

<p>Kingdom of Saudi Arabia Ministry of Higher Education <b>Qassim University</b> College of Engineering</p>		<p>المملكة العربية السعودية وزارة التعليم العالي جامعة القصيم كلية الهندسة</p>
---	--	--

## CE 652 Advanced Pavement Design

**College:** Engineering

**Department:** Civil

### First: Course Definition

**1- Course Code :** CE 652

**2- Units:** 3

**3 – Semester**

**4 -Prerequisite**

**5- Co-requisite**

**6- Location** (if not on main Campus):

**Second: Course Objectives**

- 1- To develop understanding of the concepts, theories of flexible and rigid pavement.
- 2- To identify distress types common to flexible and rigid pavements.
- 3- To calculate stresses strains and deflections in flexible pavements
- 4- To calculate wheel load and temperature, stresses in concrete pavements
- 5- To design Asphalt and concrete pavements.

### Third: Course Specifications

<b>1- Topics to be covered</b>		
Subject	No of Weeks	Units
Introduction	1	3
Stresses and Strains in Flexible Pavements	2	6
Stresses and Deflections in Rigid Pavements	2	6

<b>Kingdom of Saudi Arabia</b> Ministry of Higher Education <b>Qassim University</b> College of Engineering		المملكة العربية السعودية وزارة التعليم العالي جامعة القصيم كلية الهندسة
--	--	--

Traffic Loading and Volume	1	3
Material Characterization	1	3
Pavement Performance	1	3
Reliability	1	3
Flexible Pavement Design	2	6
Rigid Pavement Design	2	6
Design of Overlays.	1	3

## 2- Course components (Total hrs in the Semester): 42

Lecture	Exercise	Other
42	-	0

## 3- Intended Learning Outcomes of the Course (ILO's)

### a. Knowledge

#### *i) Description of the knowledge to be acquired:*

- Define the stresses and strains types in Flexible Pavements.
- Define the stresses and deflection types in rigid Pavements.
- List the traffic loading used in design of Flexible and rigid Pavements.
- Describe the process used in design of Flexible Pavements.
- Describe the process used in design of Flexible Pavements.

#### *ii) Teaching strategies to be used to develop that knowledge*

- Class lectures.
- Term projects.
- Students' presentations.
- Group discussion.
- 

#### *iii) Methods of assessment of knowledge acquired*

- Exams.
- Quizzes.
- Homework assignments.
- Term projects.

### b- Cognitive (Intellectual) Skills

<p><b>Kingdom of Saudi Arabia</b> Ministry of Higher Education <b>Qassim University</b> College of Engineering</p>		<p>المملكة العربية السعودية وزارة التعليم العالي جامعة القصيم كلية الهندسة</p>
--	--	--

***i) Cognitive skills to be developed***

- Identify the stresses and strains in Flexible Pavements
- Identify the stresses and deflection in rigid Pavements
- Classify traffic Loading and Volume
- Examine pavement performance.
- Recognize material characterization.

***ii) Teaching strategies to be used to develop these cognitive skills***

- Class lectures.
- Case studies analysis.
- Term projects.

***iii) Methods of assessment of students cognitive skills***

- Students' seminars and presentations.
- Term projects.
- Written reports.

***c. Interpersonal Skills and Responsibility***

***i) Description of the interpersonal skills and capacity to carry responsibility to be developed***

- Suggest alternative schemes for pavement design.
- Evaluate the road construction materials.
- Evaluate the pavement performance characteristics under loading conditions.

***ii) Teaching strategies to be used to develop these skills***

- Class lectures.
- Case studies analysis.
- Term projects.

***iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility***

- Students' seminars and presentations.
- Term projects.
- Written reports.

***d. Communication, Information Technology and Numerical Skills***

***i) Description of the skills to be developed in this domain***

- Literature research.
- Problems modeling.
- Utilization of computer applications in analysis and design.

