Mechanical Engineering
New Jersey Institute of Technology
ME215 Engineering Materials and Processes Course Syllabus
Fall 2023

Updated: September 6, 2023 .

It is the responsibility of the student to read and understand this course syllabus. This syllabus is subject to change and may be updated throughout the semester.

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1 Course Summary

1.1 Course Description

This course introduces the student to a combined lecture and laboratory related to engineering materials and processes. Engineering materials considered include, but are not limited to, metals, ceramics, and polymers. Processes, and how they affect properties, include but are not limited to, the formation of a part from a molten/particle state, forming, material removal, heat treatment, and additive manufacturing. Laboratory exercises involve, but are not limited to, basic machine tools, measurements, microstructure identification, and computer controlled equipment.

1.2 Credits and Contact Hours

This course is 3 credits, with 2 lecture contact hours and 2 laboratory contact hours.

1.3 Prerequisites

CHEM 126 or CHEM 122.

1.4 Text

(Required text) J.T. Black, R.A. Kohser. DeGarmo's Materials and Processes in Manufacturing, 13th Ed., John Wiley & Sons lnc., 2019.

(Lab manual) ME 215A: R. Dubrovsky: Engineering Materials and Processes. (Available on Canvas.)

1.5 Class Times and Delivery

Section	Lecture	Lab	Lecture mode
001 & HM1	Mon. 8:30-10:35am CKB315	Fri. 1:45-3:50pm MEC232	In person
003	Mon. 11:30-1:35pm FMH106	Tue. 1:00-3:05pm MEC232	In person
005 & HM3	Mon. 8:30-10:35 CKB214	Thu. 10:00-12:05pm MEC232	In person
007	Tue. 10:00-12:05 FMH314	Wed. 10:00-12:05 MEC232	In person
009	Tue. 8:30-10:35am TIER114	Fri. 9:15-11:20am MEC232	In person
101	Tue. 6:00-7:55pm MEC221	Tue. 8:05-10:00pm MEC232	In person
103	Wed. 6:00-7:55pm MEC221	Wed. 8:05-10:00pm MEC232	In person

Please note that any sections designated as hybrid will never meet face-to-face for lecture, but always face-to-face for laboratory. For hybrid sections, the lecture will be held asynchronously online. Also, we would like to remind students that a hybrid class maintains the same expectations and rigor of a face-to-face class. Please manage your time and effort appropriately, and we encourage hybrid students to reach out during laboratory classes and during office hours if you are in need of assistance.

2 Instructional Team

2.1 Instructors

Section(s)	Instructor	Office	Email
001,HM1,003,&009	Veljko Samardzic	MEC325A	samardzi@njit.edu
005 & HM3	Lin Dong	MEC325	lin.dong@njit.edu
007	Shawn Chester	FENS348/MEC305	shawn.a.chester@njit.edu
101 & 103	Naruemon Suwattananont	By appointment	ns48@njit.edu

2.2 Teaching Assistants

Rumana Hasan (rh432@njit.edu)	Ali Kazempour (ak2823@njit.edu)
Danial Cheraghali (dc689@njit.edu)	Saba Mirahsani (sm3557@njit.edu)
Md Sojib Kaisar (mk2343@njit.edu)	Keven Alkhoury (ka989@njit.edu)

2.3 Office Hours

Instructors will inform their section(s) of their office hours in the class. Also, office hours for individual instructors are typically posted in the department office.

3 Course Policy

3.1 Communication

This course will make use of Canvas for dissemination and collection of various materials. Also, you will be regularly contacted via Canvas and/or email at your NJIT email address.

There have been increasing numbers of student emails from personal accounts that have been flagged as spam. Accordingly, please do not use personal email accounts since the instructors may never respond to that email.

3.2 Repeat Students

Students repeating the course are required to repeat the entire course. Assignments, laboratory practices, exams, and laboratory reports cannot be transferred from previous semesters.

3.3 Honors Students

For those registered for an honors section of this course, an extra laboratory and corresponding report will be assigned to earn honors credit. The specific date of the honors lab will be determined in the later half of the course.

3.4 Course Learning Objectives and Performance Criteria

Students are expected to gain a basic working knowledge of engineering materials and manufacturing processes, through combined lecture and laboratory exercises. The specific objectives and performance criteria are:

1. Design new alloys, or select an alloy for a required application. Evaluated on exams and reports: 80% of the students will earn a grade of 75% or better.

