

**COURSE OUTLINE: MME 4303: Metals Processing**

**Professor**

Devesh Misra, Metallurgy M201H, office hours: M, W: 10:30 – 13:00 h or by appointment.

**Schedule**

Monday and Wednesday CRBL C205 13:30-14:50 h

**Course Objectives**

This course is an introduction to methods used for processing metals and alloys in relation to mechanical properties. The course aims to integrate processing fundamentals required to obtain desired properties, for instance, nucleation and growth of crystals, diffusion, application of phase diagrams and transformation diagrams, with processing methods. Another objective is to illustrate the developments that are currently taking place in the field of metals processing.

**Course Learning Outcomes:**

1. Introduce methods of processing metals in conjunction with the basics in metals processing.
2. Describe how the structural properties of metals are impacted by the processing methodology.
3. Analyze the underlying reasons for differences in properties of materials processed by different methods in conventional bulk metals and alloys.
4. Provide an overview of techniques to characterize processed metals and alloys.
5. Illustrate future trends in metals processing at nano/ultrafine scale.

**Measurable Student Learning Outcomes:**

At the completion of this course, students will have a thorough outstanding of different methods that are being used to process metals and alloys for varied applications in conjunction with the fundamentals required to obtain the desired mechanical properties.

**Assessment of the Course**

The final grade will be determined on the following basis:

(a)	Classroom participation and preparation	15 points
(b)	3 or 4 Tests/home assignment/exam	60 points
(c)	*Attending classes	10 points*
(d)	Project/Case-study presentation	15 points
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		100 points
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\* 10 points to be awarded if you attend 90% of the total classes (for example, if 40 classes are held, then you should have attended a minimum of 36 classes to secure 10 points). If you DO NOT ATTEND 90 % of the total classes, NO GRADE WILL BE GIVEN. The assigned 10 points include your preparation in the class\*.

A – greater than 90 %; B – 80 - 89 %; C – 70 - 79 %; D – 60 - 69 %; F – 59 % and below.

**Presentation:** Please select a recently published article (not more than 5 years old) that deals with the processing of materials. Make a presentation on all the aspects of the paper including prior art (introduction), objective of study, experimental procedure, results and discussion of results. It is important that you select a good article published in a journal whose impact factor is greater than 1.5.

**Course Outline:**

Introduction: non-ferrous and ferrous metals and alloys, metallic bonding, and common crystal structure of metallic materials.

Fundamentals in metal processing and sheet metal working involving nucleation and growth during solidification of metals, diffusion, application of phase diagrams and transformation diagrams, and

principles of material behavior.

Metal processing: rolling, forging, extrusion, wire drawing, and punching, forming limit diagrams, texture development during thermo-mechanical processing.

Case studies: Processing of ferrous and non-ferrous metals and alloys.

Powder processing of metals: Hipping and densification of metal powders.

Future trends in metals processing at the nanoscale/ultrafine scale.

### **Textbook and Other Reading**

1. *Fundamentals of Modern Manufacturing: Materials, Processes and Systems*, Fifth Edition, by Mikell P. Groover, Wiley (2013). ISBN: 978-1-118-231463

2. *Thermo-mechanical Processing of Metallic Materials*, by Bert Verlinden, Juian Driver, Indradev Samajdar, Roger Doherty, Elsevier.

### **Attendance and Class Room Policy**

- Please make sure that you are **NOT** late to the class by more than 2 minutes. If you are late by more than 2 minutes, you will be marked absent.
- Please **DO NOT** leave the class room during the duration of the class. If you need to go, please inform prior to the commencement of the class.
- Please turn off cell phones before entering the class room.

Given that this is an online course, attendance is determined by class participation online. Participation is determined by completion of the following activities:

- Reading/viewing all course materials to ensure understanding of assignment requirements
- Participating in engaging discussion with your peers on the Discussion Boards (grading rubric provided in the "grading information" area of each forum)
- Completing all Module Activities (assignments, quizzes, etc.)
- Completing all Major Assignments

To preserve a student's GPA, he/she WILL be dropped from the course for failure to turn in two or more major writing assignments.

### **Late Work Policy**

- Major Writing Assignments assignments will be due on Sundays at midnight (11:59 PM). No late work will be accepted.  
Quiz and Blog/Discussion Assignments
- All quiz, blog, and discussion board assignments will be due on Saturdays at midnight (11:59 PM). No late work will be accepted.

