EML 6934: WAVE PROPAGATION IN SOLIDS (3 CREDITS)

SPRING 2020 Syllabus
Modifications to this syllabus may be required during the semester.
Any changes to the syllabus will be announced in class

Instructor: *Dr. Benoit Revil-Baudard*
Office: 155 UF/REEF, Shalimar, FL 32579
Office hours: Thursday 2:00 pm to 4:00 pm CT
Phone: (850) 833-9350 ext. 232
E-mail: revil@ufl.edu

Course Prerequisites:
Completion of graduate courses of "EGM5533-Advanced Elasticity" and "EGM6671-Inelastic Materials"

Class meets on Wednesday: 3:00-4:55 pm and Thursday: 3:00-3:50 pm., Room 111, REEF

Textbook: None required.

Other reference books:
-Dynamic Plasticity, N. Cristescu, North-Holland Publishing Company, Amsterdam, 1967.
-Introduction to the Mechanics of a Continuum Medium, L.E. Malvern, Prentice-Hall Series in Engineering of the Physical Sciences, 1969.
- Structural Dynamics: Theory and Applications, Joseph W. Tedesco, William G. McDougal, C. Allen Ross, 1984.

Course objectives:
-Provide basic analytical methods for solving problems in wave propagation in solids.
-Allow students to assess whether a numerical solution "makes sense".
-Application of analytical and numerical techniques to dynamic testing.
-Hands-on characterization using Split-Hopkinson Pressure Bar system; learn to interpret and reduce data obtained.
- Plastic wave propagation in metallic materials
- Numerical modeling of high strain-rate dynamic events such as Taylor impact, plate impact,…
- Introduction to shock wave

Course Description:
The description below provides a tentative schedule for this course. Please, note that the course description is meant only as a guideline and there may be changes.
A general description is the following:

- Introduction
- Review of vectors and tensors
- Stress at a point
- Strains
- Balance Laws
- Linear elastic laws for isotropic and orthotropic materials
- Derivation of fundamental elastic wave equations
- Planar wave propagation in composite materials
- Derivation of longitudinal wave speed in a homogenous isotropic rod
- Examination of the two bar impact problem
- Derivation of longitudinal wave speed in a composite rod
- Discussion of a wave through half space
- Reflection and transmission of oblique incident waves.
- Plastic wave propagation in metallic materials
- Discussion of spall experiments.
- Discussion of Split-Hopkinson Pressure bar tests
- Introduction to the use of potential functions in deriving wave equations
- Introduction to shock wave
- Numerical modelling of dynamic events such Taylor impact

Policies and procedures:
Exam: One take home exam will be given at mid-term.
Grades: Grades will be determined using these weights: 25% Homework, 75% Exam
The grading scale will be: 92-100 A, 86-91 B+, 80-85 B, 76-79 C+, 70-75 C, 66-69 D+, 60-65 D, and 0-59 E.
Academic Honesty: All students admitted to the University of Florida have signed a statement of academic honesty committing them 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 student at the University of Florida and to be honest in all work submitted and exams taken in this class and all others. All students should read the University of Florida academic honesty statement available on the web at http://www.dso.ufl.edu/Academic_Honesty.html.Any student caught cheating on an exam will receive either a failing grade on the exam or, at the instructor's discretion, a failing grade in the course. ALL incidents of possible cheating will be reported to the Office of Student Judicial Affairs.