Syllabus CCE 524 – Asphalt Fundamentals (3 credits)
Spring 201x

LECTURES: TR 1400-1520, Kearney 124

INSTRUCTOR
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Office Hours:
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COURSE SPECIFICS
3 Credits
Pre-requisites: CCE 321 (or equivalent); or instructor's consent

CATALOG DESCRIPTION
Characterization of asphalt materials and mixtures, current laboratory testing technology for asphalt binders and mixes, engineering of asphalt mixes to meet design requirements, asphalt recycling process, environmental impacts of asphalt pavements, and recent developments in asphalt technology.

SYLLABUS OVERVIEW
This syllabus serves as a guideline for the course. It describes the planned course content and schedule, learning objectives, criteria for completing class assignments, information regarding examinations (final exam and term project), and grading information. Listed course topics will be covered to the extent allowed by the schedule. The topics covered and the course schedule may change due to learning abilities, time conflicts and limitations, and other unforeseen circumstances.

EMAIL
When you send an email to the instructor please include "*CCE 524*" in the subject line. This allows for easy searching to avoid missed emails pertinent to the class. If "*CCE 524*" is NOT in the subject line, I cannot guarantee that I will respond to your email in a timely manner.

COURSE OBJECTIVES
At the end of the class, the student should learn:

1) how to measure and evaluate the desired properties of asphalt aggregate paving mixtures for different applications.
2) how to measure and evaluate general properties of asphalt binders, including production, engineering properties, modification, testing, classification, specification, economics and design.
3) how to measure and evaluate general properties of aggregates used for asphalt mixes, including production, engineering properties, modification, testing, specification, interaction with asphalt, and design.
4) how to measure and evaluate general properties of asphalt mixes, including their uses, production, engineering properties, testing, performance, distress mechanisms, specification, and design.

5) general procedures followed for the construction of asphalt pavements, including equipment, procedures, influence on properties, constraints, specifications, and quality control.
6) general procedures followed for the recycling of previously used construction materials, including Recycled Asphalt Pavement, in asphalt mix technology.
7) how to do conduct FWD (non-destructive pavement testing) testing and analyze results to backcalculate important pavement properties.
8) how to design asphalt pavement structures by using mechanistic-empirical pavement design methods.
9) how to evaluate environmental considerations in the selection, design, construction and reuse of asphalt mixes.
10) current state-of-the-practice, state-of-the-art and research in asphalt pavement technology.

COURSE RESOURCES

Required

A. Scanned papers, reports, and software user's manuals uploaded to Canvas.
B. Pavement Guide Interactive: http://www.pavementinteractive.org/
C. LTPPBind, CalBack and CalME software will be given to students (will be upload to Canvas).

Additional

Y. Huang, *Pavement Analysis and Design*, 1993, Prentice-Hall

COURSE INFORMATION

The primary method for dissemination of course information will be through **Canvas**. Additional handouts may be given during lecture. Every effort will be made to post these additional materials to Canvas as well. Occasionally, course-related information may be disseminated through the class e-mail list, which requires an ONID account; thus, it is advised that you check your ONID e-mail account daily.

SCHEDULE - The topics covered in the course are listed in the following schedule. Also listed are the minimum reading requirements for each topic.

Lecture	Topic	Reading in Pavement Interactive	Other Reading on Canvas	Homework and reading assignments
1: 04/04	Course Overview, Distresses and introduction to asphalt material types and properties	Pavement/Pavement types;	Wright and Santucci	Reading assign.#1
2: 04/06	Distresses and introduction to asphalt material types and properties (cont.)	Pavement/Pavement types;		
3: 04/11	Asphalt binder rheology – Superpave binder experiments	Under Testing/Binder Testing	**LTPPBind software**	
4: 04/13	Asphalt binder rheology – Superpave binder experiments	Under Testing/Binder Testing		HW1 (Binders and aggregates)
5: 04/18	Aggregate selection and blending - Superpave	Under Materials/Aggregate/ Under Testing/Aggregate Testing		
6: 04/20	Aggregate selection and blending – Superpave &Term project discussion	Under Materials/Aggregate/ Under Testing/Aggregate Testing		Term project subject approval deadline
7: 04/25	Superpave asphalt mix design	Under Design/Mix design/Flexible pavement mix design/Superpave mix design	Harvey et al. (2001), Bell et al.	Reading assign. #2 and #3
8: 04/27	Superpave asphalt mix design	Under Design/Mix design/Flexible pavement mix design/Superpave mix design	Mechanistic-Empirical pavement design	HW2 (Mix design and characterization)
9: 05/02	Asphalt mix characterization - Lab	Under Testing/Asphalt Tests/ Under Testing/Cement Tests/	Coleri and Harvey (2011)-MM Coleri and Harvey (2011)-APT	Reading assign.#4
10: 05/04	Asphalt mix characterization - Field	Under Testing/Pavement tests/	FWD, DCP, GPR and wireless sensor networks handouts	Reading assign.#5 and #6

