Dredging and Beach Engineering (CEE 787/887)
Spring 2017

Instructor: Dr. Navid Tahvildari
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Lectures: Tuesdays 7:10-9:50 pm Room: Goronto 219

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

Course Description:
This course discusses the design of beach nourishment projects, tidal inlets, and dredging methods. Specific topics include: cross-shore and long-shore sediment transport, consideration in sediment borrow site, and environmental considerations in beach nourishment projects; types of dredging equipment, methodologies, and their performance. Furthermore, tidal inlet hydraulics and sedimentary processes, and harbor sedimentation process are discussed.

Learning Objectives:
- Define beach nourishment
- Describe profile and planform processes that affect beach nourishment
- Formulate equilibrium beach profile and longshore sediment transport
- Describe sediment compatibility and borrow site considerations
- Describe environmental and economic considerations in beach nourishment projects
- Analyze hydraulics and sedimentary processes of tidal inlets
- Describe dredging methods and their performance
- Calculate harbor sedimentation

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

Additional References:
(B) *Coastal Processes with Engineering Applications,* Robert Dean and Robert Dalrymple, 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://www.publications.usace.army.mil/USACE-Publications/Engineer-Manuals.
(D) Dredging and Dredged Material Management, 2015, U.S. Army Corps of Engineers, http://www.publications.usace.army.mil/Portals/76/Publications/EngineerManuals/EM_1110-2-5025.pdf

Lecture Notes:
Notes and other course materials will be available on Blackboard: www.blackboard.odu.edu

Prerequisites:
Fluid Mechanics, Intermediate level Mathematics

Homework:

- Four homework will be assigned and will be due two weeks after assignment.
- 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.
- Completed assignments must be submitted to Blackboard in a **single PDF file**. 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. Distance learning student should designate a proctor to administer the exams.

Course Grade:

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

Tentative Course Outline:

Week	Date	Topics	Text
1	Jan. 10	Course Introduction, An Overview on Beach Engineering, Tools for Later Use, Terminology, Cross-shore Considerations	A (Ch. 1, 3)
2	Jan. 17	Planform Considerations, Pelnard-Considère Equation, Solution to Diffusion equation, Performance Measures and Prediction	A (Ch. 3, 4)
3	Jan. 24	Equilibrium Shoreline Advancement, Sediment Suitability, Examples	A (Ch. 5) C (Part III,V)
4	Jan. 31	Profile Equilibration, Background Erosion, Erosional Hot Spots Sediment Size Impacts, Placement Strategies	A (Ch. 6)
5	Feb. 7	Borrow Site Considerations, Multiple Nourishments, Numerical Models, Costs and Benefits of Beach Nourishment	A (Ch. 6, 7, 8) C (Part V)
6	Feb. 14	Environmental Effects, Monitoring	A(Ch. 9, 10)
	Feb. 21	**Mid-term Exam, in Class**	
	Feb. 28	**Spring Break, No Class**	
7	Mar. 7	Review of Hydraulics, Tidal Prism, Tidal Inlet Hydraulics	B (Ch. 13) C (Part II)
8	Mar. 14	Inlet Stability, Sedimentary Relationships at Inlets	B (Ch. 13)
9	Mar. 21	Sand Bypassing at Tidal Inlets, Inlet Design Considerations, Case Study	B (Ch. 13)
10	Mar. 28	Introduction to Dredging Equipment and Methodologies, Hydraulic Dredging, Performance of Hydraulic Dredges	A (Ch. 2)
11	Apr. 4	Mechanical Dredging, Performance of Mechanical Dredges	A (Ch. 2)
12	Apr. 11	Harbor Sedimentation	C (Part V)
13	Apr. 18	Course Summary, Review	

	Apr. 25	**Reading Day- No Class**	
	Apr. 25	**Final Exam 7:00-10:00 pm**	

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Old Dominion University is committed to ensuring equal access to all qualified students with disabilities in accordance with the Americans with Disabilities Act. The Office of Educational Accessibility (OEA) is the campus office that works with students who have disabilities to provide and/or arrange reasonable accommodations. If you experience a disability which will impact your ability to access any aspect of my class, please present me with an accommodation letter from OEA so that we can work together to ensure that appropriate accommodations are available to you. If you feel that you will experience barriers to your ability to learn and/or testing in my class but do not have an accommodation letter, please consider scheduling an appointment with OEA to determine if academic accommodations are necessary. The Office of Educational Accessibility is located at 1021 Student Success Center and their phone number is (757)683□4655. Additional information is available at the OEA website: http://www.odu.edu/educationalaccessibility/