

Properties of Materials
CME 300 Chemical Engineers
Monday, Wednesday, Friday 9:00 to 9:50
Swift 619

Dr. Greg Beaucage
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556-3063
Office Hours: Monday and Wednesday 10:00 to 11:00

Homework F2010: [HW1](#); [Ans. DHW1](#); [HW2](#); [Ans. DHW2](#); [HW3](#); [Ans. DHW3](#); [HW4](#), [AnswersHW4](#); [HW5](#); [AnswersHW5](#); [HW6](#); [AnswersHW6](#); [HW7](#); [AnswersHW7](#); [Kuppa Homework](#); [Answers Kuppa](#); HW8

Quizzes F2010: [Quiz 1 Durgesh](#); [Answers DQ1](#); [Quiz 2 Durgesh](#); [Answers DQ2](#); [Quiz 3](#); [Quiz 4](#); [Quiz 5](#); [Quiz 6](#); Quiz 7; [Final Exam](#)

Course Synopsis: Properties of Materials gives an overview of Materials Science for Chemical Engineers with emphasis on topics that students may encounter in the Engineer in Training Exam; in graduate research projects in Chemical and Materials Engineering; and in typical professional positions for Chemical Engineers in the plastics, metals, consumer products, and microelectronics industries. Some discussion of materials aspects of heterogeneous catalysts will also be presented in this 10 week, 3 credit course.

Course Logistics and Grading:

The course will meet 3 times per week on Monday and Wednesday for lectures and on Friday for a review session and a short (30 minute) quiz (this schedule may be shifted by a day or two). The weekly quiz will be the core of the course grade. In some cases homework will be used to replace quiz grades. Generally, a weekly homework will be assigned but this will not be collected. When possible, answer sheets will be made available on line for the homework and quizzes.

In addition to the weekly quizzes a comprehensive final exam will be given that will include questions from the quizzes, homework as well as other information covered in the course. The final exam will count as four quizzes.

The course grade will be an average of the weekly quizzes and the final which is worth 4 quizzes. You are allowed to drop three quiz grades. If you do not drop 3 quiz grades you do not need to take the final. The 3 lowest quiz grades or the final will be dropped from the final average depending on what results in the highest grade.

Only whole grades will be assigned following the usual convention: A at or above 90.0, B at or above 80.0 and C at or above 70.0. There will be no scaling and it is possible that everyone in the class can get an A.

Policy for Academic Honesty:

If there is evidence of cheating the student will receive an F for the course and the evidence for cheating will be forwarded to the College Academic Standards Committee for placement in the students academic record. Any appeal will be conducted through a hearing of the College Committee.

Course Schedule:

Week 1/September 20 (No Class Monday): **Crystallography** (Durgesh Rai) [Quiz 1/Homework 1 Crystalline Structure.html](#)

[Crystal Lattice Types](#), [Crystal Structures](#), [Angle between directions/planes](#), [Crystallography Software](#), [d-spacing equations](#), [Table of interplanar angles](#)

Week 2/September 27: **Crystallography/Diffraction** (Durgesh Rai) [Quiz 2/Homework 2](#)

Week 3/October 4: **Diffraction/Bonding** (Durgesh Rai) [Homework 3](#) (No quiz due to instructor change)
[Cubic Reflections in order](#), [Diffraction notes U. Michigan](#)

Week 4/October 11: **[Mechanical Properties of Materials](#)** (Kuppa) *Copy your notes and turn in by November 1 worth 1 quiz grade*

The copied notes can be hand-written or typed. If typed, all duplicate notes will receive a 0 grade. Please feel free to embellish the notes with outside material where it seems appropriate.

Week 5/October 18: **[Polymers](#)** (Kuppa) *Copy your notes and turn in by November 1 worth 1 quiz grade*

The copied notes can be hand-written or typed. If typed, all duplicate notes will receive a 0 grade. Please feel free to embellish the notes with outside material where it seems appropriate.

[Mechanics of Materials](#), [Wiki Stress Strain Curve for Steel](#)

Week 6/October 25: (Prof. Beaucage return from medical leave) The micro- and macro-structure of metals and ceramics.

[British Notes](#), [States of Matter Simulation](#), [Some useful Videos from MIT](#),

[University of Virginia Metallurgy Notes](#), [Metal Crystal Structures](#)

Diffraction [Al Foil](#), [Can Oriented Side](#), [Top of Can](#), [Foil](#)

[Morphology of Mechanics in Metals \(high level\)](#), [Wiki Strain Hardening](#)

[Movement of Edge Dislocation](#), [Dislocation and Impurities Video](#), [LatticeDefectsDisclinations.ppt](#)

Week 7/November 1 (VOTE TUESDAY): Metal phase diagrams.

