

- Time: Tu, Th 3:00 - 5:00 p.m. (we can change upon students' schedules, and various travel plans).
- Place: 475 Weil Hall (Structures Conference Room)
- Instructor: Professor T. Krauthammer Tel.: 352-273-0691  
Center for Infrastructure Protection and Physical Security (CIPPS)  
Bldg 1406, East Campus  
www.cipps.eng.ufl  
tedk@ufl.edu
- Office Hours: By appointment
- Prerequisites: None, but see course description, below
- Teach. Asst.: None
- Course Objectives and/or Goals: Understand structural behavior under impact
- Course Outline: Enclosed
- Textbook: Norman Jones, *Structural Impact*, Cambridge, 2011.
- Reading: Students will be assigned extensive reading activities of various topics to be covered during the semester, and be expected to actively participate in class discussions on these topics. All students will be expected to present and discuss various topics.
- Approach: Class activities will consist of a combination of discussions, technical activities, and seminars.
- Homework: Regular assignments, computational work, development of computer codes.
- Projects: Projects and term papers on advanced topics.
- Team Effort: Students will work in groups of 2 or 3 (TBD) on all assignments, and each group will submit one paper/report.
- Tests: TBD
- Grading Policy:
- |                           |     |
|---------------------------|-----|
| Homework, Projects, etc.: | 60% |
| Tests:                    | 40% |
- Grade Points: Graduate students, in order to graduate, must have an overall GPA of 3.0 or better (B or better). Note: a B- average is equivalent to a GPA of 2.67, and

therefore, it does not satisfy this graduation requirement. For more information on grades and grading policies, please visit:  
<http://gradcatalog.ufl.edu/content.php?catoid=4&navoid=907#grades>

Class Attendance Policy: None

Policy for Make-up Exams or Other Work: In coordination with instructor

Accommodation for Students with Disabilities: Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.

Course Description: See below

## **BACKGROUND**

Impact is a very common form of load application that requires careful analysis, and design. Examples are:

- Vehicle crashes into other vehicles, or into stationary structural systems.
- Structural components impacting other structural components.
- Projectiles impacting structural systems.
- Dropped objects impacting structural systems.
- Etc.

Static and classical dynamic approaches may not be adequate for such problems, and one needs to employ more advanced analysis and design procedures.

**PREREQUISITES:** Graduate students in engineering with a background in structural behavior and dynamics.

## **RELATIONSHIP WITH OTHER COURSES**

This course requires basic knowledge in several areas (e.g., structural engineering, geotechnical engineering, numerical analysis, structural mechanics and dynamics, fluid mechanics and dynamics), and it is expected to integrate such knowledge for the treatment of a broad range of topics directly related to protective structures. Students from other COE departments, with appropriate backgrounds, may also take this course. Of special interest will be the relationships with other graduate courses structural mechanics and dynamics.

## **COURSE OUTLINE**

The following course outline describes the current plan for its content. However, it is reasonable to expect modifications and adjustments of its content to reflect current events, and specific interests that course participants may have.

- Introduction
- Contact problem between ideal bodies
- Classical Impact of Elastic Systems
- Static Plastic Behavior of Beams

- Dynamic Plastic Behavior of Beams
- Transverse Shear and Rotary Inertia
- Finite Displacement
- Strain Rate Effects
- Dynamic Buckling
- Summary and Closure