2. Select a desired material based on the design. Evaluated on exams and reports: 80% of the students will earn a grade 75% or better.
3. Describe the mechanical properties of different engineering materials. Evaluated on reports and the library research assignment: 80% of the students will earn a grade of 75% or better.
4. Select a material and sequence of manufacturing processes for a desired application. Evaluated on reports: 80% of the students will earn a grade 75% or better.
5. Plan the sequence of operations in order to achieve final part configuration. Evaluated on reports: 80% of the students will earn a grade 75% or better.
6. Explain the manufacturing process required for achieving desired part configuration. Evaluated on exams: 80% of the students will earn a grade of 75% or better.
7. Define tolerances, allowance, and the difference between clearance and allowance. Evaluated on exams and reports: 80% of the students will earn a grade 75% or better.
8. Select the required tolerance using tables in the system of limits and fits. Evaluated on exams and reports: 80% of the students will earn a grade 75% or better.
9. Use different measuring tools and equipment to take readings from them with required accuracy and evaluate components relative to specifications for quality control. Evaluated on lab exercises and reports: 80% of the students will earn a grade 75% or better.

3.5 Exams

For day sections Exams 1 and 2 will be common exams that take place on Monday 4:15-5:45pm, *Exam 1 will be on 10/9, and Exam 2 will be on 11/13*, and the room assignments will be announced after the registrar's office provides it to the instructional team. For evening sections exams will be held at the regular time and regular room following the routine weekly schedule. The final exam will also be a common exam, the time and place announced by the registrars office. For conflicts, we follow the NJIT policy for final exams provided online. The policy generally indicates that the course with the higher numerical value takes place during the regularly scheduled period.[1]

Exam format: Exams are individual and will be conducted **in person using the Respondus LockDown browser on a student supplied laptop**. To make sure that everyone is well prepared, a **mandatory and ungraded practice exam** will be administered so that any technical difficulties may be worked out prior to the exam. Note that NJIT requires all undergraduate students have a laptop, and details may be found here. A few general comments about online exams using the Respondus LockDown browser:

1. If you encounter technical issues, students must work through the IST Service Desk.
2. If you do not have appropriate hardware, students must contact the dean of students office, well before the exam date.

Lastly, instructors and TAs have neither the in-depth knowledge nor the admin rights to help resolve any technical issues. If issues arise, students must work through the IST Service Desk. Additionally, if you do not have the appropriate equipment, you must contact the dean of students office. Do not contact instructors or TAs, we will only direct you to either the IST Service Desk or the dean of students office.

[1] This paragraph does not apply to summer courses, where exam details are handled in each class.

Exam integrity and absence: The NJIT honor code will be upheld and any violations will be brought to the attention of the dean of students. Only non-programmable calculators are allowed during exams. *Mobile phones, smart watches, programmable calculators, and similar electronic devices are expected to remain out of sight — the sight of a mobile phone, smart watch, or programmable calculator* during an exam results in a grade of F for the class. Failure to show for an exam results in a grade of zero and employment is not considered a valid reason for missing an exam.

The NJIT best practices related to academic integrity, which may be found here, indicates that makeup exams "should not be administered unless an unforeseen extraordinary circumstance ... prevents a student from taking an exam at the designated time." We adhere to that practice, and **NO MAKEUP EXAMS WILL BE GIVEN**, and only one appropriately excused exam absence accommodation is possible per semester per student. The typical accommodation for an appropriately excused absence is to have other grades from the semester scaled by the mean and standard deviation of the normal distribution fitted over the entire course, and used in place of the missing exam score.[2] In the case that a student is absent (or expects to be absent) for an exam, the following actions are required in order for that exam grade to be non-zero:

1. In non-life threatening cases (i.e., unforeseen sickness, death in the family, etc.) the student must notify the professor and dean of students office within 48 hours after the originally scheduled exam time. Below is a quote from the dean of students office webpage, taken from here in May 2022:

   > Students who miss class due to bereavement, medical concerns, military activity, legal obligations, or university-sponsored events must provide the Office of the Dean of Students (DOS) with official and verifiable documentation related to the absences within 14 days and complete the online Student Absence Excuse Request Form.
   >
   > Students can also stop by the Office of the Dean of Students located at 255 Campus Center or email dos@njit.edu.
   >
   > Once the absence has been verified, the DOS will communicate on your behalf to your professor(s). Please note that our office only verifies documentation and it is at the discretion of your professor(s) to provide any accommodation. It is the student's responsibility to follow up with the professor(s).
   >
   > *The DOS will not seek absence excusals for pre-planned vacations, trips, weddings, graduations, or non-NJIT activities.*

2. Upon receiving notice from the dean of students office, the professor will contact the instructional team and provide the relevant information.

