

## CGN 4503/6905 – Pavement Design

1. **Catalog Description** – Function and material requirements of different elements of flexible and rigid pavement systems; characterization of soils, materials, traffic loads, and environment for design; flexible and rigid pavement design; pavement distress; new developments. Credits: 3.
2. **Pre-requisites** – CGN 3501
3. **Course Objectives** – The student is expected to:
  - Describe basic characteristics of pavement structures
  - Analyze stress distribution throughout multilayer pavements systems
  - Identify pavement distresses and possible causes
  - Obtain properties for pavement materials
  - Calculate traffic loads for highway design
  - Determine pavement structures using the AASHTO design procedure
4. **Contribution of Course to Meeting the Professional Component** – This course is part of engineering topics for the curriculum. This course is primarily engineering design with elements of engineering science.
5. **Relationship of Course to Program Outcomes** – This course requires the student to apply basic math, science and engineering principles to analyze and design pavement structures.
6. **Instructor** – Jian Zou, Ph.D.  
265 I Weil Hall  
(352) 294-7799  
E-mail address: zouj@ce.ufl.edu  
Office hours: Tuesday & Thursday, 3:00 – 4:00 PM
7. **Graduate Teaching Assistant** – TBA
8. **Lecture Meeting Time** – 6<sup>th</sup> period Monday, Wednesday, and Friday
9. **Location** – Weil Hall, Room 238
10. **Required Textbooks**
  - Huang, Y.H. (2004). Pavement Analysis and Design, 2/E. Prentice-Hall, New Jersey, 792 pp. ISBN 0131424734.
11. **Optional Textbooks**
  - Papagiannakis, A.T., and Masad, E.A. (2008). Pavement Design and Materials. John Wiley and Sons, Inc., 542 pp. ISBN 0471214612, 9780471214618.
  - AASHTO. (2008). Mechanistic-Empirical Pavement Design Guide, Interim Edition: A Manual of Practice. American Association of State Highway and Transportation Officials, 212 pp. ISBN 1560514237. *Available online at UF libraries.*
12. **Recommended Reading** – The student should read the assigned chapter(s) or notes prior to class, and come prepared to discuss the material. Class discussion, with participation by all, is an integral part of the learning process.

**13. Course Outline** – see Appendix A.

**14. Attendance and Expectations** – Attendance in this course is not mandatory; announced quizzes may be given occasionally during the semester. It is strongly recommended the student attend lecture as a large portion of the information necessary for the completion of the course is made available during lecture.

**15. Grading**

Homework assignments – 19%

Exam 1 – 27%

Exam 2 – 27%

Exam 3 – 27%

**16. Homework and Assignments** – Graded assignments will be assigned to the students in class and there will be an announcement in Canvas and will be counted toward your final grade. The graded assignments are designed to prepare the student for a professional career in engineering. This is a senior level course. Homework should be neatly and professionally formatted. Please use the format attached to this syllabus (see Appendix B).

- Homework is due at the start of the class period on the day specified, unless otherwise noted.
- Late homework will be accepted at a 25% reduction if turned in within 24 hours after the due date. No credit will be given for HW submitted thereafter. If there are extenuating circumstances with regard to ability to submit an assignment on time, prior consent with instructor must be made.
- All homework must follow the format attached to this syllabus.
- All graphs should be labeled correctly.
- Sample calculations should be clear and easy to follow.

**17. Grading Scale** – Letter grades will be determined based on an absolute scale (A=90+, A-=88+, B+=85+, B=80+, B-=75+, C+=73+, C=70+, C-=65+, D=60+, etc.).

**18. Make-up Exam/Quiz Policy** – Prior consent of the instructor or a doctor's certificate of illness is the only satisfactory excuse for absence of an exam or quiz. In such cases a make-up exam will be provided.

**19. Honesty Policy** – All students admitted to the University of Florida have signed a statement of academic honesty committing to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others.

**20. Accommodation for Students with Disabilities** – Students requesting classroom accommodation must first register with the Dean of Students Office. That office will provide the student with documentation that he/she must provide to the course instructor when requesting accommodation.

UF Counseling Services – Resources are available on-campus for students having personal problems or lacking clear career and academic goals.

The resources include:

- UF Counseling & Wellness Center, 3190 Radio Rd, 392-1575, psychological and psychiatric services.
- Career Resource Center, Reitz Union, 392-1601, career and job search

services.

