



भारतीय प्रौद्योगिकी संस्थान कानपुर
INDIAN INSTITUTE OF TECHNOLOGY KANPUR
 P.O.: IIT Kanpur, 208 016, Uttar Pradesh, India
शैक्षिक विभाग : पूर्वस्नातक शाखा
ACADEMIC SECTION : UNDERGRADUATE OFFICE

Prof. Anjan K Gupta
Chairperson, SUGC

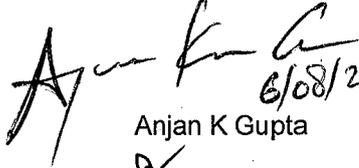
No. A(U)/New _Course/2024/CE/01
 July 29, 2024

OFFICE MEMORANDUM

The SUGC, through circulation, approved the proposal from the department of Civil Engineering to offer a new course as detailed below:

Sl. No.	Course No.	Credits	Course Title	Course Type
1.	CE401	2-0-0-0 [6]	HYDRAULIC & TURBOMACHINES	REGULAR

The copy of the course proposal is enclosed for reference.


 6/08/2024
 Anjan K Gupta

Copy to:

1. Dean, Academic Affairs
2. Associate Dean, Academic Affairs
3. All SUGC members
4. Heads of All Departments
5. OARS Section

Indian Institute of Technology, Kanpur

Proposal for a New Course

1. Course No: CE4**

2. Course Title: Hydraulic Turbomachines

3. Per Week Lectures: 2 (L), Tutorial: 0 (T), Laboratory: 0 (P), Additional Hours [0-2]: 0 (A)

Credits: 2-0-0-0 (6)

Duration of Course: Full Semester

4. Proposing Department/IDP: Civil Engineering

Other Departments/IDPs which may be interested in the proposed course: Mechanical Engineering, Aerospace Engineering

Other faculty members interested in teaching the proposed course: None

5. Proposing Instructor(s): Chunendra K Sahu (Hydraulics and Water Resources group)

6. Course Description: UG course for 3rd or 4th year students

A) Objectives: This course is designed as an elective course to acquaint an undergraduate student in civil engineering with the basic principles of Hydraulic Turbomachines. Students will learn about the functioning of pumps, compressors and turbines and their classifications. They will also learn the designing and optimization of Hydraulic Turbomachines.

B) Contents (preferably in the form of 5 to 10 broad titles):

S. No	Broad Title	Topics	No. of Lectures
1	Introduction	Continuity and momentum equations in cartesian and cylindrical coordinates, Laws of Thermodynamics, Dimensional analysis, Euler's equation of turbomachine	3
2	Turbomachines classification	Historical development of turbomachines, Pumps, Compressors, Turbines. Axial flow, Radial flow, Centrifugal flow, Mixed flow	2
3	Two-dimensional cascades	Cascade forces, Lift and Drag, Turbine cascade, Compressor cascade, Stalling	3
4	Axial flow turbines	Velocity triangle, Thermodynamics, Stage loss and efficiency, Multistage turbines, Three dimensional flows, radial equilibrium	5
5	Axial flow compressors and fans	Velocity triangle, Thermodynamics, Stage loss and efficiency, Multistage compressors, Design of an axial compressor, performance parameters	5
6	Centrifugal pumps, fans and compressors	Velocity triangle, Pressure ratio and head change, Slip factor, Diffuser, Stage loss, Choking	3
7	Hydraulic turbines	The Pelton turbine, Reaction turbines, The Francis turbines, The Kaplan turbines	6
8	Introduction to wind, gas and steam turbines	Type of wind turbines, Wind power output, Blade element theory, Working principles of radial gas turbines and steam turbines	4