### **Drop Policy**

To drop this class, please contact the [Registrar's Office](#) to initiate the drop process. If you cannot complete this course for whatever reason, please contact me. If you do not, you are at risk of receiving an "F" for the course.

### **Technology Requirements**

Course content is delivered via the Internet through the Blackboard learning management system (LMS). Ensure your UTEP e-mail account is working and that you have access to the Web and a stable web browser. Mozilla Firefox and Google Chrome are the most supported browsers for Blackboard; other browsers may cause complications with the LMS. When having technical difficulties, update your browser, clear your cache, or try switching to another browser.

You will need to have or have access to a computer/laptop, scanner, a webcam, and a microphone. You will need to download or update the following software: Microsoft Office, Adobe, Flashplayer, Windows Media Player, QuickTime, and Java. Check that your computer hardware and software are up-to-date and able to access all parts of the course.

If you encounter technical difficulties beyond your scope of troubleshooting, please contact the [Help Desk as they are trained specifically in assisting with technological needs of students.](#)

## **Netiquette**

- Always consider audience. Remember that members of the class and the instructor will be reading any postings.
- Respect and courtesy must be provided to classmates and to instructor at all times. No harassment or inappropriate postings will be tolerated.
- When reacting to someone else's message, address the ideas, not the person. Post only what anyone would comfortably state in a F2F situation.
- Blackboard is not a public internet venue; all postings to it should be considered private and confidential. Whatever is posted on in these online spaces is intended for classmates and professor only. Please do not copy documents and paste them to a publicly accessible website, blog, or other space. If students wish to do so, they have the ethical obligation to first request the permission of the writer(s).

## **Academic Honesty Policy and Scholastic Integrity**

Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. It includes, but is not limited to, cheating, plagiarism, and collusion. Cheating may involve copying from or providing information to another student, possessing unauthorized materials during a test, or falsifying research data on laboratory reports. Plagiarism occurs when someone intentionally or knowingly represents the words or ideas of another as ones' own. Collusion involves collaborating with another person to commit any academically dishonest act. Any act of academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated.

All suspected violations of academic integrity at The University of Texas at El Paso must be reported to the [Office of Student Conduct and Conflict Resolution \(OSCCR\)](#) for possible disciplinary action. To learn more [HOOP: Student Conduct and Discipline](#)

In summary, the UTEP Policy on academic honesty will be followed. Copying/Plagiarism include the definitions described in the policy. This applies to assignments and exams.

## **Accommodation Policy**

The University is committed to providing reasonable accommodations and auxiliary services to students, staff, faculty, job applicants, applicants for admissions, and other beneficiaries of University programs, services and activities with documented disabilities in order to provide them with equal opportunities to participate in programs, services, and activities in compliance with sections 503 and 504 of the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act (ADA) of 1990 and the Americans with Disabilities Act Amendments Act (ADAAA) of 2008. Reasonable accommodations will be made unless it is determined that doing so would cause undue hardship on the University. Students requesting an accommodation based on a disability must register with the [UTEP Center for Accommodations and Support Services](#).

## **Student Resources**

UTEP provides a variety of student services and support:

- [UTEP Library](#): Access a wide range of resources including online, full-text access to thousands of journals and eBooks plus reference service and librarian assistance for enrolled students.
- [Help Desk](#): Students experiencing technological challenges (email, Blackboard, software, etc.) can submit a ticket to the UTEP Helpdesk for assistance. Contact the Helpdesk via phone, email, chat, website, or in person if on campus.
- [University Writing Center \(UWC\)](#): Submit papers here for assistance with writing style and formatting, ask a tutor for help and explore other writing resources.
- [Math Tutoring Center \(MaRCS\)](#): Ask a tutor for help and explore other available math resources.
- [History Tutoring Center \(HTC\)](#): Receive assistance with writing history papers, get help from a tutor and explore other history resources.
- [Military Student Success Center](#): UTEP welcomes military-affiliated students to its degree programs, and the Military Student Success Center and its dedicated staff (many of whom are

veterans and students themselves) are here to help personnel in any branch of service to reach their educational goals.

- [RefWorks](#): A bibliographic citation tool; check out the RefWorks tutorial and Fact Sheet and Quick-Start Guide.

**\*Students are strongly encouraged to be self-stimulated, take an active role in self-learning, and expected to be intellectually challenged.**