- 21. Software Use** – All faculty, staff and student of the University of Florida are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.
- 22. Calculator Policy for Exams and Quizzes:** The only calculators that are permitted for use during tests are the same as those permitted for the Fundamentals of Engineering Exam, which all civil engineering students are required to take prior to graduation. There are no exceptions to this requirement. The only acceptable models of calculators are listed below. Use of any other calculator during the exam must be approved by the instructor at least 24 hours before the exam.
- Casio: All fx-115 models.  
Hewlett Packard: The HP33 and HP35s, but no others.  
Texas Instruments: All TI-30X and TI-36X models.
- 23. Cellular Telephone Policy:** Cellular telephones are disruptive during class and should be turned off. Cellular telephones must be turned off and stored away (preferably in a book bag) during exams and quizzes. Any student using a cellular telephone during a test will be considered to be in violation with the academic honesty policy and will be subject to disciplinary action.
- 24. Conflict and Resolution for Exam, Quiz and Homework:** Students who have conflicts and/or issues with their exam may bring it to the attention of the instructor via email, Canvas or by appointment within 7 days of the in-class distribution of the exam, quiz or homework. No conflicts will be resolved 7 days after the in-class distribution of the exam, quiz or homework.
- 25. Evaluation of the course:** Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

## Appendix A

### Tentative Course Outline:

Topic	Content	Reference
Introduction	<ul style="list-style-type: none"> <li>• Course Description, Fundamental Design Principles</li> <li>• Pavement Types, Wheel Loads</li> </ul>	Chapter 1 ( <i>Huang</i> ) Chapter 1 ( <i>Masad</i> )
Flexible Pavement Stress Analysis	<ul style="list-style-type: none"> <li>• Load-Induced Stresses in Flexible Pavements</li> <li>• Analytical Software</li> </ul>	Chapter 2 ( <i>Huang</i> ) Chapter 2 ( <i>Masad</i> )
Material Characterization	<ul style="list-style-type: none"> <li>• Strength and Deformation Tests, CBR, Resilient Modulus, Soil Classification</li> <li>• Drainage</li> </ul>	Chapter 7 ( <i>Huang</i> ) Chapter 4,5,6 ( <i>Masad</i> ) Class notes
<b>EXAM 1 TBA</b>		
Flexible Pavement Distress	<ul style="list-style-type: none"> <li>• Flexible Pavement Distress and its Causes – Design Factors</li> </ul>	Chapter 9 ( <i>Huang</i> ) Chapter 9 ( <i>Masad</i> )
Traffic	<ul style="list-style-type: none"> <li>• Vehicle and Traffic Characterization for Design</li> </ul>	Chapter 6 ( <i>Huang</i> ) Chapter 2 ( <i>Masad</i> )
Flexible Pavement Design	<ul style="list-style-type: none"> <li>• Mechanistic Empirical Pavement Design Guide (MEPDG)</li> <li>• AASHTO Design Procedure – Flexible Pavements</li> </ul>	Chapter 11 ( <i>Huang</i> ) Chapter 11 ( <i>Masad</i> ) Class notes
<b>EXAM 2 TBA</b>		
Rigid Pavement Stress Analysis	<ul style="list-style-type: none"> <li>• Thermal Stresses</li> <li>• Load-Induced Stresses in Rigid Pavements</li> <li>• Combined Effects of Temperature and Load</li> </ul>	Chapter 4 & 5 ( <i>Huang</i> ) Chapter 8 ( <i>Masad</i> )
Rigid Pavement Distress	<ul style="list-style-type: none"> <li>• Rigid Pavement Distress and its Causes – Design Factors</li> </ul>	Chapter 9 ( <i>Huang</i> ) Chapter 9 ( <i>Masad</i> )
Rigid Pavement Design	<ul style="list-style-type: none"> <li>• AASHTO Design Procedure</li> </ul>	Chapter 12 ( <i>Huang</i> ) Chapter 12 ( <i>Masad</i> )
<b>EXAM 3 TBA</b>		

## Appendix B

### Homework Format:

1. All pages should include your name, class designation (CGN 4503/6905 or Pavement Design), homework number, and the submission date at the top of the sheet.

Pavement Design CGN 4503 HW#1	08-25-2019	Last name, First name	1/2
----------------------------------	------------	-----------------------	-----

2. All homework must be submitted using only one side of the page.
3. Begin each problem with a problem statement of what is being solved.
4. Work should be organized and **neat**. Assumptions should be clearly stated, **appropriate units** should be noted on answers and answers should be boxed, underlined or otherwise **appropriately labeled**. Where appropriate include references to figures, tables or other sources. *The homework in this class should be submitted to the instructor as though the assignment is an engineering project. Assignments that do not meet a minimum standard of neatness and organization will receive penalties of up to 25%.*
5. Where appropriate, neat sketches should be included to explain design calculations or appropriate problems. Straightedges should be used to create lines for graphs, axes and where appropriate.
6. Numerical answers should be given with an appropriate **number of significant digits**.