

**GEORGIA TECH LORRAINE**  
**GEORGIA INSTITUTE OF TECHNOLOGY**  
**School of Mechanical Engineering**  
**ME 7772**  
**Fundamentals of Fracture Mechanics**

**Course Objective**

To introduce the analytical techniques and applications of fracture mechanics, with emphasis on cracks in linear elastic materials.

**Course Outline**

1. Linear elastic analysis
2. Fundamentals of fracture mechanics
3. Mechanisms of fracture and crack growth; cleavage fracture, ductile fracture
4. Elastic crack tip fields
5. Weight function analysis
6. Fracture criteria for elastic brittle fracture
7. Crack tip plastic zone (small scale yielding)
8. Energetics
9. Standard tests
10. Basic elements of elastic-plastic fracture
11. HRR Fields, J-integral and large scale yielding
12. Stable crack growth
13. Cracks in anisotropic solids
14. Interface fracture - composites, bonded joints, etc.
15. Stress corrosion
16. Fatigue crack propagation

**Lectures**

The lectures are one and a half hour long. The schedule is posted every MTW.

**Instructor**

Dr. Luis Barrales, office 225

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**Office hours**

After class or by appointment

### **Courses prerequisite**

None

### **Books, handouts & other resources**

T.L. Anderson, Fracture Mechanics: Fundamentals and Applications, 2nd Edition, CRC Press, 1994.

All handouts and resources will be posted in Canvas/T-square.

### **Honor code**

GT Academic Honor Code will be strictly enforced. Adherence to Georgia Tech's Honor Code is expected. All suspected instances of academic misconduct will be reported to the Dean of Students. It is under your responsibility to ask for clarification if collaboration guidelines, test-taking policies, etc., are not clear. You will find detailed information at: <http://osi.gatech.edu/content/honor-code>

### **Grading**

Your grade will be determined using the following weighting

Homework	20%
Midterm #1	20%
Midterm #2	20%
Final	40%

The final grade will be curved based on your attendance, performance and participation in class. Over two unexcused absences, no curving will be applied. An absence from an examination can be justified only by a medical certificate/note; rescheduling will take place at the next opportunity. Failure in providing the certificate will result in a zero in the respective exam.

### **Attendance policy**

Attendance will be taken at the beginning of each class (<http://www.catalog.gatech.edu/rules/4/>).

Student-Faculty Expectations Agreement: At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement and responsibility between faculty members and the study body. These basic expectations for both of us are listed under: <http://www.catalog.gatech.edu/rules/22/>.

## **Major Emergencies**

If you have some sort of major life emergency, for instance, a serious illness or a death in the family, that impedes your progress in the class, please let us know as soon as possible to find a solution. Please remember always to give notice before taking actions that may result in you unwilling dropping the course.

## **Disabilities**

Georgia Tech offers accommodation to student with disabilities. If you need any accommodation, please inform Dr. Boussert and Ms. Guyot and provide a certificate from the Office of Disability Services.

## **Miscellaneous**

In the classroom, cellphones are to be turned off or in silent mode. Mobile devices are allowed for taking notes but any other use that may distract from the class is prohibited.

## **Assignments**

Assignments and solutions will be periodically posted on Canvas/T-square. Assignments are to be returned one week after posting; no late assignments will be accepted. Solutions will as a rule not be discussed in class, please speak out if you want to discuss a solution. All assignments will be graded.