

CEE 415/515 - Flexible Pavements

**Credit hours** - 3, contact hours - 50

**Instructor:** Hadi Rashidi, ESB 541, Office hours: MWF 11:00 to 13:00

**Text:** Hot Mix Asphalt Materials, Mixture Design and Construction, Roberts et. al., NAPA third edition  
Additional reading assignments will be made throughout the semester.

**Objective:** During this course we will examine the properties of asphalt binders, aggregates and asphalt-aggregate mixtures. Topics will range from the selection of materials, mix design and characteristics to the design, construction and maintenance of flexible pavements.

**Prerequisite:** CE 310

**Design Elective** course for BSCE

Course Objectives: During this course we will examine the properties of asphalt binders, aggregates and asphalt-aggregate mixtures. Topics will range from the selection of materials, mix design and characteristics to the construction pavements.

**Expected Learning Outcomes** - Upon successful completion of this course students will:

Goals by topic	student outcome
Understanding of role of flexible pavements in the transportation network	J
Understanding of the component materials used in asphalt concrete	A
Able to perform analytical procedures for mix design using Marshall and Superpave mix design methods	C, K
Knowledgeable of asphalt pavement construction and maintenance	E
Able to perform a life cycle cost analysis for paving decisions	E
Able to Design a flexible pavement	C, K

ABET Outcomes

A Apply knowledge of math, science and engineering

C Design civil engineering projects and components of projects

E Identify, formulate and solve civil engineering problems

J Knowledge of contemporary issues

K Use techniques, skills, and modern engineering tools

Grading Policy: Performance will be evaluated based on exams, a final, homework assignments, and quizzes. The number of quizzes during the semester will be inversely proportional to student interest and attendance. Grades will be determined based on the percentage of points earned during the semester. Grades will be based on 90%, 80%, 70%... corresponding to A, B, C,.. **To pass this class, you must earn a 60% average on the tests and final.** The instructor reserves the right to curve up, e.g., upwards to a higher grade than earned on this scale.

Exams	3x100	300
Final	1x200	200
Homework and quizzes	~10 assignments ~10 points each.	~100

HW Assignments: Homework will be assigned periodically throughout the semester with a specific due date. Assignments are due at the beginning of class. Late assignments will not be accepted.

Attendance Policy: You are expected to attend all classes. If you have a specific problem with attendance, notify the instructor prior to the class, unless the emergency is such that this is not possible. Consistent with University guidelines, students absent from regularly scheduled examinations because of authorized University activities will have the opportunity to take the exam at an alternate time. Make up exams for absences due to other reasons will be at the discretion of the instructor.

Attendance also means that you are expected to pay attention during class; do not bring in food or drinks and only use electronic devices when you are asked to do calculations. During tests and exams only nonprogrammable and non-communicating calculators can be used.

Course Schedule

Week	Topic	Reading chapters
1	Introduction	1
	Overview of asphalt history, construction, etc.	
	Basic Concepts	
2	Asphalt cement, Asphalt grades traditional	2
	Asphalt grades performance grades	
	Asphalt chemistry	
3	Aggregates production and sampling	3
	Mineralogy and chemistry	
	Physical properties	
4	Specific gravity	
	Gradation and surface area	
	Test 1	
5	Mix design methods	4
	Objectives	
	Marshall	
6	SuperPave	
7	Characterization of Asphalt Mixtures	5
	Test 2	
8	Equipment and construction asphalt plants	6
9	Field operations	
	Field operations	
10	Contracts and specifications	
	Quality control	
11	Special mixes	7
	Recycling	
	Asphalt modifiers	
12	Performance of flexible pavements	8
	Distresses	
13	Maintenance and rehabilitation	9
	Maintenance and rehabilitation	
	Test 3	
14	Flexible pavement design	handout
	Flexible pavement design	
	Flexible pavement design	
15	Flexible pavement design	
	Life cycle cost	
	Final Exam: per university schedule	

Social justice statement: West Virginia University is committed to social justice. I concur with that commitment and expect to foster a nurturing learning environment based upon open communication, mutual respect, and non-discrimination. Our University does not discriminate on the basis of race, sex, age, disability, veteran status, religion, sexual orientation, color or national origin. Any suggestions as to how to further such a positive and open environment in this class will be appreciated and given serious consideration.

If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with Disability Services (293-6700).