[A lattice model](#), [British Notes on Phase Behavior](#),

[Metal Phase Diagrams UVa.pdf](#), [Copper/Zinc Phase Diagram.ppt](#)

[Steel Tutorial](#), [Wiki Austinite\(FCC\)](#), [Wiki Martensite \(BCC\)](#), [Steel.ppt](#), [Schaefer Phase](#)

[Diagrams.pptx](#), [Steel Video](#), [Dumping Slag 1994](#)

Week 8/November 8 (No Class Thursday): Colloids.

[Intermolecular Interactions Wiki](#), [Schaefer Colloids](#), [6-12 Potential \(Lennard-Jones\) wiki](#), [Stokes-Einstein Equation wiki](#)

[Molecular dipole](#), [Hamaker Constant Paper](#), [Colloids.pdf](#), [Double Layer](#), [Wiki Double Layer](#), [b](#),

Week 9/November 15: Colloids

[Electrophoresis Wiki](#),

Week 10/November 22 (No Class Friday): Amphiphiles

Week 11/November 29: Review Wednesday/Friday (Monday no class due to School)

Final Monday December 6, 8 AM to 10 AM

Grades (Current grade is final grade if you chose not to take the final.

The final is worth 4 quiz grades and the 3 lowest grades or the final will be dropped.)

Quiz Quiz Quiz Quiz

Student	HW 1	Quiz 1	HW 2	Quiz 2	HW 3	Kuppa 1	Kuppa 2	1 GB	2 GB	3 GB	4 GB	Quiz Average	Current Grade
	98	80	100	60	100	93	95	60	79	53	74	77.1	C
	93	110	105	50	95	85	85	54	55	55	70	70.5	C
	100	130	120	80	110	90	100	100	103	104	105	102.4	A
	90	80	95	85	100	95	95	56	74	95	95	84.4	B
	88	130	95	75	90	93	90	40	92	87	62	84.3	B
	85	150	85	80	100	85	85	72	70	74	72	86.0	B
		80		50		97	97					81.0	
	85	90	90	65	100	100	100	54	63	95	93	82.5	B
	93	95	130	100	105	100	100	70	60	67	87	87.1	B
	83	110	105	45	105	97	97	74		94	72	84.1	
	90	118	80	52	40	85	85		88	83	60	81.6	
	88	100	80	95	105	95	100	80	82	90	70	89.0	A
	100	130	120	85	110	97	100	98	100	95	108	102.6	A
	88	115	120	80	110	95	97	102	100	90	83	96.9	A
	70	120	115	73	70	80	82	78	72	75	88	82.0	B
	90	95	100	30	100	95	95	50	78	50	95	73.5	C
	90	140	95	67	75	82	82	46		57	70	77.7	
	100	130	115	80	110	100	100	98	98		102	101.1	
	76	125	105	73	110	82	80	86	80	96	90	91.3	A
	88	85	80	89	110	93	95	82	90	70	89	89.2	A
	50	125	45	75		81	80	24	80	69		76.3	
	89	50	75	45	30	90	90	54	73	45	55	62.8	C
	100	105	110	40	110	100	97	60		93	88	86.6	
	82	90	100	48	75			50	50	62	64	60.7	
	90	145	115	60	100	95	97	72	78	84	85	90.7	A
	70	80	80	40	95	85	85	22	42	52	60	58.3	D
	90	130	70	65	105	100	80	44	72	72	55	77.3	B
	90	100	115	95	100	92	90	82	81	86	90	89.5	A
	80	90	100	50	100	82	85	18	55	84	90	72.7	C
	100	110	125	85	100	100	95	96	95	92	105	97.6	A
	91	120	105	73	110	90	92	60	88	87	100	88.8	A
	83	70	115	30		90	90	30	33	13	73	53.6	D
	80	105	85	45	100	97	97	42		37	68	70.1	
	90	110	85	80	105	95	95	62	58	82	65	80.9	B
	90	80	100	90		93	95	64	90	75	74	82.6	B
	93	150		60	20	90	90	74	75	88	68	86.9	B
	75	45		45	65	100	93	52	58	95		69.7	
	93	95	125	50	90	95	90	80	62	84	52	76.0	C
		100	65	59		90	90	18	93	90	81	77.6	C
	93	90		45		92	92	46	60	73		71.1	
	93	95	105	60	100	87	85	82	92	94	70	83.1	B
	95	95	120	90	110	100	100	56	78	22	50	77.9	C
	89	180	110	93	100	100	100	96	94	104	98	108.1	A

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