3. Since it is likely that multiple students across different sections are in a similar situation, the instructional team will discuss all cases and make a decision that is equitable to everyone involved.

Typically for final exams, if properly excused, a grade of incomplete is given if appropriate.

[2] As an example, a studnet missing Exam 2, labelled "E", may be replaced by the final exam score, labelled "F", through $\frac{E_2-\bar{E}_2}{\sigma_2} = \frac{F-\bar{F}}{\sigma_F}$, where "bar" values are the mean, and σ values are the standard deviation. Therefore the scaled missing exam score will be determined by $E = \sigma_E \left(\frac{F-\bar{F}}{\sigma_F}\right) + \bar{E}$.

Office of Accessibility Resources and Services: For those students that will make use of the NJIT Office of Accessibility Resources and Services (OARS), please make note that OARS requires accommodation requests must be submitted no later than 3 business days prior to the exam date, and 3 business days prior to the last day of classes for final exams (details may be found here). However, if the instructors do not receive adequate notice, the instructional team cannot guarantee any OARS accommodation and the exam should be taken normally. Therefore, we encourage students that makes use of OARS accommodations to do so in a timely manner such that you are well before the deadlines.

3.6 Laboratory and Laboratory Reports

Safety in the laboratory is a high priority – students are required to wear safety glasses at all times in the laboratory an experiment is being performed.

Please note that further details about the lab are provided in the manual, including grading criteria.

Laboratory attendance is mandatory, students are required to complete all laboratory practices and submit all corresponding laboratory reports to pass the course. Further, if more than 15 minutes late, credit will not be given for that laboratory practice and a makeup must be taken (*more details below*). *Pre-lab quizzes are given in the first 15 minutes, these simple quizzes serve to take attendance, as well as ensure that students have read the manual prior to the lab.* Students that miss a laboratory practice are required to makeup that experiment by going to another section that semester (*see the details below*). Employment is not considered a valid reason for missing lab.

Laboratory reports are individual and due one week (specifically five working days, e.g., a lab experiment completed on a Monday, is typically due the following Monday) after the experiment is finished.[3] Lab reports are to be *submitted electronically via Canvas as a single PDF file. Any other method is not an appropriate method to submit, and therefore not graded.* Each day a laboratory report is late 10% is taken off the maximum allowable grade. Therefore a perfect lab report will get 50% credit if it is submitted 5 days late. After 10 days the report will have zero value, however will show on the record as being submitted. Keep in mind that holidays and weekends are not ignored in the late policy, they count as days. Canvas automatically computes the late penalty based on the due date and upload time, please allow sufficient time for your upload to complete.

Note that reports with incomplete, missing, or cover pages that do not conform with the general laboratory guidelines are considered unprofessional, and a 50% deduction of the earned grade will be taken. Therefore, a report that otherwise earned a grade of 88 out of 100, would receive a final score of 44 out of 100 due to an improper cover page. Additionally, a report submitted with a missing data sheet(s) results in a zero for that lab report (to be clear, for those reports where the data sheets are across multiple pages, all pages must be present). Lastly, in a case where multiple lab report submissions exist and all submissions are late, only the first one submitted is graded.

Note that plagiarism checks are in place for lab reports, when an excessive amount of plagiarism is found, a grade of zero will be given for that lab report and it is reported to the dean of students office. Also, experience has shown that a scan or other image saved as a PDF is not readable for a plagiarism check. Accordingly, such files are also deemed unacceptable and given a grade of zero since they cannot be evaluated consistently with the rest. The exception is that the original data sheet(s) may be scanned as part of the overall lab report.

Canvas allows for resubmissions, however we only grade the last submission uploaded prior to the due date. No resubmissions will be considered, even if uploaded to Canvas, past the due date,

[3]The five working days does not apply in the summer, where due to a shortened timeline, specific lab report due dates are variable and dealt with in each particular class.

or once graded, whichever comes first. Prior to the due date, or any grading performed, students may resubmit to fix their work. Past experience shows that a resubmission uploaded after the due date will only lower the score previously given. This is due to the automatically computed late penalty as described previously.

Lastly, past experience has shown a few students will knowingly submit an entirely incorrect document in an attempt to circumvent the policy that the lack of a submission leads to a failure. The course coordinator is the only person responsible to determine if a report was submitted in good faith or not. A report that has been deemed submitted not in good faith will be marked as if it were never submitted.

