George W. Woodruff School of Mechanical Engineering

Georgia Institute of Technology

Syllabus

ME3210-A
(CRN: 52817)

Design, Materials, and Manufacture

Summer 2026

(Revised 4/4/2026)

Specific Course Information

Brief Description of the Course Content (Catalog Description): Major manufacturing processes, capabilities, and costs. Interaction between design, materials and manufacturing process selection.

Prerequisites or Co-requisites: ME 2110 Creative Decisions and Design, MSE 2001 Engineering Materials, COE 3001 Mechanics of Deformable Bodies

This is a required course in the ME program.

Expected Outcomes

1) To understand the major manufacturing processes – Students shall demonstrate the ability to identify and describe the major manufacturing processes and their capabilities and limitations;

2) To understand the interactions between design, materials, and manufacturing – Students shall demonstrate the ability to convert design requirements into constraints and objectives for selection of materials and manufacturing processes;

3) To be able to select the appropriate manufacturing processes given single and multiple design and material constraints – Students shall demonstrate the ability to select manufacturing processes under single and multiple constraints and objectives. In addition, students shall demonstrate the ability to use process capability information to select and/or synthesize manufacturing processes and systems.

Instructor and Grader

Dr. Steven Y. Liang:

Phone: 404-894-8164, Fax: 404-894-9342, GTMI 459

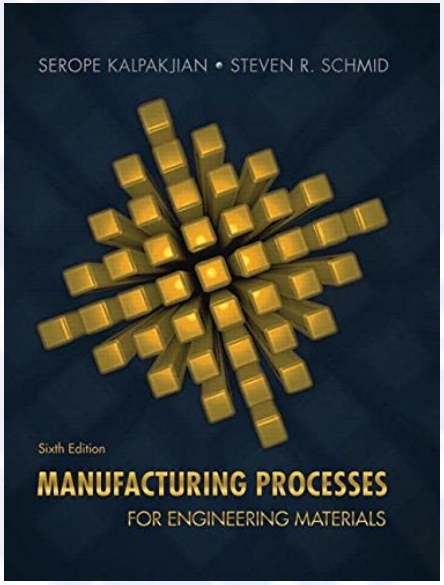
Office Hours: 24/7, by emailing questions/issues to <steven.liang@me.gatech.edu> or to schedule on-line sessions at any time.

TAs: TBA

Textbook

Manufacturing Processes for Engineering Materials, Serope Kalpakjian and Steven R. Schmid, 6th Ed, Pearson Prentice-Hall, 2016. (Hardcover book)

- Note: *Not "Manufacturing Engineering and Technology"*
- Any other version does not work



References

Fundamentals of Modern Manufacturing: Materials, Processes, and Systems, Mikell P. Groover, Prentice Hall, 2012

Materials and Processes in Manufacturing, E. Paul DeGarmo, J. T. Black, Ronald A. Kohser, 2011

Grading

Homework (mini open-book take-home exams)	15%
1st Midterm Exam, 6/16, Tue, 9:30-10:30am (60 minutes)	25%
2nd Midterm Exam, 7/21, Tue, 9:30-10:30am (60 minutes), Non-cumulative	25%
Final Exam, Date and Time TBA (90 minutes), Cumulative	35%

QUP and A section students have the same exam duration, and all have a 24-hour backward flexibility on the exam start time. For example, any students can start the 1st Midterm Exam between 9:30am on 6/16 and 9:30am on 6/17 for a 60-minute duration.

Rubric for Grading Exam Problems

Full credit for completely correct approach and completely correct answer;

1-point deduction for miscalculations only while everything else correct;

2-point deduction for using wrong variables in correct formulas;

3-point deduction for wrong or missing formulas.

Letter Grade Conversion Scheme

The final cut-off is the decision of the instructor, likely considering:

(1) the absolute scale of A=100~90; B=89.9~80; C=79.9~70; D=below 69.9, and

(2) the relative scale of A=top 30%, B, C, and D=the next 30%, 30%, and 10%.
(If over 90% of the class participate in CIOS survey the above becomes A=top 45%, B, C, and D=the next 45%, 10%, and 0%)

Will likely use either (1) or (2), whichever gives a better letter grade.

F will only be assigned to extremely low performance and with exam(s) missed.