11: 05/09	Asphalt mix characterization - Field	Under Testing/Pavement tests/	FWD, DCP, GPR and wireless sensor networks handouts Bajwa et al (2013) **CalBack software**	HW3 (wireless sensor ideas)
12: 05/11	Asphalt mixing and testing-LAB			
13: 05/16	Asphalt mixing and testing-LAB			HW4 (Asphalt concrete mix characterization-Lab data processing)
14: 05/18	Asphalt mixing and testing-LAB			
15: 05/23	Asphalt mix production, construction, and recycling			
16: 05/25	Asphalt mix production, construction, and recycling			
17: 05/30	Viscoelasticity related fuel consumption (asphalt vs concrete)		Coleri et al. (2016) Harvey et al. (2016)	Reading assign.#7
18: 06/01	Invited Talk - ODOT			
19: 06/06	Wrap up - Summary			
20: 06/08	Presentation of term projects			
Reading assignments: Thursday 06/08/2017 at 14:00 Term project report: Thursday 06/08/2017 at 14:00 Final Exam: Take home - Date TBA				

ASSIGNMENTS AND GRADING

Homework assignments are due in class at the beginning of the period (14:00).

Assignments submitted AFTER THE DUE DATE AND TIME AND UP TO ONLY THREE (3) DAYS LATE will receive a 25% penalty, once graded.
This means a regular score of 80 will receive a score 60 if it is turned in up to 3 days late.
Absolutely NO assignments will be accepted after the 3-day late (25% reduction) policy.
These assignments will receive a score of 0 "zero".

Homework

Homework assignments will be issued throughout the course. These are intended to help you grasp fundamental concepts and expose you to techniques and skills for applying these principles to real-life situations. Understanding how to do the homework problems will go a long way toward understanding how to do well on the final exam. You may discuss homework problems with your classmates and work together. However, the submitted solution should be only your own work written up independently.

Use the following guidelines for assignment preparation (see also Course Grades below):

- Engineering paper is preferred; neatness is important and **required**. Work that is difficult to follow may not be graded, or will receive a reduced score. Typewritten work is also acceptable and must have the same headings as that shown below.
- Write on only one side of the paper, and start a new problem on a new sheet of paper (unless a problem only requires a short answer).
- Write the following in the upper part of each page: assignment number (e.g., HW #1) and due date, *CCE 524*, your name, and page number/total pages as follows:

	HW#1 Feb 6, 2015	CCE 520-APM	DOE, JOHN	1/5

- Provide a problem number before each problem. Provide sketches or screenshots whenever appropriate. Show all of your work (i.e., calculations). For graphical solutions, label the axes of your graph and include units. Double underline or box your final answer(s).
- Securely staple all pages; **do not fold the corner or use a paper clip**.
- Homework will be graded according to a set grading rubric. Grading discrepancies should be discussed with the Instructor.

In-Class Assignments

There may be in-class assignments throughout the term covering subject matter presented during lectures. In-class assignments will be due during the class period assigned and will count toward class participation.

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

The paper may be a detailed evaluation of a narrow subject, or a less in-depth review of a broader subject. 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 April 20th. Papers are due at the last lecture on June 8th.

A 15-minute presentation on the paper subject should be prepared for the last lecture.

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, 25 mm margins all around. The paper will be graded primarily on content, secondarily on conciseness, and thirdly on grammar and presentation.

Reading Assignments
Required reading will be regularly assigned (papers will be uploaded to Canvas and pavement interactive links are given in the schedule). Questions in reading assignments will be answered based on the material in the required readings. All reading assignments are due at the last lecture on June 8th .

Final Exam
The course will include a final exam. These will cover material presented in the lectures, assigned reading, and homework problems. Final exam will be take-home and will be done individually.

If you must miss the final exam for an emergency, please let the instructor **know as soon as possible**. If you skip the final exam, you will **not** have an opportunity to make it up and you will receive a score of **0 (zero)**. If you have a valid (according to the instructor) time conflict and you let the instructor know in advance, there is the possibility of taking the final exam at an alternate time.

COURSE GRADING
Grades will be based upon examination of course work. A breakdown is as follows:

- Homework/In-class assignments 30%
- Reading assignments 15%
- Term project 30%
- Final exam-Take home 25%

CLASS PARTICIPATION
Each student is expected to participate in the class. Participation includes coming to class **on time**, being prepared for class, participating in class discussions, responding to PollEV questions, and interacting in a courteous, respectful, and professional manner in accordance with the policies prescribed by the University. If you do miss class, it is your responsibility to find out what was covered and any administrative information presented.

