College of Engineering

Department of Civil Engineering

CE 576 Structural Reliability

Credit and Contact hours	3/ 3 (Lectures), 0 (Tutorials), 0 (Laboratory)
Required, or Elective	Elective for a MSCE degree
Course Description	Common probability models. Principles of structural reliability. First and second order methods. Simulation techniques. Probabilistic models for loads and resistance variables. Probability-based design criteria and Design Codes; quantitative risk evaluation, safety and load factor determination.
Prerequisites or Co-requisites	None
Course Learning Outcomes	Students completing this course successfully will be able to

Course Learning Outcomes	*Related Program Outcomes*
CLO1: Recognize the role of structural reliability in the development of probability-based design codes.	**K1**
CLO2: Determine the reliability of structural components and structural systems using approximate and simulation techniques.	**S1**
CLO3: Use related computer programs for the calculation of reliability of structural components and systems	**S1**
CLO4: Compare the computer programs results of reliability of structural components systems with manual solutions.	**C2**

Student Outcomes related to this Course

K1. Recognize advanced engineering knowledge, concepts and techniques to identify, interpret and analyze complex and real-life engineering problems.

S1. Provide solution for complex and real-life engineering problems through critical thinking and using modern engineering tools and identify its impact on social and ethical issues.

<table>
<tr><td></td><td>C2. Design novel advanced Civil Engineering systems and evaluate its performance and effectiveness for engineering practice and its impact on society.</td></tr>
<tr><td>Topics Covered</td><td>
<table>
<tr><th>List of Topics</th><th>Related CLOs</th></tr>
<tr><td>1. Principles of structural reliability and quantitative risk evaluation</td><td>CLO2</td></tr>
<tr><td>2. Common probability models</td><td>CLO3</td></tr>
<tr><td>3. First and second order methods</td><td>CLO2</td></tr>
<tr><td>4. Simulation techniques</td><td>CLO2</td></tr>
<tr><td>5. Probabilistic models for loads and load factor determination</td><td>CLO4</td></tr>
<tr><td>6. Probabilistic models for resistance variables and safety factor determination</td><td>CLO4</td></tr>
<tr><td>7. Probability-based design criteria and Design Codes</td><td>CLO1</td></tr>
</table>
</td></tr>
<tr><td>Textbook(s) and Other Required Material</td><td>• Reliability of Structures by A. S. Nowak and K. R. Collins, McGraw-Hill, International Edition 2000.</td></tr>
<tr><td>Grading System</td><td>Assignments 15%
Mini Project and Oral Presentation 15%
Midterm Exam 30%
Final Exam 40%</td></tr>
<tr><td>Instructors</td><td>Prof. Dr. Nadeem A. Siddiqui; Office 2A89; email: nadeem@ksu,edu.sa</td></tr>
<tr><td>Date of Review</td><td>February, 2021</td></tr>
</table>