

**CEE 787/887**  
**Dredging and Beach Engineering**  
**Spring 2015**

**Instructor:** Dr. Navid Tahvildari  
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**Lectures:** M 7:10-9:50 pm                      Room: Gornto 219

**Office Hours:** M 1:00 - 3:00 pm, or by appointment

**Course Description:**

Considerations in the design of beach nourishment projects, types of dredging equipment, methodologies, and their performance, tidal inlet hydraulics and sedimentary processes are discussed.

**Learning Objectives:**

- Key concepts in beach nourishment
- Fundamentals of cross-shore and planform processes
- Sediment compatibility and borrow site considerations
- Environmental and economic considerations in beach nourishment projects
- Hydraulics and sedimentary processes of tidal inlets
- Dredging methods and their performance, fundamental of hydraulic dredging

**Textbook:**

(A) *Beach Nourishment Theory and Practice*, Robert Dean, 2002, World Scientific.

**Recommended References:**

(B) *Coastal Processes with Engineering Applications*, Robert Dean and Robert Dalrymple (Ch.13 on Blackboard), 2004, Cambridge University Press.

(C) *Coastal Engineering Manual*, 2008, U.S. Army Corps of Engineers, Part II (Ch. 6), Part III, Part V (Ch. 4, 6), <http://chl.erdc.usace.army.mil/cem>.

**Lecture Notes:**

Notes and other course materials will be available on Blackboard: [www.blackboard.odu.edu](http://www.blackboard.odu.edu)

**Prerequisites:**

Fluid Mechanics, Intermediate level Mathematics

**Homework:**

- Four homework assignments will be posted on Blackboard and will be due two weeks after assigned.
- Late homework will have a 10% penalty each day after the due date and will not be graded if it is more than three days late.
- Homework must be submitted to Blackboard in PDF format. Spreadsheets or codes should not be submitted and will not be graded. Group work is accepted but blind copying is not allowed.

**Exams:**

One mid-term and a final exam will be given in class. Both the approach and final answer will be evaluated.

**Course Grade:**

Homework 30%, Mid-term exam 35%, Final exam 35%

**Tentative Course Outline:**

Meeting	Date	Topics	Text
1	Jan. 12	Course Introduction, An Overview on Beach Engineering, Tools for Later Use, Terminology, Cross-shore Considerations	A (Ch. 1, 3)
	Jan. 19	<b>Martin Luther King, Jr. Holiday, No Class</b>	
2	Jan. 26	Planform Considerations, Pelnard-Considère Equation, Solution to Diffusion equation, Performance Measures and Prediction	A (Ch. 3, 4)
3	Feb. 2	Equilibrium Shoreline Advancement, Sediment Suitability, Examples	A (Ch. 5) C (Part III, V)
4	Feb. 9	Profile Equilibration, Background Erosion, Erosional Hot Spots Sediment Size Impacts, Placement Strategies	A (Ch. 6)
5	Feb. 16	Borrow Site Considerations, Multiple Nourishments, Numerical Models, Costs and Benefits of Beach Nourishment	A (Ch. 6, 7, 8) C (Part V)
6	Feb. 23	Environmental Effects, Monitoring, Case Study	A(Ch. 9, 10)
7	Mar. 2	<b>Mid-term Exam, in Class</b>	
	Mar. 9	<b>Spring Break, No Class</b>	
8	Mar. 16	Review of Hydraulics, Tidal Prism, Tidal Inlet Hydraulics	B (Ch. 13) C (Part II)
9	Mar. 23	Inlet Stability, Sedimentary Relationships at Inlets	B (Ch. 13)
10	Mar. 30	Sand Bypassing at Tidal Inlets, Inlet Design Considerations, Case Study	B (Ch. 13)
11	Apr. 6	Introduction to Dredging Equipment and Methodologies, Hydraulic Dredging, Performance of Hydraulic Dredges	A (Ch. 2)
12	Apr. 13	Mechanical Dredging, Performance of Mechanical Dredges	A (Ch. 2)
13	Apr. 20	Harbor Sedimentation, Case Study	C (Part V)
14	Apr. 27	Course Summary, Review	
15	May 4	<b>Final Exam 7:00-10:00 pm</b>	