IIT Mandi
Proposal for a New Course

Course number : CE405
Course Name : Water and Wastewater Engineering
Credit : 3
Distribution : 3-0-0-3
Intended for : UG/ M. Tech. /MS
Prerequisite : Environmental Science (IC 230) or equivalent
Mutual Exclusion: None

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1. Preamble:

The objective of this course is to help students understand various aspects of water and waste water treatment plants. The course will be helpful for students to develop the ability to apply the understanding of physical, chemical and biological phenomena for the efficient design of water/wastewater treatment plants. The course will also help them understand regular maintenance of treatment plants for sustainable recycling. The expected outcome of the course is that the students will be able to develop the ability to estimate, design and maintain wastewater treatment plants and to manage sludge.

2. Course Modules with quantitative lecture hours:

1. **Planning and hydraulic design of water and sewerage system**: Population forecasting, equivalent sewage flow estimation, sewer pipelines and materials, sewer hydraulics, stormwater drainage, storm runoff estimation, sewer appurtenances, sewage pumping. (12 hours)

2. **Water treatment processes**: Theory and application of water treatment process - aeration, coagulation, flocculation, sedimentation, filtration, and disinfection. (6 hours)

3. **Wastewater treatment processes**: Unit operations and processes, selection of treatment processes, onsite sanitation, septic tank, grey water harvesting, primary treatment, screens, grit chamber, primary sedimentation tanks, construction, operation and maintenance aspects. (8 hours)

4. **Secondary treatment processes**: Selection of treatment methods, hydraulic principles, activated sludge process and extended aeration systems, trickling filters and their design, sequencing batch reactor (SBR), membrane bioreactor (MBR), waste stabilization ponds, construction, operation and maintenance aspects.

(10 hours)

5. **Sewage Disposal and sludge management**: Standards for disposal methods, dilution, mass balance principle, self-purification of river, oxygen sag curve, deoxygenation and reaeration, dissolved oxygen modelling, reclamation and reuse of sewage, land disposal, agricultural uses of treated sewage, sludge characterization and sludge disposal methods. (6 hrs)

3. **Laboratory/practical/tutorial Modules:** None

4. **Text books:**

1. Mackenzie L. Davis, Water and Wastewater Engineering: Design Principles and Practice, McGraw-Hill Education, India, 2010.
2. Peavy, H.S., Rowe, D.R., Tchobanoglous, G., Environmental Engineering, McGraw-Hill Education, India, 2013.

5. **References:**

1. Metcalf, L., Eddy, H. P., & Tchobanoglous, G. (1979). Wastewater engineering: treatment, disposal, and reuse (Vol. 4). New York: McGraw-Hill.
2. Karia, G. L., Christian, R. A., Wastewater treatment: Concepts and design approach. PHI Learning Pvt. Ltd., India, 2013.

6. **Similarity with the existing courses:**
(Similarity content is declared as per the number of lecture hours on similar topics)

S. No.	Course Code	Similarity Content	Approx. % of Content
1.	CE559 (this course is no longer being offered)	Less than 5%	Less than 10%

7. **Justification of new course proposal if cumulative similarity content is >30%:** NA