<p>Kingdom of Saudi Arabia Ministry of Higher Education <b>Qassim University</b> College of Engineering</p>		<p>المملكة العربية السعودية وزارة التعليم العالي جامعة القصيم كلية الهندسة</p>
---	--	--

<p><b>ii) Teaching strategies to be used to develop these skills</b></p> <ul style="list-style-type: none"> <li>- Class lectures.</li> <li>- Case studies analysis.</li> <li>- Computer lab sessions.</li> <li>- Term projects.</li> </ul> <p><b>iii) Methods of assessment of students numerical and communication skills</b></p> <ul style="list-style-type: none"> <li>- Term project.</li> <li>- Written reports.</li> <li>- Students' seminars and presentations.</li> </ul>
---

**e. Psychomotor (if applicable) & Other Non-cognitive Skills**

<p><b>i) Description of the psychomotor or other skills to be developed and the level of performance required</b></p> <ul style="list-style-type: none"> <li>- NA</li> <li>-</li> <li>-</li> </ul>
--

<p><b>ii) Teaching strategies to be used to develop these skills-</b></p> <ul style="list-style-type: none"> <li>-NA</li> <li>-</li> <li>-</li> <li>-</li> </ul>
--

<p><b>iii) Methods of assessment of student's psychomotor skills</b></p> <ul style="list-style-type: none"> <li>-NA</li> <li>-</li> <li>-</li> </ul>
--

**4- Student Assessment Schedule**

Serial	Assessment tool (test, group project, examination etc.)	Week due	Weight
1	Term Project – 1	3 <sup>rd</sup>	15 %
2	Mid Term Exam -1	7 <sup>th</sup>	15 %
3	Term Project – 2	10 <sup>th</sup>	15 %
4	Term Project – 3	13 <sup>th</sup>	15 %
5	Final Exam	16 <sup>th</sup>	40 %

<p><b>Kingdom of Saudi Arabia</b>  Ministry of Higher Education  <b>Qassim University</b>  College of Engineering</p>		المملكة العربية السعودية وزارة التعليم العالي جامعة القصيم كلية الهندسة
---	--	--

**5- Student Support**

- Providing electronic library of textbooks and scientific periodicals.
- Providing the necessary computer applications for the course.

**6- Learning Resources**

- i) Essential Books (References)**
- Huang, Y. H. "Pavement Design and Materials," Prentice Hall; 2 edition, ISBN-10: 0131424734 ISBN-13: 978-0131424739.
  - Huang, Y. "Pavement Analysis and Design," Prentice Hall; 2<sup>nd</sup> edition, 2003.
  - AASHTO Guide for Design of Pavement Structures, 1993.
  - Yoder and Witczak "Principles of Pavement Design," John Wiley & Sons; 2nd Edition, 1976.

- ii) Course Notes**
- NA
  - 
  - 
  -

- iii) Recommended Books**
- Roberts et al. "Hot Mix Asphalt Materials, Mixture Design and Construction," NAPA Education Foundation, 1997.
  - Hausmann, M. R. "Engineering Principles of Ground Modification," McGraw-Hill, 1990.
  - The Asphalt Institute Pavement Design Manual (MS-1).
  - The Portland Cement Association Pavement Design Manual.

- iv) Electronic Books & Web Sites:**
- Scientific journals and forums.
  - Instructor's instruction
  -

- v) Periodicals**
- Journal of Transportation Engineering
  - Transportation Research Records
  - International Journal of Pavement Research and Technology

<p><b>Kingdom of Saudi Arabia</b> Ministry of Higher Education <b>Qassim University</b> College of Engineering</p>		<p>المملكة العربية السعودية وزارة التعليم العالي جامعة القصيم كلية الهندسة</p>
--	--	--

- ASTM Journal of Testing and Evaluation

**7- Course Evaluation and Improvement Processes**

***i) Strategies for Obtaining Student Feedback on Effectiveness of Teaching***

- Students' questioners.
- Students' evaluation of course and instructor.
- 
- 

***ii) Other Strategies for Evaluation of Teaching by the Instructor or by the Department***

- Public faculty seminars.
- Assessment by external evaluators of students achievements.
- Instructor (Course) Report
- 

***iii) Processes for Improvement of Teaching***

- Assessment of students' work by external examiners.
- Analysis of students' evaluation of course and instructor.
- Seminars by industry professionals.

***iv) Processes for verifying standards of student achievement (e.g. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution)***

- Assessment of students' work by external examiners.
- Analysis of students' evaluation of course and instructor.
- Seminars by industry professionals.
- 

***v) Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.***

- Assessment and evaluation of the level of achieving the course outcomes through a continuous improvement process (part of a quality assurance system established by the university),
- Consequently, actions are to be taken to improve the course delivery when necessary.
- Review of the course objectives, outcomes and curriculum every 2 years.

**Kingdom of Saudi  
Arabia**  
Ministry of Higher  
Education  
**Qassim University**  
College of Engineering



المملكة العربية السعودية  
وزارة التعليم العالي  
جامعة القصيم  
كلية الهندسه