

Metal Forming Course-PM 2021

MH2281 6hp

FMH3281 7.5hp PhD-course

Teacher: Stefan Jonsson jonsson@kth.se 070-290 84 04

Assistant: Nader Heshmati nader2@kth.se

Place for all activities: Digital Zoom meetings starting 15min past the hour

Schedule (updated 2021-08-30). Le=Lecture, Ex= Exercise

Updated schedule: <https://www.kth.se/social/course/MH2281/calendar/>

iCalendar link: <https://www.kth.se/social/course/MH2281/calendar/ical/?lang=en>

Day	Date	Time	Zoom link	Activity	Subject
Tue	31-aug	10-12	613 7383 5141	Le1	Introduction
Tue	07-sep	10-12	646 4114 8745	Le2	Plasticity
			684 0770 6340		Thermal activation Recover,
Tue	07-sep	13-15		Ex1	Modelling
Tue	14-sep	10-12	636 8011 9320	Le3	Microstructure evolution
Tue	14-sep	13-15	637 7049 6997	Ex2	
Tue	21-sep	13-15	641 9098 1527	Ex3	
Thu	23-sep	08-10		KON1	Mid-term exam. Course goals 1&2: 1, deformation and 2, microstructure
Tue	28-sep	10-12	649 9175 3575	Le4	Stereographic projection and textures
Tue	28-sep	13-15	644 9395 4381	Ex4	
Tue	05-oct	10-12	660 7555 2816	Le5	Rolling and forging
Tue	05-oct	13-15	612 4685 9351	Ex5	Mohr's circle in roll gap
Tue	12-oct	13-15	657 4327 8381	Ex6	
Thu	14-oct	13-15	695 6519 2520	Ex7	
Fri	15-oct	13-15	633 2757 5815	Le6	Metal forming processes
Fri	29-oct	14-18		TENB	Examination All course goals
Mon	20-dec	14-18		TENB	Re-examination All course goals

Examination MH2281

LADOK	Description	Credits	Grading scale
INL1	Assignment	0	P,F
KON1	Mid-term Exam	0	P,F
TENB	Written Exam	6.0	A,B,C,D,E,FX,F

Examination FMH3281 (PhD:s)

LADOK	Description	Credits	Grading scale
INL1	Assignment	2.0	P,F
KON1	Mid-term Exam	1.0	P,F
RAP1	Report	1.0	P,F
SEM1	Seminar	0.5	P,F
TENB	Written Exam	3.0	P,F

Metal Forming Course-PM 2021

Links to Course information and course plan

<https://www.kth.se/student/kurser/kurs/MH2281?l=en>

<https://www.kth.se/student/kurser/kurs/kursplan/MH2281-20192.pdf?lang=en>

Course material: Download from Canvas

Contents:

Le1,	Introduction (rolled products, FEM, material models, rolling defects, rolling mills, grain fragmentation)
Le2	Stress & strain tensors, effective stress and strain, principal stresses, Mohr's circles, plastic yielding under 3D-loads (Tresca & von Mises), modelling of flow stress curve, Crystallographic orientations, slip systems, Schmid factors
Ex1	
Le3	Thermal activation (Creep-laws, strain-rate dependence), Zener parameter (Ti as an example), microstructure evolution, defect evolution
Ex2	
Ex3	
Le4	Stereographic projection, prediction of texture evolution, inverse pole figures. Anisotropy & texture (Casting structures, in-plane texture, deep-drawing, texture hardening, Cube- & Goss textures, stereographic projection, EBSD, pole figures, deformation microstructures of Al, reorientation during deformation, recrystallisation textures, PSN, earing)
Ex4	
Le5	Rolling (Roll materials, Roll bending & flattening, CVC-rolls, Sendzimir mills, deformation zones, forces & friction, friction hill, material flow, buckling), Tube forming (Pilgering, extrusion)
Ex5	
Ex6	
Le6	Metal forming processes
Ex7	

Exercises will give additional training of the material discussed during lectures. Several FEM-models will be constructed and worked with.

If time allows:

Machining, milling, turning, polishing, surface integrity, residual stresses, tool wear