

**INDIAN INSTITUTE OF TECHNOLOGY TIRUPATI**  
**PROFORMA FOR NEW COURSE**

1.	Title of the Course	Physicochemical Processes in Water and Wastewater Engineering
2.	Course Number	CE5104
3.	Status of the Course	Core
4.	Structure of Credits	3-0-0-3
5.	Offered To	PG
6.	New Course/Modification to	New
7.	To be Offered by	Department of Civil Engineering
8.	To take effect from	July 2019
9.	Prerequisite	Nil
10.	Whether approved by the Department	Yes
11.	<b>Course Objective:</b> The course describes the principles and applications of physicochemical processes in water and wastewater treatment. The course is designed to give a solid foundation to students on low-cost and simple treatment technologies as well as conventional options. The course also introduces advanced physicochemical treatment options employed in water and wastewater treatment, and regulatory changes that have occurred over the last decades in the area of water and wastewater treatment.	
12.	<b>Course Content:</b> Structure and properties of water; Overview of pollutants in water and wastewater; Water quality requirements; Water quality criteria and objectives; Implementation and monitoring compliance; Wastewater effluent standards; Water quality indices; Principles of water and wastewater treatment; Process flow sheeting; Unit operations and unit processes: Sedimentation; Flotation; Coagulation and flocculation; Gravity thickeners; Slow and rapid sand filtration; Precoat filtration; Ultra-filtration; Adsorption and ion exchange processes; Disinfection; Aeration and gas transfer; Diffused and surface Aeration; Air stripping of volatile contaminants in packed tower; Advanced treatment process: Reverse Osmosis; Electrodialysis; Capacitive deionization; Electrocoagulation; advanced oxidation processes.	
13.	Text book(s): 1. Weber W J, <i>Physicochemical processes for water quality control</i> , Wiley Inter-Science (1972). 2. Vigneswaran S and Visvanathan C, <i>Water treatment processes: Simple options</i> , CRC Press (1995).	
14.	Reference(s): 1. Droste R L, <i>Theory and practice of water and wastewater treatment</i> , John Wiley & Sons (1996). 2. Benefield L D, Judkins J F, and Weand B L, <i>Process chemistry for water and wastewater treatment</i> , Prentice Hall (1982). 3. Sincero A P and Sincero G A, <i>Environmental engineering: A design approach</i> , Prentice Hall India (1999). 4. Metcalf and Eddy Inc., Tchobanoglous G, Burton F, and Stensel H D, <i>Wastewater engineering – treatment and reuse</i> , Tata-McGraw Hill, New Delhi (2009).	