

Syllabus

Number: MSE 791

Department: Materials Science and Engineering

Title: Nonferrous alloys

Required/Elective: Elective

Instructor: Jag Kasichainula, Jag_kasichainula@ncsu.edu Room: 3056 Engineering Building 1

Class Hours: Tuesday and Thursday 3:00 to 4:15.

OFFICE HOURS: Tuesdays and Thursdays : Before and after the class as needed in the class room. Additional help may appointment in Rm 3056 in EB1.

DISCLAIMER: Information in this syllabus is subject to changes and the possession of it does not ensure that you have information required to successfully complete the semester. Announcements of changes will be made and students are obtaining additional information by attending class.

Course description:

Prerequisite(s): MSE 434, 435

Textbook(s) and/or other required material:

Course objectives:

By the end of this course, the student should be able to:

1. appreciate the importance of fundamental microstructural features and defects in the design and evolution of nonferrous alloys
2. realize the importance of various alloys that include copper base alloys, light metal alloys (titanium, aluminum and magnesium) temperature alloys (nickel and cobalt),
3. understand the use of these alloys in real world applications,
4. follow in each class of alloys, different phase transformations and important phases formed from addition of different alloying el
5. follow the role of each alloying element in strengthening and stabilizing the phases via order-disorder or martensitic or other tra
6. appreciate the importance of alloying elements that enhance corrosion resistance, high temperature oxidation resistance and c
7. apply alloy theories to show how certain phases detrimental to service life can be prevented to form.

Policies and Procedures: Visit the course site on [Policies](#)

Handicapped participants: Visit the course site on [Policies](#)

?

Teacher Evaluation:

Online class evaluations will be available for students to complete during the last two weeks of class (November 26-December 5). You will receive an email message directing them to a website where they can login using their Unity ID and complete evaluations. All evaluations are confidential; instructors will never know how any one student responded to any question, and students will never know the ratings of their instructors.

Evaluation website: <https://classeval.ncsu.edu/>

Student help desk: classeval@ncsu.edu

More information about ClassEval: <http://www.ncsu.edu/UPA/classeval/>

University required document:

ADDITIONAL SYLLABUS LANGUAGE, Fall 2022

Due to the COVID-19 pandemic, public health measures continue to be implemented across campus. Students should stay current with campus practices and expectations through the [Protect the Pack](https://www.ncsu.edu/coronavirus/) website (<https://www.ncsu.edu/coronavirus/>). The sections below provide information on student conduct related to COVID-19 issues.

Health and Participation in Class

We are most concerned about your health and the health of your classmates and instructors/TAs.

- If you test positive for COVID-19, or are told by a healthcare provider that you are presumed positive for the virus, you should avoid hybrid or face-to-face (F2F) classes and work with your instructor on any adjustments necessary; also follow other university policies including self-reporting ([Coronavirus Self Reporting](#)): Self-reporting is not only to help provide support to you, but also to assist with tracing for containing the spread of the virus.
- If you feel unwell, even if you have not been knowingly exposed to COVID-19, please do not come to a F2F class or activity.
- If you are in quarantine, have been notified that you may have been exposed to COVID-19, or have a personal or family situation that prevents you from attending this course in person (or synchronously), please connect with your instructor to discuss plans, as necessary.
- If you need to make a request for an academic consideration related to COVID-19, such as a discussion about possible options for online learning, please talk with your instructor.

Health and Well-Being Resources

These are difficult times, and academic and personal stress are natural results. Everyone is encouraged to [take care of themselves](#). If you need additional support, there are many resources on campus to help you:

- Counseling Center ([NCSU Counseling Center](#))
- Student Health Services ([Health Services | Student](#))
- If the personal behavior of a classmate concerns or worries you, either for the classmate's well-being or yours, we encourage you to report the behavior to the NC State CARES team: ([Share a Concern](#)).
- If you or someone you know are experiencing food, housing or financial insecurity, please see the Pack Essentials Program

As a student, you may experience a range of personal issues that can impede learning,

such as strained relationships, increased anxiety, alcohol/drug concerns, feeling down,

difficulty concentrating, and/or lack of motivation. These mental health concerns or

stressful events may lead to diminished academic performance and may impact your

ability to participate in daily activities. It is very important that you have a support system

and that you ask for help when you are struggling. The Counseling Center at NC State offers confidential mental health services for full-time NC State students, including same-day emergency services. Please visit <https://counseling.dasa.ncsu.edu/> to get connected.