Letter Grade Conversion Scheme

For Examples:

Fall 2025:	Spring 2025:	Fall 2024:	Spring 2024:
A=100~81;	A=100~76;	A=100~78;	A=100~76;
B=80~74,	B=75~66,	B=77~70,	B=75~66,
C=73~67,	C=65~52,	C=69~59,	C=65~63,
D=below 66;	D=below 52;	D=below 59;	D=below 63;
CIOS: 87% ☹	CIOS: 85% ☹	CIOS: 84% ☹	CIOS: 91%

Grade Transparency

For grade transparency and privacy, grade distribution will be posted after each midterm and right before the final.

As an example

HW1	HW2	HW3	HW4	HW5	QZ1	QZ2	QZ3	QZ4	MT1	MT2	Total-to-date(*)	Grade-to-date
10.0	10.0	9.0	10.0	10.0	2	2	2	2	25	25	69.76	A
10.0	10.0	10.0	10.0	8.5	2	2	2	2	25	23	67.64	A
9.5	10.0	9.0	9.0	10.0	2	2	2	2	24	24	67.40	A
9.5	10.0	10.0	10.0	10.0	2	2	2	2	23	23	65.88	A
9.5	10.0	9.0	9.5	10.0	2	1	2	2	23	24	65.52	A
9.3	10.0	10.0	8.5	10.0	1	2	1	2	25	23	65.46	A
9.5	10.0	10.0	10.0	10.0	2	1	2	2	23	23	64.88	A
9.3	10.0	10.0	10.0	0.0	2	2	2	2	23	24	64.42	A
9.5	10.0	10.0	10.0	10.0	2	1	2	2	25	20	63.88	A
10.0	8.0	10.0	10.0	10.0	2	2	1	2	23	21	62.52	A
9.8	10.0	10.0	10.0	10.0	2	1	2	2	25	18	61.94	A
9.5	10.0	9.0	7.0	10.0	2	2	2	2	23	20	61.92	A
9.5	9.5	10.0	10.0	10.0	2	1	2	1	23	21	61.76	A
8.5	10.0	10.0	10.0	10.0	2	1	2	2	25	18	61.64	A
9.5	8.5	9.0	9.3	10.0	1	2	1	2	23	21	61.10	A
9.5	10.0	10.0	10.0	10.0	2	2	1	1	24	19	60.88	A
9.5	10.0	8.0	8.5	10.0	1	1	2	1	23	21	60.04	A
9.5	10.0	10.0	10.0	10.0	2	2	1	1	21	20	58.88	A
10.0	10.0	10.0	9.0	10.0	2	1	2	2	21	19	58.76	A
10.0	10.0	10.0	10.0	10.0	2	1	2	1	21	19	58.00	A/B (**)
9.5	10.0	10.0	10.0	10.0	2	1	1	2	21	19	57.88	B
9.5	10.0	10.0	10.0	10.0	2	1.7	1	2	23	16	57.58	B
10.0	0.0	10.0	10.0	10.0	2	1	0	1	23	20	56.60	B
9.5	10.0	9.0	9.0	10.0	2	1	2	2	18	20	56.40	B
9.5	8.8	8.0	9.7	10.0	2	1	1	2	20	19	56.03	B
9.5	10.0	10.0	10.0	10.0	2	2	1	2	21	16	55.88	B
9.5	10.0	10.0	10.0	9.6	2	1	1	1	25	14	55.78	B
8.5	10.0	10.0	10.0	9.6	2	1	2	2	18	19	55.54	B
9.0	10.0	7.0	6.2	9.0	2	1	1	1	21	19	54.89	B
9.0	10.0	10.0	10.0	10.0	2	1	1	2	19	18	54.76	B
9.0	10.0	10.0	10.0	10.0	2	1	1	2	17	20	54.76	B
9.0	10.0	7.0	5.9	10.0	2	1	1	1	19	20	54.06	B
9.3	7.5	10.0	10.0	10.0	1	2	1	2	18	18	53.22	B
9.5	10.0	9.0	9.5	10.0	2	2	2	2	18	15	52.52	B
9.0	10.0	10.0	10.0	10.0	2	1.3	1	1	19	16	52.06	B
9.0	8.5	10.0	10.0	10.0	2	2	2	2	12	20	51.15	B
9.5	9.5	9.0	9.5	10.0	1	1	1	1	19	16	50.40	B
9.0	10.0	8.0	9.5	10.0	2	1	1	1	14	20	50.16	B/C (**)
7.0	8.5	10.0	10.0	10.0	0	1	0	2	19	16	48.92	C
10.0	8.1	10.0	10.0	10.0	0	1	2	2	18	14	48.54	C
9.5	7.5	10.0	10.0	10.0	1	1	1	1	14	18	47.28	C
9.5	7.5	10.0	10.0	10.0	2	1	1	1	17	14	47.28	C
10.0	0.0	10.0	10.0	0.0	2	1	1	0	15	19	45.20	C/D (**)
9.5	6.8	10.0	10.0	10.0	2	2	2	1	12	15	45.10	D
8.0	5.9	9.0	9.0	8.0	1	1	0	1	14	18	44.56	D
8.5	0.0	8.0	9.7	0.0	2	0	2	1	18	12	41.29	D
7.0	8.5	9.0	9.0	10.0	2	1	1	1	9	15	39.44	D
0.0	0.0	8.0	9.5	10.0	2	2	0	1	10	15	36.60	D