Canvas discussions for laboratory report questions and answers: Students are expected to use canvas discussions to ask the instructional team questions related to laboratory reports. Chances are that another student has the same question, and so by using canvas discussions everyone has the benefit of the questions and answers.

When a student has a question, first search to see whether or not that question has been previously created and an answer has been provided. Feel free to reply to a post if there is no answer or the answer is not clear.

Please note that timing is important, do not wait for the last minute since members of the instructional team are not constantly monitoring the discussion posts. Members of the instructional team will check the discussions a few times per week to provide feedback and answer only during normal business hours.

Online forum discussions are expected to be meaningful and of an academic nature to satisfy the Regular and Substantive Interaction requirement by the Department of Education. Note that: (i) sharing answers to graded questions/activities/methods/etc. is not permitted; and (ii) postings that are unprofessional, disrespectful, or offensive will be deleted.

Makeup labs: For a makeup, the makeup lab needs to be reserved online, and the provided makeup form must be attached to the submitted lab report so proper attendance may be kept. Details on the makeup form are provided in the general laboratory guidelines. *The makeup reservation is a google form that is only available with your NJIT UCID* (you may need to log out of personal emails if necessary). The link may be found on Canvas, and it asks for details about what was missed and when you intend to make it up. After submission, your reservation is saved to a spreadsheet and an email sent to the instructors. The makeup form must be completed in full prior to the student leaving the makeup lab, and fully signed before submitted with the report. A makeup lab report is due one week (again, specifically five working days) after the makeup lab is completed.

Here are a few example cases to ensure clarity of the policy, in cases 1 and 2 everything goes as scheduled, however in cases 3 - 5, a lab is missed.

1. A student goes to a lab on 10/1, and the lab is finished. The report is then due one week later at the start of lab on 10/8.

2. A student goes to a lab on 10/1, and it is part 1 of a two part experiment. The student returns on 10/8 and part 2 of the lab is finished. The report is then due one week later at the start of lab on 10/15.

3. A student misses a lab on 10/1. That student then goes to a makeup lab on 10/21 in a different section. The report is due one week later on 10/28 with the makeup form attached.

4. A student goes to lab on 10/1, and it is part 1 of a two part experiment. That student misses part 2 of a lab on 10/8. That student then goes to a makeup lab on 10/21 for part 2 in a different section. The report is due one week later on 10/28 with the makeup form attached.

5. A student misses lab on 10/1, and it is part 1 of a two part experiment. The student goes to part 2 of a lab on 10/8 as scheduled. That student then goes to a makeup lab on 10/21 for part 1 with a different section. The report is due one week later on 10/28 with the makeup form attached.

Makeup labs can be attended throughout the semester, as the previous examples showed and are only for those labs that were missed due to absence, not for labs that were attended for the purpose of a "do over." Typically a student needs to refer to the lab schedule and find another section that will perform that laboratory at a time in the future. However, if the last laboratory was missed, or no other time exists, then there is no other section to attend. Accordingly, there will be two days set aside at the end of the semester for these "last chance" makeup labs, with a set of labs running in the day and that same set in the night. To ensure that we have adequate resources in place (instructors, TA's, supplies, etc.) we will only run a particular lab, at a particular time if it has been reserved. Details (such as the specific days) will be worked out after the second exam of the semester, and published on Canvas when as soon as ready.

3.7 HW assignments

Homework is regularly assigned and the questions for the entire semester are posted at the end of this syllabus. Assignments will be collected via Canvas only, and a random sample of assignments will be graded at various times throughout the semester. The solutions to these assignments will not be posted, they will only discussed in the class (either face-to-face or online). A late penalty of 10% per day will be enforced for late submissions.

3.8 Grading

Note that *late assignments, reports, etc., will not be accepted after the last day of class for the semester (i.e., the university wide last day of class, not the last day of lecture for your section).*[4] The weights shown in the table will be used in determination of the final course grade. Alongside are the letter grades and their corresponding description as written in the university undergraduate academic policy.

Exam 1:	20%	A	Superior
Exam 2:	20%	B+	Excellent
Final Exam:	25%	B	Very Good
Reports, Pre-lab quiz: Laboratory:	30%	C+	Good
HW/Library/Participation/etc.:	5%	C	Acceptable
		D	Minimum
		F	Inadequate

In addition, an inability to meet 40% of the course objectives described previously will result in a grade of F regardless of performance. For example, any student that is unable to meet 4 out of the 9 listed performance criteria will be considered to have inadequate understanding of the course

[4]The last day in the summer session is the last day of lecture since the schedule does not follow a normal semester.

material — and therefore will earn a grade of F. Also, as mentioned previously an inability to submit or attend all labs will result in a failure regardless of performance. And note that external factors (such as level of effort, ability in other courses, time management, etc.) are typically not considered in the computation of grades.

