1. COURSE DESCRIPTION

Asphalt mix types and their use in civil engineering structures, with primary emphasis on pavements, with some attention to roofs, hydraulic structures and containment structures. Properties of asphalt and aggregate that determine mix properties. Engineering of mixes to meet design requirements. Effects of construction on properties, and strategies to meet construction requirements. Recycling of asphalt mixes, and design of mixes containing Recycled Asphalt Pavement and other recycled materials. Recent developments in asphalt mix technology, including results of SHRP, Superpave, accelerated pavement testing and other recent research, and use of modified asphalt binders. Review of current laboratory testing technology for binders and mixes.

2. COURSE OBJECTIVES

At the end of the class, the student should understand:

a. Asphalt binders, including production, engineering properties, modification, testing, classification, specification, chemical nature, economics and design.

b. Aggregates used for asphalt mixes, including production, engineering properties, modification, testing, specification, interaction with asphalts, economics and design.

c. Asphalt concrete mixes, including their uses, production, engineering properties, testing, performance, distress mechanisms, specification, economics and design.

d. Asphalt-aggregate combinations (surface treatments) other than asphalt concrete, including their uses, production, engineering properties, testing, performance, distress mechanisms, specification, economics and design.

e. Construction of asphalt mixes, including equipment, procedures, influence on properties, constraints, specifications, and quality control.

f. Recycling of previously used materials, including inplace and central plant recycling.

g. Environmental considerations in the selection, design, construction and reuse of asphalt mixes.

3. GRADE DETERMINATION

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<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework</td>
<td>20 %</td>
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<tr>
<td>Midterm</td>
<td>20 %</td>
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<tr>
<td>Research Paper and presentation*</td>
<td>30 %</td>
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<tr>
<td>Final</td>
<td>30 %</td>
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Undergraduate students enrolled in CIVL 598 will do a project analysis and design paper.
Details regarding paper given below.

4. **LECTURE TOPICS**
   Approximate order, and to be covered as time permits. Each lecture subject will include current practice in California and elsewhere.

   a. Overview of asphalt and asphalt mix uses

   b. Asphalt binders and binder products, including production, engineering properties, modification, testing, classification, specification, chemical nature, economics.

   c. Aggregates used for asphalt mixes, including production, engineering properties, testing, specification, interaction with asphalts, economics.

   d. Asphalt concrete mixes, including their uses, production, engineering properties, testing, specification, economics and design.

   e. Review of performance requirements and pavement problems.

   f. Asphalt-aggregate combinations (surface treatments) including their uses, production, engineering properties, testing, performance and failure mechanisms, distress mechanisms, specification, economics and design

   g. Construction of asphalt mixes, including equipment, procedures, influence on properties, constraints and problems, specifications, and quality control.

   h. Recycling of previously used materials, including Recycled Asphalt Pavement, in asphalt mix technology, including construction, design, and economics.

   i. Environmental considerations in the selection, design, construction and reuse of asphalt mixes, including porous pavements, tire-pavement noise, and heat island effects.

   j. Each student will conduct a 10 minute presentation on his/her term paper.

V. **READING**

Required reading will be regularly assigned. Material in the required readings will be the subject of homework and quizzes, and discussion in the lectures.

VI. **HOMEWORK**

Homework will be regularly assigned. Homework will typically be due two weeks after it is assigned. Homework must be presented in a format similar to that required in an engineering consulting office. It must be neat, readable and complete.
VII. TERM PAPER

Term paper must be original work primarily based on the existing literature, particularly the most current available for the subject matter. The paper must include your conclusions drawn from the research, and may include your original ideas for improvement of asphalt technology or selection of best practices based on your investigation.

Students enrolled as undergraduates, in CIVL 598, will do an analysis of an asphalt paving project. Students will be encouraged to address projects that involve recent state of the art technology. Example of topics are asphalt rubber, recycling asphalt concrete, and safe use of fog seals.

Potential paper topics may be selected from the lecture subjects, or cover asphalt technology topics outside of those covered in the course. Papers may also consist of critical reviews of several papers on the same subject in the literature. All paper topic must be discussed with the instructor and approved by November 1st. Papers are due on December 9th.

A 10-minute presentation on the paper subject should be prepared for the last lecture period. The paper must include full citation of all references used. The paper must be 10 to 15 pages not counting figures, double spaced, 12 point font, machine printed, 1 in margins all around. The paper will be graded primarily on content, secondarily on conciseness, and thirdly on grammar and presentation. The paper may be a detailed evaluation of a narrow subject, or a less in-depth review of a broader subject.