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:

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

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.

<table>
<thead>
<tr>
<th>Exams</th>
<th>3x100</th>
<th>300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final</td>
<td>1x200</td>
<td>200</td>
</tr>
<tr>
<td>Homework and quizzes</td>
<td>~10 assignments ~10 points each.</td>
<td>~100</td>
</tr>
</tbody>
</table>

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 ask to do calculations. During tests and exams only nonprogrammable and non-communicating calculators can be used.
## Course Schedule

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

### 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).