|  |  |  |
| --- | --- | --- |
| Image result for nit meghalaya logo | **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** |
| CourseCode | Course Name | Pre requisites | Credit Structure | Marks Distribution |
| L | T | P | C | INT | MID | END | Total |
| **CE563** | **Fundamentals of Geoenvironmental Engineering** | **None** | **3** | **0** | **0** | **3** | **50** | **50** | **100** | **100** |
| CourseObjectives | 1. To enable the students to learn emerging topics related to Geotechnical and Geoenvironmental engineering.
2. To make students aware about sources of contamination and remediation of contaminated sites.
3. To make the students understand and explore the feasibility of rehabilitation of waste dumps and re-use of waste.
 | Course Outcomes | CO1 | Students will be able to understand the importance of soil-water-contaminant interaction.  |
| CO2 | Students will be able to identify the factors affecting the soil-groundwater-waste pollution.  |
| CO3 | Students will be able to comprehend the methods for deciding the fate of contaminants in the geoenvironment for contaminated land management. |
| CO4 | Students will be able to design the Waste Management Facilities. |
| CO5 | Students will be able to comprehend methods for reuse of waste.  |
| SYLLABUS |
| **No.** | **Content** | **Hours** | **COs** |
| I  | **Introduction:**  Need and scope for Geoenvironmental Engineering; Sources of Contamination, Environmental impacts of contaminants within soils- Multiphase behaviour of soil.  | 4 | CO1 |
| II | **Soil-Waste interaction:** Physical, chemical, and biological characteristics of wastes; Soil-waste interaction; Impact of pollution on clay mineralogy. | 6 | CO1, CO2 |
| III | **Transport of Contaminants:** Contaminant transport in sub surface; Transport Mechanisms and Principles- Advection, Diffusion, Dispersion; Contaminant transformation, Assess exposure pathways in environment-Contaminant mobility and its impacts on contaminated land management and remediation. | 9 | CO2, CO3 |
| IV | **Design of Waste Management Facilities:**Waste containment facilities and disposal practices, Landfills: Types of landfills, Guidelines and recommendations for waste containment system, Site Selection, Layers of waste containment liners, Types of barrier materials; Leachate collection system, Cover system, Gas collection system, Continuous Environmental monitoring around landfills, Case studies. | 10 | CO3, CO4 |
| V | **Waste Utilization:**Engineering Properties of mined waste and geotechnical reuse, mine-site restoration; Regulations; Case studies. | 7 | CO4, CO5 |
| **Total Hours** | **36** |  |
| **Essential Readings** |
| 1. Sharma, H.D., and Reddy, K.R., Geoenvironmental Engineering: Site Remediation, Waste Containment, and Emerging Waste Management Technologies, John Wiley and Sons, INC, USA, 2004.
2. Qian, X., Koerner, R., and Gray, D.H., Geotechnical aspects of landfill design and construction, Prentice Hall, 2002
3. Sarsby, R., Environmental Geotechnics, Thomas Telford, 2000.
 |
| **Supplementary Readings** |
| 1. Bouazza, A., and Bowders J.J., Geosynthetic Clay Liners for Waste Containment Facilities, CRC Press, 2010.
2. Reddi, L.N., and Inyang H.I., Geoenvironmental Engineering: Principles and Applications, Marcel Dekker Inc Publication, 2000.
3. Daniel, D.E., Geotechnical Practice for waste disposal. Chapman and Hall, London,1993
 |