CEE 4224 –Transportation Facilities Design Fall 2015

Professor: Dr. Leslie McCarthy, P.E., Associate Professor in Civil & Environmental Engineering
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Textbook: Fricker & Whitford (2004), Fundamentals of Transportation Engineering, Prentice-Hall
References: AASHTO Geometric Design of Highways and Streets (2004); PennDOT Pub 70M and 408; FAA Advisory Circulars; AREMA Railway Engineering Design Standard (2009); FHWA Manual on Uniform Traffic Control Devices
Software: AASHTOWare Pavement ME Design Software; Google SketchUp; FAA FAARFIELD

Prerequisites: CEE 2211, CEE 2106, CEE 3801

Lecture: MWF 11:30 am - 12: 20pm in CEER 001
Office Hours: MW 10:15 AM - 11:15 AM; Thurs 4:45 PM – 5:30 PM
General Email Hours: MTWRF, 9:00 AM to 9:00 PM and Sunday 6:00 PM – 9:00 PM

Course Outcomes:

Outcomes related to technical content
1. Combine various components to design a complete a pavement or railway infrastructure system;
2. Design the pavements for new and existing roadways and airfields using professional software;
3. Interpret highway design standards to select and justify specific parameters of a roadway design;
4. Apply multiple elements of design standards to complete a component of a railroad or airfield;
5. Challenge or question results generated by one or more software tools by comparing them to design standards or specifications.

Outcomes related to technical, professional, and interpersonal skills
1. Develop the skills to solve open-ended design problems involving highway, rail, or airport facilities;
2. Improve students' ability to communicate technical information in both written form;
3. Develop the ability to learn complex, technical material independently and collaboratively.

Learning Assessment:		
	3 midterm exams & final exam (20% each)	80%
	Homework assignments	10%
	Graded class exercises	10%

Lecture Policy: Students are expected to continually check the Blackboard class website and to print their own lecture notes & homework assignments. Any handouts will be provided by the Instructor.

Attendance Policy: Because active learning requires you to be in class, attendance is strongly encouraged and one point will be taken from your course grade for every unexcused absence. Everyone receives one "grace" absence (athletes receive 3 with provision of athletic schedule), but after that the grade penalty goes into effect.

Student athletes: Please contact the instructor within the first two weeks of classes to make necessary homework/exam arrangements for team travel time. Exceptions cannot be made during the day of an exam.

Grading Scale: Numerical averages for specific letter grades* are as follows:

Numerical Average	Letter Grade	Numerical Average	Letter Grade
95 – 100	A	71 – 74	C
91 – 94	A-	67 – 70	C-
87 – 90	B+	63 – 66	D+
83 – 86	B	59 – 62	D
79 – 82	B-	55 – 58	D-
75 – 78	C+	0 - 55	F

*Grades will be rounded to the whole number

Exams: Three midterm exams will be given during the course of the semester and one (non-comprehensive) final exam given at the conclusion of the semester. Equation sheets and references may be provided at the discretion of the instructor. The instructor will discuss any exam or HW grade within 48 hours (excluding weekends and holidays) of their return, after which time the discussion is closed.

EXAM DATES*:

Topic of Exam	Exam Date
Module 1 Airport Design	September 25, 2015 (administered on Blackboard)
Module 2 Roadway Pavement Design	October 23, 2015 (in classroom)
Module 3 Highway Design Plans & QA	November 16, 2015 (in classroom)
Module 4 Railway Design	December 12, 2015 (in classroom)

* These dates were set in coordination with the other 5 senior-level design course instructors and are not negotiable.

Make-up Exam Policy: Prior consent of the instructor, or a doctor's certificate of illness, is the only satisfactory excuse for making up an exam. In such cases, a make-up exam will be considered by the Instructor.

Homework / Graded Class Exercises: You may have individual and group homework assignments/graded class exercises to turn in for the course. Individual homework must reflect an independent effort.

1. Homework is due at the beginning of class on the due date. Late HW will be accepted at a 50% reduction, if turned in within 24 hours after the due date. No credit will be given for HW submitted thereafter.
2. Prepare all HW solutions on one side of sheet only and staple all pages together. For all HW's prepared on a word processor (Word, Excel), you must show all calculations in long-hand form to receive partial credit. All graphs should be computer-generated with axes labeled correctly.

Academic Honesty Policy: All students admitted to Villanova University are subject to the statement of academic honesty committing them to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a Villanova student and to be honest in all work submitted and exams taken in this course, including not changing answers and seeking extra points after a graded exam is handed back to you. In addition, this includes not sharing references or sources with each other during an exam period or discussing questions/answers of an exam with others during the test period. If the Instructor suspects that academic dishonesty has taken place, the burden of proof is on the student and not on the Instructor. Violation will result in a "0" for the assignment/exam and possible academic suspension by the Dean of the College of Engineering.
http://www1.villanova.edu/villanova/vpaa/studentservices/policies/integrity/integritypolicy.html

Students with officially-documented disabilities: If you are a person with a disability, please make arrangements to register with the Learning Support Office. Please any special needs or accommodations with me at the beginning of the semester within 3 weeks of the start of the semester.

Planned Topics and Sequence:

Module	Lecture Numbers	Topics and Design Theories	Standards, Tools & Software	Supporting Reading
1	1	General Aviation Field Design	USAF design standards	Handouts from USAF
	2	Design of Flexible Airport Pavements	FAA Advisory Circulars	FAA handouts & Mallick book handouts
	3	Design of Rigid Airport Pavements	AirPave software tool	
2	1	Introduction to Pavement Design: materials & traffic	AASHTO Pavement ME Design	AASHTO 1993 design manual handouts
	2	Flexible Pavement Design		
	3	Rigid Pavement Design		
	4	Pavement Rehabilitation Design		Asphalt Institute pavement costs handout
3	1	Review of Geometric Alignment and Cross-Sectional Elements for Roadways	AASHTO Greenbook AASHTO Roadside Design Guide (RDG) PennDOT Pub 70M	FTE book Ch. 6 p 339-347 FTE book Ch. 7 p 370-400 FTE book Ch. 7 p 400-410 RDG & PennDOT handouts
	2	Work Zone Design / Maintenance and Protection of Traffic	Google SketchUp FHWA Manual of Uniform Control Devices	Handouts from FHWA
	3	Quality Assurance / Percent Within Limits design analysis	PennDOT Pub 408	Handouts from PennDOT and FHWA
4	1	Railroad Infrastructure Design	AREMA	FTE book Chapter 12 pp. 658-663, Handouts
	2	Railroad Alignment Design	AREMA	FTE book Chapter 12 pp. 679-684, Handouts

Module 1 includes: Design procedures for pavement markings, operational signage, and lighting for airfield design; common airfield pavement cross section designs & materials; aircraft loading; types of airports; theory of airfield flexible & concrete pavement design

Module 2 includes: Roadway material properties & traffic ESALs; AASHTO 1993 design procedure for flexible & rigid pavements; Pavement ME Design® analysis software; Overlay design; optimization, cost, and performance comparisons.

Module 3 includes: Interpreting highway elevation, plan, and section views; work zone design; QA for design and construction; using design standards

Module 4 includes: Track system components, substructure, materials; Geometric curves, superelevation, rail-highway grade crossing elements