

ME-620

Mechanics of dislocations

Curtin William

Cursus	Sem.	Type
Mechanics		Opt.

Language of teaching	English
Credits	4
Session	
Exam	Term paper
Workload	120h
Hours	56
Courses	42
Exercises	14
Number of positions	20

Frequency

Only this year

Remark

Prerequisite: Good background in Continuum Mechanics at the level of ME-331; ME-437 would also be helpful; this course will start with a review of key background; ME-414 would be a complem

Summary

The course introduces dislocation defects, which are the carriers of plastic deformation in crystalline materials. Dislocations will be studied from both continuum and atomistic perspectives, and making connections to macroscopic plastic behavior with a focus on metal alloys.

Content

Topics that are planned to be covered:

- Review of Solid Mechanics principles
- Defining the dislocation
- Stress and Strain fields of straight dislocations
- Dislocation Loops
- Dislocation Interactions
- Line Tension concept
- Dislocation Mobility Laws
- Peierls-Nabarro model of the dislocation core
- Dislocation reactions and junction formation/destruction
- Dislocations in different crystal structures - role of the atoms
- Cross-slip
- Strengthening mechanisms: solutes and precipitates

Learning Prerequisites**Required courses**

ME-331 (Solid Mechanics) or equivalent

Recommended courses

ME-437 (Advanced Solid Mechanics)