BEST 201
Special Topics in Materials
Fall, 2018
3 units

Professor Dr. Kara McCloskey
Office: SE1 344
Phone: (209) 228-7885
E-mail: kmccloskey@ucmerced.edu

Lecture M/W 12-1:15 in COB 272

Office Hours Dr. Kara McCloskey, Mondays 11am-12pm

Required Text: No text, required readings will be posted on CatCourses (with quizzes)

Course Overview: Special Topics in Materials covers background principles of cutting-edge research directions in the field of material science. This course includes three hours of lecture and discussion per week and significant out-of-class reading and study. The course format also emphasizes student-led presentation, analysis and discussion of reading assignments from the current and recent scientific literature. Broadly, topics will include: Materials Characterizations: Probing&Imaging, Nanomaterials, Soft Materials and Biomaterials, Energy Materials and Technologies, Electronic and Photonic Materials, and Manufacturing in Materials

Prerequisites: MATH 021; PHYS 008 and BIO 100 or equivalent or good standing in graduate program, or consent of instructor. Letter grade only.

Course Goals:
1. Learn key concepts and methods of materials science research.
2. Gain understanding of how properties are influenced by structure, processing and performance in engineering applications and the key role of characterization methods.
3. Gain knowledge of topics in cutting-edge research by which materials scientists study and apply methods to understand and predict phenomena.
4. Analyze contemporary case studies by reviewing current articles. Be able to communicate knowledge gained.

Learning Outcomes: By the end of the course, students will demonstrate:
1. An ability to apply fundamental knowledge about materials science.
2. Knowledge of topics in materials science that enable the comparison of similarities and differences with other fields.
3. An ability to analyze contemporary materials science studies to make connections and decisions based on their scientific merit.
4. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.
5. An ability to communicate and function effectively on a multi-disciplinary team.
6. An ability to strengthen self-learning methods and organizational skills to enhance problem-solving abilities and efficiency.

Relationship to Program Learning Outcomes:
BEST 201 maps directly onto 2 of the Program Learning Outcomes for the BEST Ph.D. and M.S. degrees.

PLO #1 Possess a broad foundation in the fundamentals and current topics in either biological or materials science and engineering, as well as, an in-depth understanding of their chosen research topic area.
PLO #3 Be able to identify new, important, and interesting research opportunities, and be able to develop effective strategies, including the experimental plan, for pursuing these opportunities.

Grading
30% Attendance and Discussion Participation
20% Quiz on Readings
30% Oral Presentations
20% Final Project Paper

This course requires some outside work, but is mostly in-class learning. Therefore, attendance and discussion will be mandatory and graded.

Attendance – missing more than 2 classes without doctor's note or conference attendance will result in grade reduction

Discussion – you are expected to ask 1 question per lecture and 1 question per journal presentation (unless presenting)

In order help motivate you to read journals BEFORE class, we will have a short quiz on the assigned journal readings at the beginning of those

Final Paper can be on your research area of interest as long as it is materials-focused. Details and expectations will be discussed in class.

Course Policies:

1. Students are expected to attend each class as scheduled, and to be on time. Attendance may be taken at the beginning of each class.
2. Students may use during lectures: laptops, notebooks, handhelds, etc. for purposes related to the session content only.
3. All cell phones turned OFF or in silent mode.
4. Students are expected to read their e-mails at least once every 12 hours, and are responsible for any class-related announcements or directives from the instructor that might be distributed on UCMCROPS.
Note: I am a single mother, and may need to cancel class if my little girl is sick and I cannot make other arrangements. This may happen once per semester, so please check your emails regularly for potential notifications.
5. Students are expected to be attentive and respectful of speakers and fellow students at all times.
6. For exams and quizzes, no notes allowed.

Academic honesty:
1. Each student in this course is expected to abide by the University of California, Merced's Academic Honesty Policy. Any work submitted by the student in this course must be the student's own work.

2. However, you are encouraged to study together and to discuss information and concepts in lecture with other students. You can give "consulting" help to or receive "consulting" help from such students. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else (THIS INCLUDES ONLINE SOLUTIONS), in the form of an e-mail, and e-mail attachment, a diskette, or a hard copy. Should copying occur, both the student who copied work and the student who gave material to be copied with both automatically receive a zero for the assignment. Penalty for violation of this Policy can also be extended to include failure of the course and University disciplinary action.

Disability Statement: Accommodations for Students with Disabilities: The University of California Merced is committed to ensuring equal academic opportunities and inclusion for students with disabilities based on the principles of independent living, accessible universal design and diversity. I am available to discuss appropriate academic accommodations that may be required for student with disabilities. Requests for academic accommodations are to be made during the first three weeks of the semester, except for unusual circumstances. Students are encouraged to register with Disability Services Center to verify their eligibility for appropriate accommodations.

Lecture Schedule – Fall, 2018

	Date	Lecture	Instructor
Week 1	22-Aug	Introductions - Format/Oral Presentations	McCloskey
Week 2	27-Aug	Biomimicry: Materials Design from Nature	Viney
	29-Aug	Materials Characterizations: Probing&Imaging	McCloskey
Week 3	3-Sep	**Labor Day - No class**	
	5-Sep	Materials Characterization: Electron Microscopy	Leppert
Week 4	10-Sep	AFM Characterization of Biointerfaces	Ye
	12-Sep	Atomic Scale Characterization: Scanning probe microscopy (SPM)	Baykara
Week 5	17-Sep	Journal Club	
	19-Sep	Plasma processing of nanostructured materials	Ayyaswamy
Week 6	24-Sep	Graphene Oxide Material Systems	Limsakoune
	26-Sep	Nanoscale Magnetic Structures and Materials	McCloskey
Week 7	1-Oct	Technical Writing	McCloskey
	3-Oct	Journal Club	
Week 8	8-Oct	Liquid crystal and liquid crystal composites	Hirst
	10-Oct	Cells and Biomolecules at Material Interfaces	McCloskey
Week 9	15-	Smart Hydrogels and Living Materials	McCloskey

	Oct		
	17-Oct	Journal Club	
Week 10	22-Oct	Photovoltaic materials-requirements, opportunities&challenges	Kurtz
	24-Oct	Emerging Light-Emitting Materials and Devices— Halide Perovskite & Nanoscale Emitters	Ghosh
Week 11	29-Oct	Energy Storage and Conversion	Lee
	31-Oct	Journal Club	
Week 12	5-Nov	MAECS Centers	Lu
	7-Nov	Organic Electronics	Wang
Week 13	12-Nov	**Veteran's Day - No class**	
	14-Nov	Journal Club	
Week 14	19-Nov	**Thanksgiving Break - No class**	
	21-Nov	**Thanksgiving Break - No class**	
	26-Nov	**Thanksgiving Break - No class**	
Week 15	28-Nov	3D Printable Functional Polymers	Wang
Week 16	3-Dec	Final Papers Due	
	5-Dec	Journal Club	
		No final	