Department of Mechanical & Aerospace Engineering
University of Florida

EGM 6671: INELASTIC MATERIALS

– SPRING 2020-

Instructor:

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Office Hours: **Oana Cazacu: Tu: 2:00-4:00 pm**

Resources and Reference Materials

Required Textbook:

Plasticity-Damage Couplings: From Single Crystal to Polycrystalline Materials", O. Cazacu, B. Revil-Baudard, N. Chandola, Springer, 518 pages, 2018; ISBN: 978-3-319-92921-7 (https://www.springer.com/gb/book/9783319929217)

Additional References

1. Hill, Rodney.*The mathematical theory of plasticity*. Vol. 11. Oxford university press, 1998 (reissued in the Oxford Classic

Texts in the Physical Sciences series, and first published in 1950),
2. Lubliner, Jacob.*Plasticity theory*. Courier Corporation, 2008.
3. Hosford, W.F. and Caddell, R., M., 1983. Metal forming : Mechanics and Metallurgy, Prentice-Hall, Inc., Englewood Cliffs, N.J., ISBN: 0135561353.
4. L. E. Malvern, 1969, Introduction to the Mechanics of a Continuous Medium, Prentice-Hall.

Course Prerequisites:

Completion of undergraduate Mechanics of Materials course such as EGM 3520 or permission of the instructor.

The aim of this course is to provide the student with the fundamental understanding of mechanics & various materials used in structural applications and skills needed for development of constitutive laws for new/advanced materials

Course description: Review of concepts of continua, tensor analysis, stress and deformation tensors, balance and conservation laws and elasticity. Constitutive models used to describe deformation in real structural materials (isotropic and textured metallic materials and geological materials), developed in the framework of plasticity and damage mechanics will be introduced. Overview of integration algorithms for computational plasticity along with solutions of boundary value problems relevant to metal forming will be presented.

Course outcomes

After a successful completion of this course, the student should:

- Show profound knowledge of the basic concepts of plasticity and damage mechanics and understand the capabilities and limitations of the different constitutive models introduced in the course
- Determine based on the results of mechanical tests the most appropriate material model to be used for a given application ;
- Identify the material parameters associated with any given material model and prepare material input data for finite element modeling;
- Develop integration algorithms for the respective models;

- Solve boundary value problems using the respective models;
- Master key techniques and concepts to be used for development of new models
- Have the ability to critically judge the content of technical papers and seminars.

Class Schedule:
Gainesville: Tapes shown in Room: CSE E118 on Tuesday: Period 2- 3 (8:30 AM - 10:25 AM) and Thursday: Period 3(9:35 AM - 10:25 AM)
Shalimar: class meets on Tuesday: 10:00 AM-12:00 (noon) and 1:00 PM-2:00 PM
Where: REEF, Studio 1

Policies and Procedures:

Exams: Exam 1 will be given during the regularly scheduled class time: on Tuesday, 2/25/2020. It is a 2-hours exam. Exam 2 is a take-home exam. Assigned on 4/7/ 2020; should be turned in on 4/8/2020. No "final exam" will be given. Exam 1 is closed book and closed notes. No exams will be given prior to the scheduled dates and no makeup exams will be allowed.

Grading: Grades will be determined using equal weights for homework assignment and exams: 20% Homework, 40% Exam 1, 40% Exam 2. 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. For individuals in the gray area between two grades, performance on the homework will be used to make the final decision.

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.

Course web site.
The class lectures, assignments as well as the solutions + lecture notes will be posted on EDGE website. The videos of the class are received via streaming. The webpage for the course is accessed from http://lss.at.ufl.edu. Click on one of E-learning system link. Login using your Gatorlink username and password.

Special Needs. If you require accommodations due to a disability, please make an appointment during my office hours so that we may discuss your needs.
Personal responsibility. You are personally responsible for all information disseminated during the lectures. This means knowing all homework due dates, knowing when exams will be given, where they will be given, what material they will cover, and knowing all material, handouts, and announcements made in the lectures, whether or not you were present. Thus, if you miss a lecture, it is your responsibility to obtain all information presented during that lecture. "I missed that information" or "I was unaware of that information" will not be accepted as valid excuses.