

Mechanical and Aerospace Engineering

EGM 5423: High Strain Rate Behavior of Materials

Textbook: "Dynamic Behavior of Materials" by Marc A. Meyers, John Wiley (2008)
"Dynamic Behavior of Advanced Ceramics" by G. Subhash, A. Awasthi, D. Ghosh, Wiley (2021)

Instructor: Dr. Ghatu Subhash, subhash@ufl.edu, NEB 129, Ph: 352-392-7005,

Lecture times, days and location:

Tue: 7th Period (1:55 – 2:45 pm) and Thur 7th and 8th Periods (1:55-3:50 pm)
MAEB 0234

Office Hours: 1:00 - 1:50pm T, Th

Assessment Method:

| | | |
|-------------------------------------|-----|---|
| Midterms (Mar 3rd) | 50% | (in class) |
| Lab Reports | 15% | |
| Term Paper (due Dec 4) | 20% | |
| Presentation (Nov 20-Dec4) | 10% | |
| Attendance | 5% | (full grade if no more than 5 missed classes) |

Course Contents: This is an advanced graduate level course. Students are expected to have sound knowledge of Mechanics of Materials, Basics of Material Science, Elasticity, Continuum mechanics and Fracture Mechanics. Although the initial topics follow the contents of few chapters in the textbook, the latter part of the course covers numerous topics of topical interest in the field. It will include dynamic characterization of ceramics, hydrogels and emerging materials. The basic topics covered are:

- Elastic Waves, Plastic Waves, Shock Waves, Experimental Techniques
- Material Constitutive Behavior at High Strain Rates and Shear Banding
- Microstructural Changes at High Strain rates
- Dynamic deformation and Fracture of Metals and Ceramics
- Response of Soft Materials, Biological Materials and Foams

Term paper:

Students must choose a topic on High Strain Rate Behavior of Materials that is not covered in class. The group must review background, literature search, theory, technique, application, relevant schematics and an assessment of the direction in which the field is progressing. Appropriate references must be provided. The topic must be chosen by Jan 31st and approved by the Instructor. Report is due on Apr 8th. A 10-minute presentation is made during the regular class anytime in the last three weeks (pick your time ahead).

Grading Scale:

| | | | | | | | |
|----|----------|----|---------|----|---------|----|---------|
| A | 90-100%; | A- | 82-90%; | B+ | 75-82%; | B | 70-75%; |
| B- | 65-70%; | C+ | 61-65%; | C | 56-61%; | C- | 51-56%; |
| D+ | <50% | | | | | | |

Make-up Exam Policy: No make-up exams unless there is a **documentable extreme medical emergency.** No credit will be given for a missed exam/lab.

Honesty Policy: All students must adhere to the UF's academic honesty rules and understanding that failure to comply with this commitment will result in disciplinary action. Every student must be honest in all work submitted and exams taken during this course.