STUDENT CONDUCT
It is expected that you will know and abide by the Oregon State University Student Code:
http://studentlife.oregonstate.edu/sites/studentlife.oregonstate.edu/files/code_of_student_conduct.pdf
It is expected that you know and will abide by the CCE Honor Code posted at:
http://cce.oregonstate.edu/node/258

Two other documents are posted at the website above: CCE as a Professional Community and the Student Code of Conduct. You are also expected to know and abide by these conducting yourself in an according manner.

CCE Honor Code
While representing himself or herself as a member of the CCE community, the CCE student will maintain the highest standards of honesty and integrity. The student will strive for these standards in his or her representations, academic pursuits, research and scholarly activity, and respect for the property and individual rights of others; will uphold the specific principles described in the Code; and will actively support the Code.

In addition to this Honor Code, all CCE students are expected to know fully the OSU Student Conduct Regulations. Likewise, the CE student is expected to read and understand the American Society of Civil Engineers (ASCE) Code of Ethics, and the Oregon State Board of Examiners for Engineering and Land Surveying (OSBEELS) Rules of Professional Conduct. The CEM student is expected to read and understand the AIC, American Institute of Constructors, http://www.professionalconstructor.org/code-of-ethics and the Construction Management Association of America (CMAA) Ethics Policy

Disruptive Behavior
While the university is a place where the free exchange of ideas allows for debate and disagreement, all classroom behavior and discourse should reflect the values of respect and civility. Behaviors that are disruptive to the learning environment will not be tolerated. OSU's policy on disruptive behavior may be found at:
http://studentlife.oregonstate.edu/sites/studentlife.oregonstate.edu/files/code_of_student_conduct.pdf

Academic or Scholarly Dishonesty
You are expected to be honest and ethical in your academic work. OSU Academic Misconduct (Policy 1) (see http://studentlife.oregonstate.edu/sites/studentlife.oregonstate.edu/files/code_of_student_conduct.pdf) states that, "Any action that misrepresents a student or group's work, knowledge, or

achievement, provides a potential or actual inequitable advantage, or compromises the integrity of the educational process." This document describes academic and scholarly dishonesty as follows:

a. Cheating. Unauthorized assistance, or access to or use of unauthorized materials, information, tools, or study aids. Examples include, but are not limited to, unauthorized collaboration or copying on a test or assignment, using prohibited materials and texts, unapproved use of cell phones, internet, or other electronic devices, etc.
b. Plagiarism. Representing the words or ideas of another person or presenting someone else's words, data, expressed ideas, or artistry as one's own. Examples include, but are not limited to, presenting someone else's opinions and theories as one's own, using another person's work or words (including unpublished material) without appropriate source documentation or citation, working jointly on a project and then submitting it as one's own, etc.
c. Falsification. Fabrication or invention of any information. Examples include, but are not limited to, falsifying research, inventing or falsely altering data, citing fictitious references, falsely recording or reporting attendance, hours, or engagement in activities such as internships, externships, field experiences, clinical activities, etc.
d. Assisting. Any action that helps another engage in academic misconduct. Examples include, but are not limited to, providing materials or assistance without approval, altering someone's work, grades or academic records, taking a test/doing an assignment for someone else, compelling acquisition, selling, bribing, paying or accepting payment for academic work or assistance that contributes to academic misconduct, etc.
e. Tampering. Interfering with an instructor's evaluation of work by altering materials or documents, tampering with evaluation tools, or other means of interfering.
f. Multiple submissions of work. Using or submitting work completed for another or previous class or requirement, without appropriate disclosure, citation, and instructor approval. 6
g. Unauthorized recording and use. Recording and/or dissemination of instructional content without the express permission of the instructor(s), or an approved accommodation coordinated via Disability Access Services.

The administration of the classroom rests with the instructor. When evidence of academic dishonesty comes to the instructor's attention, the instructor will (a) document the incident, (b) permit the accused Student to provide an explanation, (c) advise the Student of possible penalties, and (d) take action. The instructor may impose any academic penalty up to and including an "F" grade in the course after consulting with his school head and informing the Student of the action taken. Using the standard form, the instructor will report the incident and the action taken to his school head, who, in turn, shall forward the report to his dean.

For Students not enrolled in the College of Engineering, the Dean of the College of Engineering shall forward the report to the dean of the college or school in which the student is enrolled for possible disciplinary action.

Students With Disabilities

Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at http://ds.oregonstate.edu. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required,

students and faculty members are encouraged to discuss details of the implementation of individual accommodations.