

## River Engineering and Sediment Transport

<b>Course Code</b> <b>CE-855</b>	<b>Credit Hours</b> <b>3+0</b>
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### Course Description

The course aims to equip the student with the knowledge of fluvial sediment transport mechanism, analysis, and computation in channels. It discusses various techniques to compute channel aggradation and degradation. Additionally, the course discusses river regulation and flood defenses.

### Text Book:

- 1 G. parker, E-book: 1d sediment transport morphodynamics with applications to rivers and turbidity currents, accessible from internet at [http://hydrolab.illinois.edu/people/parkerg/morphodynamics\\_e-book.htm](http://hydrolab.illinois.edu/people/parkerg/morphodynamics_e-book.htm)
- 2 H. Chanson, Hydraulics of Open Channel Flow (2nd ed.), Elsevier,2005.
- 3 Ning Chien & Zhaohui Wan, Mechanics of Sediment Transport, ASCE Press, 1999.
- 4 J. Raudkivi, Loose Boundary Hydraulics (3rd Edition), Pergamon Press, 1990.
- 5 Van Rijn, Principles of Sediment Transport in Rivers, Estuaries and Coastal Seas, Aqua Publication, 1993.

### Reference Book:

- 1 Venoni, Sedimentation Engineering, ASCE, 1977.
- 2 K. G. Ranga Raju & R. J. Garde, Mechanics of Sediment Transportation and Alluvial Stream Problems (2nd Edition), Halsted Press, 1986.
- 3 W. H. Graf, Hydraulics of Sediment Transport, 1984.

**Prerequisites.** Nil

## ASSESSMENT SYSTEM FOR THEORY

Quizzes	10%
Assignments	10%
Mid Terms	30%
End Semester Exam	50%

### Teaching Plan

Week No	Topics	Learning Outcomes
1	Sediment observation, Estimation of Sediments at Gauging Station, and Estimation of suspended sediments at Project Area.	Calculate bedload, suspended load, and total load through application of bedload and suspended load techniques separately as well as through total load method.
2	Characterization of Sediment and Grain Size Distributions.	
3	Bankfull Characteristics of Rivers; Relations for the Conservation of Bed Sediment	
4	Review of 1D Open-Channel Hydraulics; Threshold of Motion and Suspension; Relations for 1D Bedload Transport	
5	Fluvial Bedforms.	Identify bed forms and regimes of its occurrence
6-7	Relations for Hydraulic Resistance in Rivers.	Divide total drag into form drag and skin friction components using various techniques.
8	Relations for the Entrainment and 1D Transport of Suspended Sediment.	Compute channel aggradation and degradation in a simplified river

9	<b>Mid Semester Exam</b>	
10	Sample Calculation for Bed Load, Suspended Load and Total Load.	
11	Bulk Relations for Transport of Total Bed Material Load	
12-13	River Morphology / Mechanics: Classification of Rivers, Behavior of Rivers, River Regime Theories, Meandering, Cut-offs, Effect of Dams on River Regime.	Select and implement appropriate methods of data collection for addressing engineering problems
14-15	River Survey: Introduction, Mapping, Water Levels, Bed Levels, Discharges, Stage-Discharge Relationship, Sediments, Water Quality.	Make observations and develop hypotheses about river processes
16	River Training Works for Flood Control.	Identify appropriate engineering solutions for river training
<b>17-18</b>	<b>End Semester Exam</b>	