In semesters where multiple sections of the course are running, for fairness and consistency, the final assigned grades will be determined among all sections at once. That implies that any curve will be computed among all sections, not just a single section. Any disagreement over grades must be brought to the attention of the instructor no later than the first two weeks of the following semester, grades will not be altered after that. Further, final grades are typically not discussed via email, an appointment should be made.

3.9 Academic integrity

Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found here.

Please note that it is the professional obligation and responsibility of faculty to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing, using any online software inappropriately, or other forms of dishonesty in academics will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu.

All course content (including this syllabus, lecture materials, homework assignments, and exams) is protected content. Students should not make copies of any course materials or distribute these materials in the public domain, including sites such as Chegg, CourseHero, etc.

3.10 Requirements

In order to ensure fairness and consistency among all sections of ME215, the following requirements and expectations are meant to ensure that all sections are equivalent, and everyone is treated equally and fair.

Requirements for Instructors Instructors will not fall behind the schedule posted on the syllabus for lecture, as well as the lab schedule (with the exception of officially cancelled days). It is the instructors responsibility to take and maintain attendance for all laboratory periods. Instructors are expected to remain in the laboratory for the entire laboratory period, *the instructor is the responsible person* for the people and equipment. If an instructor is sick or otherwise unavailable for a lab, then arrangements should be made to have someone cover since the schedule shouldn't be changed unless due to official school closures. When a student from section "A" is doing a makeup lab in section "B" that student will have a pre-lab quiz and makeup form. The instructor should place the completed pre-lab quiz in the mailbox of the professor for the student's regular section. This allows the instructor of the regular section to confirm the new report deadline to account for the makeup. All instructors (and TA's) should meet at the start of the semester to coordinate.

Requirements for TA's The TA's will input the due dates for lab reports on Canvas, including those for makeup labs. Have lab reports graded in a timely matter using the rubric. Do not override the prescribed late policy for reports described here previously. The most senior TA and the course

coordinator will determine the specific lab schedule every semester. For new TA's, they should attend to prior classes for practical experience. All TA's should meet with the instructors at the start of the semester to coordinate.

Requirements for students Verify that you are able to take the online exams with ample time prior to the exam through the provided practice exams. Prior to the start of the lab class period, print a hard copy of the lab manual, read it, and bring it to the lab class period. Ensure that you have taken the pre-lab quiz for attendance. The student is responsible to attend all labs, and complete all reports since they are mandatory. As soon as possible after missing a lab, it is the responsibility of the student to fill out the online makeup lab reservation form to arrange for a makeup lab, and also to bring a hardcopy of the makeup form for signatures, so that proper credit can be received. It is the responsibility of the student to inform the dean of students of any missed exam or other mandatory materials. Employment is not considered a valid reason for missing an exam, class, lab, or any portion of the class. If you feel you are not going to pass this course, reach out to your instructor with adequate time before the drop date.

4 Tentative Lecture Schedule[5]

Section schedules are color coded as follows: 001 & HM1; 003; 005 & HM3; 007; 009; 101; 103; and labelled with the "lecture number" in the calendar below. For asynchronous lectures, the day posted is the day that the lecture slides become available. Note that the schedule may be changed due to unforeseen circumstances such as weather closings, public health emergencies, etc., and at times we may go faster than what is posted here to add a buffer for any such closing.

