

## MSE 8803M: Biological Properties

Fall 2008

T,Th 4:05-5:25pm

Room: Love 183

**Instructor:** Drs. Nils Kröger & Valeria Tohver Milam  
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**OFFICE HOURS:** By appointment

**COURSE DESCRIPTION:** This graduate level course will address the structure and properties of biological systems ranging in size from macromolecules to cells. One-half of the course will provide an overview of fundamental biological concepts. The second half of the course will survey various characterization methodologies for biological and biomimetic systems using examples from recent literature.

**Prerequisites:** none except graduate level student status

**RECOMMENDED TEXTBOOKS:** *Fundamentals of Biochemistry* by D. Voet et al, 2<sup>nd</sup> edition (2006), Wiley. *The Molecular Biology of the Cell* by Bruce Alberts, et al 5<sup>th</sup> Edition. 2008. Garland Science. Note: These textbooks are recommended but not required.

**LECTURES:** Half of the course will provide an overview of biological systems. The other half of the course will focus on characterization of biological systems. Much of the lecture material for the latter part of the course will be based on selected journal articles (approximately one article per lecture) available through T-Square. Students are strongly encouraged to read assigned articles prior to class. Supplementary reading assignments based on the recommended textbook or other journal articles will be suggested, but not required. **Please turn off cell phones, pagers, etc. before entering the classroom.**

**QUIZZES:** Approximately every two weeks, quizzes based on lecture material will be given at the beginning of class.

**EXAMINATIONS:** There will be two in-class, closed book and notes examinations during the semester. If a student has a legitimate conflict, the exam must be rescheduled by that student prior to the examination day.

**FINAL PRESENTATION:** During the last week of the semester, students will take turns giving a 10-15 minute oral presentation on a journal article selected by the student. A five-minute question and answer session will follow the presentation. The article must not coincide with those assigned by the instructors, but can be on a specific topic related to a lecture or other topic suggested by the instructors. One month prior to the presentation, the student must seek approval for the journal article he or she has selected. One week prior to the presentation, the student must turn in a one page report on the article which includes 1) an abstract of the article's research objectives and conclusions and 2) a critique highlighting strengths and weaknesses of the authors' experimental approach and conclusions 3) suggestion(s) of future related work to explore.

## LECTURE TOPICS:

Date/Instructor	Topics or Article	Quiz or Exam
Aug 19 <sup>th</sup> / Kröger	General biochemistry	
Aug 21 <sup>st</sup> / Milam	S.Y. Park et al <i>Science</i> 2008 451 553-556	
Aug 26 <sup>th</sup> / Milam	A.W. Peterson et al <i>Nucl. Acids Res</i> 2001 29 24 5163-5168	
Aug 28 <sup>th</sup> / Kröger	Nucleic acid-modifying enzymes-Part I	
Sept 2 <sup>nd</sup> / Kröger	Nucleic acid-modifying enzymes-Part II	Quiz 1
Sept 4 <sup>th</sup> / Kröger	Phages, Reverse transcription, PCR	
Sept 9 <sup>th</sup> / Milam	S.R. Peña et al <i>JACS</i> 2002 124 7314-7323	
Sept 11 <sup>th</sup> / Milam	A.G. Kanaras et al <i>Angew. Chem., Int. Ed.</i> 2003 42 191-194	
Sept 16 <sup>th</sup> / Milam	R.D. Jenison <i>Science</i> 1994 263 1425-1429	Quiz 2
Sept 18 <sup>th</sup> / Kröger	Proteins – Part I	
Sept 23 <sup>rd</sup> / Kröger	Proteins – Part II	
Sept 25 <sup>th</sup> / Kröger	Proteins – Part III	
Sept 30 <sup>th</sup> / Milam	Dujardin et al <i>Nano Lett</i> 2003 3 413-417	Quiz 3
Oct 2 <sup>nd</sup> / Milam	S.R. Whaley et al <i>Nature</i> 2000 405 665-668	
Oct 7 <sup>th</sup> / Sandhage	Biopanning	
Oct 9 <sup>th</sup>	<b>EXAM 1</b>	<b>EXAM 1</b>
Oct 16 <sup>th</sup> /Milam	V. Breedveld <i>Macromolecules</i> 2004 37 3943-53	
Oct 21 <sup>st</sup> /Kröger	Cytoskeleton	
Oct 23 <sup>rd</sup> /Milam	D. Humphrey <i>Nature</i> 2002 416 413-416	
Oct 28 <sup>th</sup> /Kröger	Extracellular Matrix	Quiz 4
Oct 30 <sup>th</sup> / Milam	C. Storm <i>Nature</i> 2005 435 191-194	
Nov 4 <sup>th</sup> /Kröger	Enzymes and Receptors	
Nov 6 <sup>th</sup> /Milam	TBA	Quiz 5
Nov 11 <sup>th</sup> /Kröger	Biological membranes	
Nov 13 <sup>th</sup> /Milam	TBA	
Nov 18 <sup>th</sup> /Kröger	Antigens, Antibodies and the Immune System	
Nov 20 <sup>th</sup> /Milam	TBA	
Nov 25 <sup>th</sup>	<b>EXAM 2</b>	<b>EXAM 2</b>
Dec 2 <sup>nd</sup>	Student Presentations	Student Presentations
Dec 4 <sup>th</sup>	Student Presentations	Student Presentations

**GRADE:** Your final grade will be computed based upon your performance and scaled according to the following scheme:

Quizzes – 25%

Examination 1 - 25%

Examination 2 - 25%

One-page Paper – 10%

Presentation - 15%

### ACADEMIC INTEGRITY

In this course students are encouraged to study together.

Students are to neither receive nor provide help to others during exams.

The use of programmable calculators is not allowed during exams.

Any student suspected of academic misconduct will be referred to the Office of Student Integrity at the Georgia Institute of Technology.