Indian Institute of Technology, Kanpur

Proposal for a New Course

1. Course number: CE 7XX 718

2. Course title: Water resources systems analysis

3. Per week: Lectures – 3(L), Tutorial – 0(T), Laboratory – 0(P), Additional hours: 0(A)

Credits: 3-0-0-0 (9)

Duration of course: Full semester

4. Proposing department/IDP: Civil Engineering

Other Departments/IDPs which may be interested in the proposed course: Earth Sciences, School of Sustainability

Other faculty members interested in teaching the proposed course: Shivam Tripathi

5. Proposing instructor: Tushar Apurv

6. Course description: PG course/department elective

A. Objectives

The course introduces optimization and simulation techniques that are used in planning and management of water resources systems. The course will include application of these techniques to problems such as reservoir design and operations, river basin management, water allocation to multiple sectors, decision making under uncertainty and multi-criteria decision making.

B. Contents

S. No.	Broad title	Topics	No. of lectures
1.	Introduction	Overview of water resources systems analysis and its applications	1
2.	Optimization	Optimization techniques in problems of Hydrology and Water Resources	15
3.	Simulation	Stochastic streamflow generation models, simulation-based optimization using genetic and evolutionary algorithms	9
4.	Reservoir design and operation	Reservoir capacity design, rule curves, optimization of reservoir release, hedging rules	5
5.	River basin management models	Setting up a river basin model: representation of river networks, surface and groundwater storages, water users, specification of objective functions and constraints	5
6.	Decision making under uncertainty	Scenario generation for climate change impact assessment, performance metrics for water resources systems, multi-criteria decision analysis	5
Total			**40**

C. Pre-requisites: (CE361 and CE262) or (CE610 and CE611)

D. Short summary for including in the Courses of Study Booklet: Linear programming, non-linear optimization, constrained optimization, stochastic optimization, dynamic optimization, multi-objective optimization, genetic and evolutionary algorithms, stochastic streamflow generation, reservoir design and operation, river basin management models, decision making under uncertainty, scenario generation for climate change impact assessment.

7. Recommended books:

Reference books:

Loucks, D. P., & Van Beek, E. (2017). Water resource systems planning and management: An introduction to methods, models, and applications. Springer.

Deb, K. (2012). Optimization for engineering design: Algorithms and examples. PHI Learning Pvt. Ltd.

8. Any other remarks: none

Proposer: Tushar Apurv
Dated: 05-04-2024

DPGC convener:
Dated:

The course is approved/not approved.
Chairperson, SPGC
Dated:

CE

Scan/532
06/06/24

INDIAN INSTITUTE OF TECHNOLOGY KANPUR
POSTGRADUATE OFFICE

No. A(P)/IITK/course approval/
June 5, 2024

The Convener, DPGC
Departments of CE/SEE/PHY
IIT Kanpur

I am directed to communicate the concurrence of the SPGC (2023-24) in its 9th meeting held on 28/05/2024 for the approval of new PG course proposal. After detailed discussion the following courses were approved.

Course No	Title	Credits	Instructor	SPGC /Decision
CE716	Project Management and Control	3-0-0-0-9	Dr. Chirag Kothari	Approved
CE718	Water resources systems analysis	3-0-0-0-9	Dr. Tushar Apurv	Approved
CE719	Hydrometeorology	3-0-0-0-9	Dr. Tushar Apurv	Approved
SEE631	Sustainable Forest Management	3-0-0-0-9	Dr. Ashish Garg	Approved
PHY685	Introduction To Quantum Field Theory	3-0-0-0-11	Dr. Arjun Bagchi	Approved

Joint Registrar
Academic Affairs

CC: OARS (DOAA Office) For necessary action

MINUTES
FOR THE 9th MEETING OF THE SENATE POSTGRADUATE COMMITTEE (2023-24) TO BE HELD ON May 28, 2024 (TUESDAY) AT 02:00P.M.
DOAA CONFERENCE ROOM (208), ACADEMIC AFFAIRS BUILDING

Members present:

Prof(s): P M Mohite (AE), Vishal Agarwal (CHE), Chinmoy Koley (CE), Ark Verma (CGS), Abheejeet Mohapatra (EE), T H Syed (ES), Feroz Hassan (HSS), Amit Shukla (DoMS), Santanu De (ME), Niraj Chawake in place of Sudhanshu S Singh (MSE), Subhajit Dutta (MATH), Laltu Chandra (SEE), Sagar Chakrabarty (PHY), Sharvari Nadkarni Ghosh (SPASE), Piyush Rai (CSE).

Members Absent: Prof(s), Suresh Kumar (BSBE), Ashis Kumar Patra (CHM), J Ramkumar (DES), Shilpi Gupta (PSE), Vasudha Jain (ECO), Sri Sivakumar (MSP), Pankaj Wahi (NET)

Student representative:

Parthadhwaj Konduparty (22106009), Shivam Nigam (19112264), Harsha Prasad (21106270), Kartik Rout(20218267),

Item requiring SPGC Approval:

a) **Conversion from MSR/MTech to PhD Program:**

S.No	Roll No	Name	Dept	Prog	Supervisor and DPGC Recommendation	SPGC Recommendation/Decision
01-	22101403	Anil S Karthik	AE	MSR	Recommended	Approved to be reported to Senate
02-	22104065	Nilesh Pandey	EE	MTech	Recommended	Approved to be reported to Senate
03-	22118003	Aditya Gautam	BSBE	MTech	Recommended	Approved to be reported to Senate
04-	22101058	Sai Rohith Thaviti	AE	MTech	Recommended	Approved to be reported to Senate

*Students has completed course and CPI requirement as per clause 4.6 of PG Manual

b) **New course approval:-**

Course No	Title	Credits	Instructor	SPGC /Decision
CE716	Project Management and Control	3-0-0-0-9	Dr. Chirag Kothari	Approved
CE718	Water resources systems analysis	3-0-0-0-9	Dr. Tushar Apurv	Approved
CE719	Hydrometeorology	3-0-0-0-9	Dr. Tushar Apurv	Approved
SEE631	Sustainable Forest Management	3-0-0-0-9	Dr. Ashish Garg	Approved
PHY685	Introduction To Quantum Field Theory	3-0-0-0-11	Dr. Arjun Bagchi	Approved

Items requiring SPGC recommendation for Senate considerations:

a) **Conversion Programme Full Time to Part Time-recommended**

S.No	Roll No	Name	Dept	Prog	Supervisor and DPGC Recommendation	SPGC Recommendation /Decision
1	20227263	Soumyajit Bhunia	ECO	PhD	Recommended	Recommended
2	19104275	Rahul Bapusaheb Kodag	EE	PhD	Recommended	Recommended
3	17214263	Sanjeev Newar	DoMS	PhD	Recommended	Recommended subject to submission of a proper thesis plan by student, duly approved by the thesis supervisor and DPGC

Abheejeet Mohapatra 31/5/24