Monday	Tuesday	Wednesday	Thursday	Friday
9/4/23 Labor Day	9/5/23 007-1 009-1 101-1	9/6/23 103-1	9/7/23	9/8/23
9/11/23 001-1 003-1 005-1	9/12/23 007-2 009-2 101-2	9/13/23 103-2	9/14/23	9/15/23
9/18/23 001-2 003-2 005-2	9/19/23 007-3 009-3 101-3	9/20/23 103-3	9/21/23	9/22/23
9/25/23 001-3 003-3 005-3	9/26/23 007-4 009-4 101-4	9/27/23 103-4	9/28/23	9/29/23
10/2/23 001-4 003-4 005-4	10/3/23 007-5 009-5 101-5	10/4/23 103-5	10/5/23	10/6/23
10/9/23 Common Exam 1	10/10/23 Exam 1	10/11/23 Exam 1	10/12/23	10/13/23
10/16/23 001-5 003-5 005-5	10/17/23 007-6 009-6 101-6	10/18/23 103-6	10/19/23	10/20/23
10/23/23 001-6 003-6 005-6	10/24/23 007-7 009-7 101-7	10/25/23 103-7	10/26/23	10/27/23
10/30/23 001-7 003-7 005-7	10/31/23 007-8 009-8 101-8	11/1/23 103-8	11/2/23	11/3/23
11/6/23 001-8 003-8 005-8	11/7/23 007-9 009-9 101-9	11/8/23 103-9	11/9/23	11/10/23
11/13/23 Drop day Common Exam 2	11/14/23 Exam 2	11/15/23 Exam 2	11/16/23	11/17/23
11/20/23 001-9 003-9 005-9	11/21/23 Thu. Classes Meet	11/22/23 Fri. Classes Meet	11/23/23 Thanksgiving	11/24/23
11/27/23 001-10 003-10 005-10	11/28/23 007-10 009-10 101-10	11/29/23 103-10	11/30/23	12/1/23
12/4/23 001-11 003-11 005-11	12/5/23 007-11 009-11 101-11	12/6/23 103-11	12/7/23	12/8/23
12/11/23 001-12 003-12 005-12	12/12/23 007-12 009-12 101-12	12/13/23 103-12 Last Day of Classes	12/14/23 Reading Day	12/15/23 Reading Day

[5]Note that this section does not apply to summer courses, where details are handled in each class.

5 Lecture Topics and Assignments

Lecture	Topic	Pages	HW; Review Questions
1	Introduction, and manufacturing systems design	1-22	Ch.1: 1, 3, 6, 17, 26, 31, 32
2	Nature of materials	45-56	Ch.3: 1, 2, 6, 16, 17, 21, 22, 23, 29, 30, 34, 37
3	Properties of materials. Fundamentals of metal alloys. Equilibrium diagrams. Iron - Iron carbide equilibrium diagram, steels and cast Irons.	23-44, 57-66	Ch.2: 3, 6, 10, 11, 15, 16, 21, 24, 42, 43. Ch.4: 2, 4, 12, 13-18, 22, 28-30, 32-35, 37, 39
4	Heat treatment of metals	67-86	Ch.5: 1, 5-7, 11, 12, 23, 25, 32, 59
5	Ferrous metals and alloys, cast irons and steels, and non-ferrous alloys. Non-metallic materials. Materials selection.	87-105, 106-124, 125-152, 153-162	Ch.6: 2, 11, 17, 19, 23, 47, 54; Ch.7: 4, 5, 7; Ch.8: 3, 5, 46; Ch.9: 4
6	Fundamentals of metal forming, bulk forming, hot and cold working, and sheet forming	292-303, 304-330, 331-358	Ch.17: 3, 24, 37, 47; Ch.18: 5, 48, Ch.19: 1, 20, 35, 46
7	Casting, powder metallurgy, joining process, and their influence on design aspects.	221-235, 236-259, 260-274, 275-291, 680-689, 690-711, 712-725, 726-745	Ch.13: 2, 8, 10; Ch.14: 1, 50; Ch.15: 1, 3, 4, 28; Ch.16: 1, 2, 5, 11, 15; Ch.35: 3, 7; Ch.36: 2, 9, 11; Ch.37: 7; Ch.38: 6, 14, 18, 33, 40
8	Measurement and inspection.	163-185, 186-196	Ch.10: 1, 10, 11, 21, 23; Ch.11: 5, 8, 9, 10
9	Fundamentals of machining and tool geometry.	381-404, 405-427	Ch.21: 3, 4, 6, 15; Ch.22: 1, 6, 8, 13, 17
10	Turning, boring, and drilling	428-446, 462-481	Ch.23: 2, 4, 8, 21; Ch.25: 8, 21, 23;
11	Milling, sawing, broaching, other machining. CNC.	447-461, 502-522, 482-501	Ch.24: 1, 12; Ch.27: 34; Ch.26: 1, 23
12	Additive processes	637-655	Ch.33: 2, 10, 12, 13, 70

6 Exam coverage

- Exam 1 covers all material covered in lectures 1 through 3, based on the textbook.
- Exam 2 covers all material covered in lectures 3 through 7, based on the textbook. (There is indeed some overlap.)
- The final exam covers all course material, including the library and laboratory.