

MET/MSE 407: Materials Fabrication

Course Information:

Course title: Materials Fabrication

Course number: MET/MSE 407, Spring semester

Course credits: 3 credits

Instructor Information:

Instructor: Dr. F.H. (Sam) Froes

Office: McClure Hall, Room 437

Telephone: 885-7989

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E-mail: froes@uidaho.edu

Office Hours: Open

Assigned Text: Course handouts and supplemental readings (to be announced)

Reference Texts:

1. "Foundation of Materials Science and Engineering", Third Edition. William F. Smith, McGraw-Hill Higher Education, 2004.
2. "Manufacturing Engineering and Technology", Fourth Edition. Serop Kalpakjian and Steve Schmid, Prentice Hall, 2001.

Course Scope:

This course is designed to introduce junior/senior students in metallurgical engineering and materials science and engineering to the basics of fabricating materials. The course will address the fundamentals of powder metallurgy, casting, solidification, working, and joining of materials; emphasis on interaction between processing, properties, structure, and design. Semester project covering design of procedure for fabrication. Two 1-day field trips.

Course Learning Goals:

1. To grasp the fundamental concepts related to various materials function techniques: casting, solidification, working, and joining of materials.
2. To develop understanding of why these fabrication techniques are important to production of components.
3. To understand the essence of each technique.
4. To learn the interaction between processing (synthesis), microstructure, mechanical properties, applications and design.
5. To understand the cost impact of each procedure and when it should be used.

Course Topics:

1. Introduction to fabrication of metals, ceramics and polymers
2. Ingot metallurgy/melting
3. Casting
4. Powder metallurgy
5. Spray forming
6. Semi-solid processing
7. Rapid solidification
8. Mechanical alloying
9. Vapor deposition
10. Working
11. Joining
12. Ceramics
13. Polymers

Course Calendar/Schedule:

<u>CLASS</u>	<u>SUBJECTS</u>
1	Introduction, Scope, Grading, Assignment
2	Further Details on Course, Video Ladish / Aerospace
3	Phases Temperature, Solidification,
4	Solidification (continued)
5	Heat Treatment, Precipitation, Diffusion
6	Titanium Video(ASM)
7	Video Ladish / Customer, Kobe / Hi Pressure Tech.
8	Casting (Steel, Light Metals)
9	Casting (Steel, Light Metals)
10	Forming Metals - Theory
11	Testing / Metallography / NDI
12	Primary and Secondary Processing
13	Continued, examples
14	Machining
15	Joining / Surface Effects
16	Semi – Solid Processing
17	P /M
18	RS and MA
19	Mid Term Exam
20	Ceramic Processing – Introduction, Raw Material, Material Characterization
21	Continued – Processing Additives, Rheology, Beneficiation
22	Continued – Forming (Pressing, Extrusion, Injection Molding, Slip / Gel Casting, Tape Casting)
23	Continued – Forming (Pressing, Extrusion, Injection Molding, Slip / Gel Casting, Tape Casting)

24	Continued – Post Forming Processes
25	Polymer Processing – Introduction, Structural Characteristics. Characterization
26	Continued – Processing Additives, Rheology
27	Fall Break
28	Fall Break
29	Continued – Injection Molding, Extrusion, Calendering, Blow Molding, Compression Molding, Vacuum Forming, Thermoforming)
30	Continued – Injection Molding, Extrusion, Calendering, Blow Molding, Compression Molding, Vacuum Forming, Thermoforming)
31	Dead Week
32	Dead Week
33	Final Exam (To Be Arranged)
34	-

Grading:

There will be a mid-term and final exam. These exams will make up 60% of the total grade (30% each). Homework will carry 20% of the total grade. A class assignment involving a paper and presentation will make up the remaining 20%

Standard University of Idaho grading policy applies.

Disability Support Services Reasonable Accommodations Statement:

Reasonable accommodations are available for students who have a documented disability. Please notify the instructor during the first week of class of any accommodation(s) needed for the course. Late notification may mean that requested accommodations might not be available. All accommodations must be approved through Disability Support Services located in the Idaho Commons Building, Room 333.

- **885-7200**
- **email at <dss@uidaho.edu>**
- **website at <www.access.uidaho.edu> or <www.webs.uidaho.edu/aap>**