | ogy with   | n Materia | al and Met    | hods: Des       | cription of   | the issue,    | methodology     |      |      |      |      |
|             |  |     |            |        | ado   | bted for the    | he study.  | 0.         |           |               |                 | 1             |               | 25              |      |      |      |      |
|             |  |     |            |        | Cha   | pter III: H     | Experime   | ntal: Pres | entation  | of data col   | lected and      | detailed an   | alysis of res | ults.           |      |      |      |      |
|             |  |     |            |        | Cha   | pter IV: I      | Result an  | d Discus   | sion: Dis | cussion on    | the data ar     | nd results of | btained and   | Presentation    |      |      |      |      |
|             | of method suggested to solve the problem.  |     |            |        |       |                 |            |            |           |               |                 |               |               |                 |      |      |      |      |
|             | Chapter V: Summary and Conclusions: A summary of the dissertation and important conclusi   |     |            |        |       |                 |            |            |           |               | t conclusions   |               |               |                 |      |      |      |      |
|             | drawn at the end of the investigation.   |     |            |        |       |                 |            |            |           |               |                 |               |               |                 |      |      |      |      |
|             | Bibliography or References: A list of references cited in the text.  |     |            |        |       |                 |            |            |           |               |                 |               |               |                 |      |      |      |      |
|             | The Field Project Report should be typed on A4 size bond paper with 1.5 line spacing. Illustrati   |     |            |        |       |                 |            |            |           |               | . Illustrations |               |               |                 |      |      |      |      |
|             | and photographs should be of high quality. The report should be flawless without any spell   |     |            |        |       |                 |            |            |           |               | any spelling    |               |               |                 |      |      |      |      |
|             | mistakes or grammatical errors. Students will have to submit their field project report one mo   |     |            |        |       |                 |            |            |           |               | ort one month   |               |               |                 |      |      |      |      |
|             | Before the practical examination at the end of Semester. The field work report will carry 100 marks  |     |            |        |       |                 |            |            |           |               |                 |               |               |                 |      |      |      |      |
|             |  |     |            |        | (Inte | ernal mar       | ks 20 and  | Externa    | l marks 8 | 30). Assessi  | ment of the     | report will   | be done at    | the end of the  |      |      |      |      |
|             | year. Students have to present a Power Point Presentation. Assessment of the field work shal   |     |            |        |       |                 |            |            |           | work shall be |                 |               |               |                 |      |      |      |      |
|             | done by the external examiner appointed by HOD, Integral University.   |     |            |        |       |                 |            |            | -)        |               |                 |               |               |                 |      |      |      |      |
| PO          |  |     |            |        | 1     |                 | Course     | ATUCUIA    | uon ma    | i ix: (wiap)  | ping or CO      | s with r O    |               | s)              |      |      | 1    |      |
| PSO         | PO1  | PO2 | PO3        | PO4    | Р     | PO6             | PO7        | PO8        | PO9       | PO10          | PO11            | PO12          | PSO1          | PSO2            | PSO3 | PSO4 | PSO5 | PSO6 |
| CO          | 101  | 102 | 105        | 104    | 0     | 100             | 107        | 100        | 107       | 1010          | 1011            | 1012          | 1501          | 1502            | 1505 | 1504 | 1505 | 1500 |
|             |  |     |            |        | 5     |                 |            |            |           |               |                 |               |               |                 |      |      |      |      |
| CO1         | 2  | 2   | 2          | 1      |       |                 | 1          |            |           | 2             | 1               |               | 1             | 2               |      |      |      |      |
| CO2         | 3  | 2   | 1          | 1      |       |                 |            |            | 1         |               | 1               |               | 1             | 1               |      |      |      |      |
| CO3         | 3  | 2   | 2          | 2      | 2     | 2               |            |            |           |               | 2               |               | 1             | 1               | 1    |      |      |      |

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

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