Community Standards related to COVID-19

We are all responsible for protecting ourselves and our community. Please see the [community standards](#) (which have been updated) and Rule 04.21.01 regarding Personal Safety Requirements Related to COVID-19 [RUL 04.21.01 – Personal Safety Requirements Related to COVID-19 – Policies, Regulations & Rules](#)

Course Expectations Related to COVID-19:

- **Face Coverings:** All members of the NC State academic community are expected to follow all university policies and guidelines regarding [Personal Safety Rule](#) and [community standards](#), for the use of face coverings. Face coverings are required in instructional settings. Face coverings should be worn to cover the nose and mouth and be close fitting to the face with minimal gaps on the sides.
- **Course Attendance:** NC State attendance policies can be found at: [REG 02.20.03 – Attendance Regulations – Policies, Regulations & Rules](#). Please refer to the course's attendance, absence, and deadline policies for additional details. If you are quarantined to miss class because you have been advised that you may have been exposed to COVID-19, you should not be penalized for attendance or class participation. However, you will be expected to develop a plan to keep up with your coursework during your absences. If you become ill with COVID-19, you should follow the steps outlined in the health and participation section above. If you have a documented absence, related absences will be considered excused; documentation need only involve communication with your instructor.
- **Technology Requirements:** This course may require particular technologies to complete coursework. Be sure to review these expectations, and see the [syllabus technical requirements](#) for your course. If you need access to additional technology, please contact the Libraries' Technology Lending Service: ([Technology Lending](#)).

Course Delivery Changes Related to COVID-19

Please be aware that the situation regarding COVID-19 is frequently changing, and the delivery mode of this course could change including from in-person to remote. Regardless of the delivery method, we will strive to provide a high-quality learning experience.

NO LONGER AVAILABLE - Grading/Scheduling Changing Options Related to COVID-19

Two policies, (1) enhanced S/U Grading Option, and (2) Late Course Drops, were put in place at the beginning of the COVID-19 pandemic to reduce student stress and promote course completion. Those two policies **have been discontinued** and thus are no longer available to students.

For situations where relief may be needed, and depending on the details, students should explore the applicability of an "incomplete" grade. If you are experiencing difficult or extenuating circumstances, you should discuss possible options with your instructor and your advisor.

Need Help?

If you find yourself in a place where you need help, academically or otherwise, please review these [Step-by-Step Help Topics](#).

Other Important Resources

- **Keep Learning:** [Keep Learning](#)
- **Protect the Pack FAQs:** [Frequently Asked Questions | Protect the Pack](#)

- **NC State Protect the Pack Resources for Students:** [Resources for Students | Protect the Pack](#)
- **Academic Success Center** (tutoring, drop in advising, career and wellness advising): [Academic Success Center](#).
- **NC State Keep Learning, tips for students opting to take courses remotely:**
[Keep Learning Tips for Remote Learning](#).
- **Introduction to Zoom for students:**
<https://youtu.be/5LbPzzPbYEw>
- **Learning with Moodle, a student's guide to using Moodle:**
<https://moodle-projects.wolfware.ncsu.edu/course/view.php?id=226>
- **NC State Libraries [Technology Lending Program](#)**
- Recordings can be found at:<https://www.engineeringonline.ncsu.edu/course/mse-791-601-nonferrous-alloys/?display=cours>

Please access the Video lectures and handwritten notes from the following website:

https://notes.engineeringonline.ncsu.edu/mse/MSE791/Fall_2023 ↗

Panoptorecordings may be found here:

<https://ncsu.hosted.panopto.com/Panopto/Pages/Sessions/List.aspx#folderID=%22b5bb97a5-3d8c-463e-a5a1-b05601307a65%22>

Syllabus (VL=Video lectures and handwritten notes from EOL course site), Lectures: Typed class Notes

November 18

Lecture #	Date	Lecture in the Notes	Objective
1	August 20	1 VL#1	Introduction, Syllabus, Policies Nonferrous alloys
2	August 22	2 VL#1-3	Electron theory of metals Lecture 1
3	August 27	3 VL#3-4	Electron/atom ratio for each phase based on Bri theory Lecture 2
4	August 29	4 VL#4-5	Hume Rothery rules applied to alloys Lecture 3
5	Sept 03	4 VL#4-5	Cu-Zn system Lecture 4
6	September 05	4	Cu-Sn and Cu-Al systems Lecture 4

7	September 10	4 VL#6-7	Cu-Be alloys Lecture 4
8	September 12	7 VL#7-8	Light metal alloys: Ti alloys: Martensitic transformation Lecture 5
	Test1 September 19 (shifted to)		Lectures 1 to 7 (inclusive)
9	September 24	8 VL#9-11	Twinning and deformation behavior of Ti alloys Lecture 5
10	September 26	9 VL#11-12	Alpha and Alpha-beta alloys of Ti Lecture 6
11	October 1	10 VL#12-14	Commercial alloys of Ti Lecture 6
12	October 3	11 VL#15-17	Light metal alloys-Al alloys Age hardenable alloys Lecture 12
13	October 8	12 VL#17	Cold workable Al-Mn alloys Lecture 13
14	October 10		Al-Si alloys and heat treatable Al-Mg-Si and Al-Z Lecture 13
15	October 17	13 VL#18	Light metal alloys: Magnesium alloys Lecture 14
16	October 22	14 VL#18	Deformation behavior and precipitation hardening Lecture 14
17	October 24	15 VL#18	Make up

	Test 2 October 29		Test 2 (Lecturers 8 to 14 both inclusive)
18	October 31	15 VL#19-21	High temperature alloys: Nickel alloys Lecture 7
19	November 05	16 VL#21-22	Importance of different alloying elements in Ni a Lecture 8
20	November 07	22 VL23-25	Ni-Al, Ni-Cr-Al and Ni-Cr-Al-Ti alloys, Complex N parameters important in performance Lecture 8
21	November 07	22 VL23-25	Electron-hole number and formation of TCP pha Lecture 9
22	November 12	23	Directional solidification of Ni alloys Lecture 10
23	November 14	24,25	High temperature alloys-Cobalt alloys Differences between Cobalt and Nickel alloys Lecture 11
24	November 19	25,26	Importance of stacking faults and chromium carb precipitation, Importance of TCP phases in Cobalt alloys, Microstructure of Cobalt alloys Lecture 11
	November 21		Test 3 (Lectures 15 to 22 inclusive)
27	November 26	29,30 VL#26-28	Refractory metal alloys Lecture 16
29	December 03 VL#26-28	Solder alloys: Tin alloys Lecture 15	

30	December 03	31	Precious metal alloys Lecture 17 Metallic glasses Lecture 18
----	-------------	----	-------------------------------------------------------------------------------------------------------

Tentative Schedule of Midterm Tests. These exams may be postponed for needed reasons. Portions covered for the exam change slightly. Both chapters are included. Midterm Test #4 will be on University Scheduled time.

For Fall semester: All tests will be held in Class room. If the test time is not convenient, arrange with the instructor.

Midterm Test	DATE	(DAY)	TIME	Lectures in the notes		
1	09/19	Thursday		1 to 7		
2	10/24	Thursday		8 to 14		
3	11/26	Tuesday		15 to 27		
4	12/10	Tuesday		All material covered		

Last modified: Saturday, August 17, 2024, 11:10 AM

[◀ Policies](#)

Jump to...