Note: (*) Total-to-date=((A+B+C+D+E)*12/50)+F+G+H+I+J+K
(**) Marginal

Letter Grade Conversion Scheme

For Examples:

Fall 2024:	Spring 2024:	Fall 2023-B:	Spring 2023:
A=100~78;	A=100~76;	A=100~76;	A=100~80;
B=77~70,	B=75~66,	B=75~65,	B=79~69,
C=69~59,	C=65~63,	C=64~55,	C=68~56,
D=below 59;	D=below 63;	D=below 55;	D=below 56;
CIOS: 84% ☹	CIOS: 91%	CIOS: 96%	CIOS: 81% ☹

Policies

- A marginal final grade will receive favorable consideration if either (1) submitting all homeworks in QUP section, or (2) attending all lectures with no more than one un-excused absence in A section.
- Homeworks are considered mini open-book take-home exams, and shall be done on individual basis and will be deemed cheating otherwise.
- Prior to the due dates, instructor can only clarify the homework problem statements but will not the homework methods.
- Late homework without instructor's PRIOR approval will, regretfully, not be accepted WITHOUT EXCEPTION. By intention, the instructor and graders do not read late homework submission emails and Canvas comments.
- There could be a homework due on 7/28.

Policies

- It is student's responsibility to look up, with or without notifications, all materials and instructions posted on Canvas.
- Students are expected to complete the lecture notes on their own. Comprehensive lecture notes will not be provided by the instructor, no matter what.
- All midterm and final exams will be open books/notes – you are allowed to use any books, notes, lecture slides, etc. However, discussing with any other student or consultant is prohibited. Use of AI software is permitted but it needs to be declared following the answers. Any violation will be considered cheating.
- Even when a class absence is granted, relevant homework still needs to be submitted on the scheduled due date.

Policies

- Absence from an exam (due to Institute activities) with instructor's prior approval will receive make-up for missed exam. However, it is the student's responsibility to make up the missed lecture content in preparation for subsequent homework and exams.
- Absence from any exam without instructor's PRIOR approval will result in a zero point for that test.
- Personal travel is not a permissible reason for rescheduling an exam.
- All acts of cheating will lead to a zero point for that grading item plus a 10-point reduction of the overall semester grade. It will also be reported to the VP/Dean of Students without exception.

Policies

- In case of academic, physical, or other barriers on campus, reach out to Office of Disability Services (https://disabilityservices.gatech.edu/) for help.
- See (https://policylibrary.gatech.edu/student-life/academic-honor-code) and follow the Georgia Tech's academic honor code.
- Any discussion with the instructor regarding grades in this semester shall be made before Monday, 5/24/2027.

Schedule

Week	Tuesdays	Thursdays
1	May 19 (Lecture 1) Syllabus, Key Manu Considerations	May 21 (Lecture 2) Design for Manu and Assembly
2	May 26 (Lecture 3) Design for Manu and Assembly	May 28 (Lecture 4) Material Variety and Functionalities
3	June 2 (Lecture 5) Material Variety and Functionalities	June 4 (Lecture 6) Material Variety and Functionalities
4	June 9 (Lecture 7) Surface & Quality Assurance	June 11 (Lecture 8) 3-D Printing
5	June 16 1st Midterm Exam	June 18 (Lecture 9) Casting (Video)

Schedule

Week	Tuesdays	Thursdays
6	June 23 (Lecture 10) Casting	June 2 Casting
7	June 30 (Lecture 11) Forming	July 2 (Lecture 12) Holiday
8	July 7 (Lecture 13) Forming	July 9 Machining: Traditional
9	July 14 (Lecture 14) Machining: Non-Traditional (Video)	July 16 (Lecture 15) Powder Metallurgy, Joining (Video)
10	July 21 2nd Midterm Exam	July 23 (Lecture 16) Semiconductor Manu
11	July 28 (Lecture 17) Semiconductor Manu	July 30 (Wed) Final Exam