AGU Graduate School of Engineering and Science Materials Science and Mechanical Engineering

COURSE RECORD

Code	**MSME 694**
Name	**Advanced Strengthening Mechanisms**
Hour per week	3 (3+0)
Credit	3
ECTS	7.5
Level/Year	Graduate
Semester	Fall/Spring
Type	Elective
Prerequisites	None
Description	This course aims to introduce the advanced theory of dislocations in different crystal structures and strengthening mechanisms in solids. Topics include the crystallography, dislocations in different crystal structures and several strengthening mechanisms in solids. Multi-scale modelling, including monte-carlo simulations, molecular dynamics and finite element analysis, will also be covered.
Objectives	Describing the crystallography in nature. Explaining the differences of crystal structures. Discussing dislocations in different crystal systems and associated plastic flow. Presenting how to transfer linear/nonlinear elasticity to multi scale modeling.
Learning Outcomes	*By the end of the course, the student will be able to*: LO1. Explain the key principles of dislocations LO2. Argue the specifications of dislocation in different crystal systems. LO3. Explain the strengthening mechanisms of metals. LO4. Demonstrate the ability to design different applications in simulation environments.

CONTRIBUTION TO PROGRAMME OUTCOMES*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10
LO1	5	5	4	4	2	0	3	0	2	4
LO2	5	5	4	4	3	0	3	0	2	4
LO3	5	5	5	4	2	0	4	0	1	5
LO4	5	5	5	5	0	5	5	3	2	5

*Contribution Level: 0: None, 1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High

COURSE CONTENT DETAILS

Topic	Outcomes
Crystallography	L01 LO2
Advanced concept of dislocation theory	L01 LO2
Dislocations in different crystal structures	L02 LO3
Solute-Solution Strengthening	LO3
Precipitation Strengthening	LO3
Grain boundary Strengthening	LO3
Strain Hardening	LO3
Multiscale Modelling	LO4

DERS BİLGİLERİ

Kodu	**MSME 694**
İsmi	**İleri Pekleşme Mekanizmaları**
Haftalık Saati	3 (3+0)
Kredi	3
AKTS	7,5
Seviye/Yıl	Lisansüstü
Dönem	Güz/Bahar
Dersin Dili	İngilizce
Tip	Seçmeli
Ön Şart	Yok
İçerik	Bu ders farklı kristal yapılarda dislokasyonların ileri teorisini ve katılardaki pekleşme mekanizmalarını tanıtmayı amaçlamaktadır. Konular kristalografiyi, farklı kristal yapılardaki dislokasyonları ve katılardaki çeşitli pekleşme mekanizmalarını içerir. Monte-carlo simülasyonları, moleküler dinamik ve sonlu elemanlar analizini de içeren çok ölçekli modelleme de ele alınacaktır.