

Course Type	Course Code	Name of the Course	L	T	P	Credits
DC	NCEC520	River Engineering	3	1	0	4

Course Objective

To introduce fundamentals of fluvial system, flow and sediment transport mechanism in rivers and their responses to interventions.

Learning Outcomes

Upon completion of this course, student will

- Understand the characteristics of different types of rivers
- Understand sediment transport and erosion processes in rivers
- Get knowledge of flow sediment interaction with hydraulic structures and river training work
- Able to do physical and numerical modelling of river flow

Unit No.	Topics to be Covered	Contact Hours	Learning Outcome
1	Introduction: River classification, river morphology, major river projects in India Properties of sediment, stress concept on cohesion less and cohesive soils.	6L+1T	• Able to classify rivers. • Understand the basic properties of river sediment.
2	Hydraulics of river flow: Governing equations, flow resistance in rivers, bed forms; velocity and shear stress distribution in rivers.	10L+3T	• Thorough idea of governing equations for steady and unsteady flow. • Shear stress distribution along the bank and bed of a river
3	Sediment transport in rivers: incipient motion condition, bed load, suspended load and total load transport, mechanism of suspension; reservoir siltation.	8L+3T	• Able to estimate river aggradation and degradation • Estimate reservoir sedimentation
4	Fluvial mechanics of braided rivers, bar formation, river meandering	6L+2T	• Understand various bar formation in rivers • Understand the formation of river meanders
5	Physical river models, scour process around piers and embankments, bank protection and stabilization, river training work.	7L+2T	• Able to do physical river model • Able to calculate scour depth • Thorough idea of various river training work
6	Introduction to the numerical modelling of fluvial system, use of open source code/matlab/fortran/python for river modelling	5L+3T	• Able to use numerical tool for flow and sediment transport modelling
	Total Contact Hours	42L+14T	

Text Books:

1. Garde, R.J. (2006) "River Morphology", New International Publishers
2. Pierre Y. Julien (2018), "River Mechanics", Cambridge University Press

Reference Books:

1. Wu W. 2007. "Computational river dynamics", Taylor and Francis.
2. Garde, R.J. and Ranga Raju, K.G. (2006) "Mechanics of Sediment Transportation and Alluvial Stream Problems", Wiley Eastern Limited.
3. Julien, P.Y. (1998) "Erosion and Sedimentation", Cambridge University Press