

CE 466**Design of Free-Surface Hydraulic Systems****3 Units**

USC | SONNY ASTANI DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

ABET Course Syllabus

Course Information, Textbook and Supplementary Materials

Design Kernel

Course Description: Hydrological and hydraulic design for uniform and non-uniform flows, channel transition, sedimentation controls, design discharge for tributary watersheds, flood routing, flood detention, and computer aided design.

Design Kernel course for: BSCE, BSCE-ENE, and BSENE

Prerequisites: CE 309/ENE 410 Fluid Mechanics

Co-Requisite: none

Required Textbook: Open Channel Flow, 2009, Henderson, MacMillan Publishing Company

Reference: none

Topics Covered	Learning Outcomes
Open channel hydraulics and coastal engineering problems	<p>Students will have learned:</p> <ol style="list-style-type: none"> 1. Basic concepts of fluid flow, conservation of mass, energy and momentum 2. Specific energy and its relationship to critical, subcritical, and supercritical flow 3. Application of specific energy to transitions with change in bed elevation and width 4. Momentum principle in open channel, hydraulic jump, and concept of specific force 5. Open channel flow resistance, Manning equation, uniform and non-uniform flow 6. Design of open channels for uniform flow 7. Non-uniform flow and water surface profile computation and analysis 8. Analysis and design of open channel controls, upstream and downstream controls 9. Analysis and design of open channel transition, junctions, and energy dissipaters 10. Hydraulic analysis and design of culverts and inverted siphons 11. An introduction to coastal engineering, wave transformation in coastal zone, and breakwater design 12. Concepts in sediment transport, incipient sediment motion, conceptual design of unlined channels 13. Elements of computer calculation, models for non-uniform flows computation 14. Analysis of non-uniform flow and computation of flow profiles

Topics Covered	Learning Outcomes
Free surface hydraulics and coastal engineering problems	15. To perform hydraulic analysis and design of culverts, channel transitions, and inverted siphons 16. To perform hydraulic analysis and design of breakwaters and coastal protection structures

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Topics Covered	Learning Outcomes
Problems associated with sediment transport in rivers and channels	17. To perform hydraulic analysis and design of unlined channels 18. To perform sediment transport analysis to estimate suspension and bed load in a natural channel 19. To analyze reservoir sedimentation and sediment controls of reservoir

Lecture and Lab Schedule			
Lecture		Lab	
Sessions per Week	Duration per Session	Sessions per Week	Duration per Session
1	3 hours	n/a	

Relation of Course Objectives to Program Outcomes

The Civil Engineering program is designed to teach beyond the technical content of the curriculum and prepare the students to utilize what they learn in a professional setting.

This course does not contribute to the program outcomes.

Course Contribution to Program Outcomes (a-k)	✓ Key
N/A	

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