|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | **National Institute of Technology Meghalaya**  An Institute of National Importance | | | | | | | | | | **CURRICULUM** | | |
| Programme | | | **Master of Technology** | | | | | Year of Regulation | | | | | **2018-19** | | |
| Department | | | **Civil Engineering** | | | | | Semester | | | | | **I** | | |
| Course Code | | Course Name | | Pre-requisite | | Credit Structure | | | | Marks Distribution | | | | | |
| L | T | P | C | INT | | MID | END | | Total |
| **CE 515** | | **Physico Chemical Processes in Environmental Engineering** | | **NIL** | | **3** | **0** | **0** | **3** | **50** | | **50** | **100** | | **200** |
| Course Objectives | | 1. To understand various terms used in wastewater treatment 2. To understand basics of wastewater treatment. 3. To acquaint with different steps involved in primary treatment of wastewater. 4. To expose the students to understand the characteristics of water and its measurement. 5. To understand the design of basic components of water supply lines 6. To depict the information on water treatment processes and its design | | | Course Outcomes | | CO1 | Able to understand the principles and operation of water treatment systems and get concept of a unit operation and a unit process | | | | | | | |
| CO2 | Able to appraise the suitability of the design of treatment plants and unit processes | | | | | | | |
| CO3 | Able to understand coagulation, flocculation, and sedimentation, filtration, and disinfection processes. | | | | | | | |
| CO4 | Be able to apply water distribution processes. | | | | | | | |
| CO5 | Be able to discuss the accuracy of the Finite Element solutions | | | | | | | |
| CO6 | Able to design of a wastewater treatment plant and operation of wastewater treatment plant | | | | | | | |
| SYLLABUS | | | | | | | | | | | | | | | |
| No. | Content | | | | | | | | | | Hours | | | COs | |
| I | **Introduction:**  Physical, Chemical and Biological quality Parameters of surface and sub-surface waters and wastewater, Potable Water Standards, Wastewater Effluent Standards | | | | | | | | | | **8** | | | CO1, CO2 | |
| II | **Water Quality Indices**  Water Purification in Natural Systems - Primary, Secondary and Tertiary Treatment | | | | | | | | | | **8** | | | CO2, CO3, CO4 | |
| III | **Unit Operations**  Unit Processes, theory and design of physicochemical unit operations, screening, grit chamber, equalization, sedimentation, floatation, coagulation, flocculation, filtration, disinfection, water softening, adsorption, ion exchange, aeration and gas transfer, membrane separation processes, reverse osmosis, electrodialysis, desalination, electrodialysis, ultrafiltration, etc | | | | | | | | | | **10** | | | CO2, CO3, CO4 | |
| IV | **Applications & Design water treatment Plant**  Applications of Unit Operations in Water Treatment and Design of Physical Facilities, Design water treatment Plant | | | | | | | | | | **10** | | | CO4, CO5, CO6 | |
| Total Hours | | | | | | | | | | | **36** | | |  | |
| **Essential Readings** | | | | | | | | | | | | | | | |
| 1. Metcalf and Eddy Inc, Wastewater Engineering: Treatment, and Reuse, 4th edition, Tata McGraw Hill, 2007. | | | | | | | | | | | | | | | |
| 1. Peavy, H. S., Rowe, D. R., Tchobanoglous, G. Environmental Engineering, McGraw Hills, New York, 2013. | | | | | | | | | | | | | | | |
| 1. Weber, W. J. Physicochemical processes for water quality control, John Wiley and sons, Newyork, 2003 | | | | | | | | | | | | | | | |
| **Supplementary Readings** | | | | | | | | | | | | | | | |
| 1. Schroeder E D. Water and Wastewater Treatment, McGraw-Hill, 1997 2. Ministry of Urban development, Govt of India – Manual for Water Treatment. | | | | | | | | | | | | | | | |