

CE432 HIGHWAY ENGINEERING LABORATORY	
Course Description CE432 Highway Materials Testing (Required for a B.Sc.E degree)	Highway materials testing including: aggregates, bitumen, and asphalt concrete. Marshall Mix Design method, Superpave Mix Design method, Asphalt concrete distresses. [1(0,0,2)]
Course learning objectives	<p>Upon successful completion, the student will be able to:</p> <ol style="list-style-type: none"> 1. Understand the characteristics and the various tests of pavement materials including: aggregate, bitumen, and asphalt concrete. 2. Carryout Asphalt Concrete Mix Design.
Topics covered	<ol style="list-style-type: none"> 1. Introduction to Aggregate Materials. 2. Aggregate Sampling Methods, Sieve Analysis test, Sand Equivalent Value test. 3. Specific Gravity and Absorption test for Fine and coarse Aggregate. 4. Los Angeles test, California Bearing Ratio test, 5. Introduction to Bitumen Materials. 6. Penetration test of Semi-solid Bitumen, Specific Gravity of Semi-solid Bitumen, Ring and Ball test (Softening Point test). 7. Flash and Fire Point test, Ductility test, Kinematic Viscosity test. 8. Rolling Thin Film Oven (RTFO) test, Pressure Aging Vessel (PAV) test, Dynamic Shear Rheometer (DSR) test. 9. Bending Beam Rheometer (BBR) test (video), Direct Tension (DT) test (video), Skid Resistance test. 10. Introduction to Asphalt Concrete Mix Design: Marshall Method - Numerical Example. 11. Introduction to Asphalt Concrete Mix Design: Superpave Method - Numerical Example. 12. Project: Experimental Work. 13. Project: Experimental Work. 14. Project: Experimental Work.
Class/Laboratory sessions	Lectures/ Laboratory sessions of 100 minutes held once a week.
Computer applications	None
Project	<ol style="list-style-type: none"> 1. Students are required to submit a laboratory report for each experiment they conduct. 2. Students are required to submit mini- project reporting on the data acquired, analysis and the final Hot Mix Asphalt (HMA) concrete design
Contribution of course to meeting the professional component	Students learn the basic characteristics of highway materials and improve their report writing skills.
Textbook(s) and/or other required material	<ol style="list-style-type: none"> 1. Highway Engineering, 7th Edition, (2004), Paul H. Wright and Karen Dixon / Chapter 19. 2. Performance Graded Asphalt Binder Specification and Testing, SUPERPAVE, Asphalt Institute, Superpave Series No.1 (SP-1) 3. Class Notes and Handouts. 4. Digital notes on http://staff.ksu.edu.sa/welsaigh
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Grade Distribution

Description	Percentage	Dates and Times
Laboratory Reports	5	Submit before next session
Evaluation	10	Weekly
1 st Midterm	15	26/01/1439 H (16-Oct-2017)/ 17:00 -18:00 (Monday)
2 nd Midterm	15	24/02/1439 H (13-Nov-2017)/ 17:00 -18:00 (Monday)
Mix Design Project	15	29/03/1439 H (17-Dec- 2047) 12:30 – Deadline (Sunday)
Final Exam	40	30/03/1439 H (18-Dec-2017)/ 17:30 -19:00 (Monday)

*Attendance is crucial and shall be made on time

General Instructions

1. A brief on the test method will be provided by the instructor in the first twenty minutes of the laboratory session, but the student is advised to familiarize himself with the testing procedure of the specific test, days prior to the scheduled experiment date.
2. The students are required to take notes and collect data during testing. A hand-written data sheet shall be established by each student. The data sheet shall be approved by instructor or the lab. technician before the student leaves the laboratory premises. The data sheet shall be attached to the report as an appendix.
3. The students are required to submit a complete and informative report before next laboratory session. Minus grading policy will be strictly applied for late reports (1 mark will be deducted for each late day). The report must be typed.

Laboratory Report Format

1. *Cover Page*: The cover page bears student name and number, title of the experiment, Section number, submission date, and so forth.
2. *Introduction*: provide background information about the test, state how the test fits in the pavement design and / or construction process. Also state the objectives of your test (use bullets for each objective).
3. *Apparatus*: Describe the apparatus used in the test. Either free-hand sketches or photos is required. Place captions beneath Figures.
4. *Procedure*: Describe the procedure(s) followed in the test. Provide comments when possible.
5. *Experimental Data and Results*: Use tables to report the data when possible. Place caption on top of the table.
6. *Discussions and Conclusions*: Discuss the result. Provide conclusions in bullets format.
7. *References*: Add a list of references/webpage used in the laboratory report.

Important Notes:

- (1) Attendance of lectures and tutorials is crucial and shall be made on time.
- (2) Student attendance is counted based on student presence for all course activities (lectures, tutorial, and lab sessions if any) and not only lectures.
- (3) Official excuses for absence should be submitted to the course instructor within two weeks after the absence day. It is the responsibility of the instructor to accept or not to accept the excuse (medical excuses from King Khalid Hospital (KKH) and other Governmental Hospitals are accepted. Excuses from Clinics are not accepted).