|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Image result for nit meghalaya logo | | | | **National Institute of Technology Meghalaya**  An Institute of National Importance | | | | | | | | | | | | | | | | | | | | | | **CURRICULUM** | | | | | | |
| Programme | | | | **Bachelor of Technology in Civil Engineering** | | | | | | | | | | | | Year of Regulation | | | | | | | | | | **2019-20** | | | | | | |
| Department | | | | **Department of Civil Engineering** | | | | | | | | | | | | Semester | | | | | | | | | | **IV** | | | | | | |
| Course  Code | | Course Name | | | | | | | **Pre requisite** | | | Credit Structure | | | | | | | | | Marks Distribution | | | | | | | | | | | |
| L | | | T | | P | | C | | INT | | | MID | | | END | | | Total | | |
| **CE 252** | | **ENVIRONMENTAL ENGINEERING - I LAB** | | | | | | | **NIL** | | | **0** | | | **1** | | **2** | | **2** | |  | | | | | | **100** | | | **100** | | |
| Course  Objectives | | To familiarize the students with the analysis of the various physical and chemical parameters of water and waste water | | | | | | | | | Course Outcomes | | | | CO1 | | Identify environmental problems arising due to engineering and technological activities and the science behind those problems | | | | | | | | | | | | | | | |
|  | | | | | | | | | CO2 | | Estimate the population - economic growth, energy requirement and demand. | | | | | | | | | | | | | | | |
|  | | | | | | | | | CO3 | | Analyse material balance for different environmental systems. | | | | | | | | | | | | | | | |
|  | | | | | | | | | CO4 | | Realize the importance of ecosystem and biodiversity for maintaining ecological balance | | | | | | | | | | | | | | | |
|  | | | | | | | | | CO5 | | Identify the major pollutants and abatement devices for environmental management and sustainable development | | | | | | | | | | | | | | | |
|  | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | |
| No. | COs | | Mapping with Program Outcomes (POs) | | | | | | | | | | | | | | | | | | | | | | Mapping with PSOs | | | | | | | |
| PO1 | | PO2 | | PO3 | PO4 | PO5 | PO6 | | | PO7 | PO8 | | | | PO9 | | PO10 | | PO11 | | | PO12 | | | PSO1 | | | PSO2 | | PSO3 |
| 1 | CO1 | | **0** | | **3** | | **3** | **2** | **3** | **2** | | | **0** | **0** | | | | **3** | | **0** | | **3** | | | **3** | | | **0** | | | **3** | | **2** |
| 2 | CO2 | | **0** | | **0** | | **0** | **2** | **0** | **0** | | | **0** | **0** | | | | **3** | | **0** | | **3** | | | **3** | | | **0** | | | **3** | | **2** |
| 3 | CO3 | | **0** | | **3** | | **3** | **2** | **3** | **0** | | | **0** | **0** | | | | **3** | | **0** | | **3** | | | **3** | | | **0** | | | **3** | | **2** |
| 4 | CO4 | | **0** | | **3** | | **3** | **2** | **3** | **0** | | | **0** | **0** | | | | **3** | | **0** | | **3** | | | **3** | | | **0** | | | **3** | | **2** |
| 5 | CO5 | | **0** | | **3** | | **3** | **2** | **3** | **2** | | | **0** | **0** | | | | **3** | | **0** | | **3** | | | **3** | | | **0** | | | **3** | | **2** |
| SYLLABUS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| No. | Content | | | | | | | | | | | | | | | | | | | | | | Hours | | | | | | COs | | | |
| I | To find the turbidity and colour of a given sample of water. | | | | | | | | | | | | | | | | | | | | | | **1** | | | | | | **CO1, CO3, CO5** | | | |
| II | To determine the pH value of a given sample of water. | | | | | | | | | | | | | | | | | | | | | | **1** | | | | | | **CO1** | | | |
| III | To determine the conductivity of a given sample of water | | | | | | | | | | | | | | | | | | | | | | **1** | | | | | | **CO1** | | | |
| IV | To find out total dissolved solid, settle able solids and suspended solids of the given sample | | | | | | | | | | | | | | | | | | | | | | **2** | | | | | | **CO1, CO3, CO5** | | | |
| V | To determine the carbonate, bicarbonate, and hydroxide alkalinity of a sample. | | | | | | | | | | | | | | | | | | | | | | **2** | | | | | | **CO1, CO3, CO5** | | | |
| VI | To find out the concentration of chlorides in the given sample of water. | | | | | | | | | | | | | | | | | | | | | | **1** | | | | | | **CO1, CO3, CO5** | | | |
| VII | To estimate the hardness of the given sample of water by standard EDTA method. | | | | | | | | | | | | | | | | | | | | | | **2** | | | | | | **CO1, CO3, CO5** | | | |
| VIII | To find the optimum amount of coagulant required to treat the turbid water by Jar Test. | | | | | | | | | | | | | | | | | | | | | | **2** | | | | | | **CO1, CO3, CO5** | | | |
| IX | To determine residual chlorine in a given sample of water. | | | | | | | | | | | | | | | | | | | | | | **2** | | | | | | **CO6** | | | |
| X | To find the quantity of dissolved oxygen (DO) present in the given sample. | | | | | | | | | | | | | | | | | | | | | | **2** | | | | | | **CO4** | | | |
| XI | To determine biochemical oxygen demand (BOD) exerted by the given waste water sample | | | | | | | | | | | | | | | | | | | | | | **2** | | | | | | **CO4** | | | |
| XII | To determine Chemical oxygen demand (COD) exerted by the given waste water sample | | | | | | | | | | | | | | | | | | | | | | **2** | | | | | | **CO4** | | | |
| XIII | To determine MPN of coliforms of the given sample. | | | | | | | | | | | | | | | | | | | | | | **2** | | | | | | **CO4** | | | |
| XIV | To determine the metal & metalloids of the given sample. | | | | | | | | | | | | | | | | | | | | | | **2** | | | | | | **CO4** | | | |
| Total Hours | | | | | | | | | | | | | | | | | | | | | | | **24** | | | | | |  | | | |
| **Essential Readings** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. APHA, Standard Methods Examination of Water and Wastewater, American Public Health Association, Washington DC, 22nd Edition. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Metcalf & Eddy (Revised by G. Tchobanoglous, F. L. Burton and H. D. Stensel), “Wastewater Engineering Treatment and Reuse”, Tata McGraw Hill.4 th Edition | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Supplementary Readings** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Peavy H. S., Rowe D. R. and George Tchobanoglous, “Environmental Engineering”, McGraw-Hill International.First Edition | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. McGhee T. J ., “Water Supply and Sewerage”, McGraw-Hill Inc., 6th edition | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Davis M. L and Cornwell D. A “Introduction to Environmental Engineering”, McGraw-Hill, Inc.5 th Edition. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Sawyer C. N., McCarty P. L and Parkin G. F., “Chemistry for Environmental Engineers”, McGraw- Hill. Fifth edition. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Manual for Sewer and Sewerage, Central Public Health & Environmental Engineering Organization, Ministry of Housing and Urban Development, Govt. of India. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Manual for water supply and treatment, Central Public Health & Environmental Engineering Organization, Ministry of Housing and Urban Development, Govt. of India. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |