BMED3600: Physiology of Cell and Molecular Systems

Instructor: Prof. Manu Platt – manu.platt@bme.gatech.edu (He/him/his)
Office: EBB1 3015 (404) 385-8531
Office hours: Wednesday 12:30 – 1:30 pm (or by appointment)

Text: Molecular Biology of the Cell, 6th Edition, Alberts et al. (Required)
Handouts as appropriate, including original scientific articles, will be on T-square

Class Website: T-Square

Course objectives:
- To introduce BME students to the anatomy of mammalian cells: structure, organization and basic function of organelles, gene expression, intracellular signaling cascades, the cytoskeleton, the cell life cycle, and the extracellular matrix.
- To introduce students to the relationship between cell and molecular biology and bioengineering.
- To introduce concepts of how cells interact with their physical and mechanical environments and function as intricate machines that sense, process, and respond to stimuli.
- To introduce students to analytical methods used in cell biology research.
- To acquaint students with issues related to biological variability.

At the end of the course, the students will understand:
1. The structure and functional organization of cell organelles, especially membranes, the cytoskeleton, extracellular matrix and the nucleus
2. Quantitative aspects of cell signaling pathways
3. Mechanisms regulating cell growth and death
4. Basic regulatory mechanisms of gene expression
5. Applications to biomedical engineering

Attendance: Attendance is mandatory; poor grades in this course correlate strongly with failure to attend class. Several assignments are to be handed in at the beginning of class and will not be accepted late.

E-mail Etiquette: Should you e-mail Prof. Platt, you must include i) the course number “BMED3600” and ii) your full name in the subject line. Sign your e-mail with your name. E-mails that do not include this information or follow this format will not be answered. Use proper English.

Classroom Etiquette:
- Be on time. Late arrivals disrupt class. After 15 minutes do not enter.
- Cell phones, iPhone, Androids, and text messaging devices should be silenced.
- No whispering to buddies during lectures; if it is important enough to share with your buddy, it is worth sharing with your classmates, plus we all have the same questions so help Dr. Platt know what is not clear.
- **No laptops or tablets** are to be used in class. If there are special educational needs for one, please see Professor Platt.

**IMPORTANT NOTE:** It is vital that you arrive to class prepared to **TAKE NOTES** and ask questions during lectures. Do not expect slide handouts on lecture material.
Grading:

Paper Reviews - Students are required to read the assigned articles (available on T-square). Original scientific articles will be discussed on assigned days. Students are required to write 1-page reviews of the original scientific articles following the format below. These will be collected at the beginning of class within the first 5 minutes and randomly graded. Participation in the discussion will also be assessed and factored into the grade.

(2 pts) 1) Brief description of the point of the article -- why did the scientists believe this work would be important?
(1 pt)  2) What background motivated this study?
(1 pt)  3) What are the health issues or diseases this work will help address?
(2 pts) 4) Which do YOU think is the most important figure in this paper and why?
(2 pts) 5) Describe at least one scientific problem with the paper. This could be in the experiments, methods, conclusions, etc. (EVERY paper has them!)
(2 pts)  6) Describe a biomedical engineering approach that could enhance this study.

10 points

Exams (subject to change w/ advanced notice):
May 29, June 10, June 21 (Final)

Final Project and Presentations: Abstracts due June 3, 2019; Final Paper due June 14, 2019; Oral presentations June 13-14, 2019

60 points: Exams (3)
20 points: Final project and papers
10 points: Other presentations and articles
10 points: Class participation

100% Total

Grading Scale
A 90.0 – 100%
B 80.0 – 89.9%
C 70.0 – 79.9%
D 60.0 – 69.9%
F Less than 60.0%

There will be ABSOLUTELY NO CURVE. Your grade will be your grade. Do not ask about this; it is non-negotiable.

Statement on Academic Integrity:
Students enrolled in this course are expected to abide by the tenets of the Georgia Tech Student Honor Code. This means that you are willing to comply with common and accepted standards of academic honesty in all matters related to your academic work. Incidents of plagiarism of any kind will not be tolerated. If you are unfamiliar with what constitutes plagiarism, the Georgia Tech Student Honor Code, please consult the following website: http://www.honor.gatech.edu/honorcode/honorcode.html#appendixA

Georgia Tech complies with the regulations of the Americans with Disabilities Act of 1990 and offers accommodations to students with disabilities. If you are in need of a classroom accommodation, please make an appointment with the Office of Disabilities to discuss the appropriate procedures. Their website is http://disabilityservices.gatech.edu
Topics | Readings (MBoC)
---|---
**Module I: Building Blocks** (May 20 – May 29) | A. Cell Anatomy Ch. 1 
B. Building blocks Ch. 2 
C. Membranes Ch. 10, Ch. 13 
D. Proteins, Enzymes, and Kinetics Ch. 3 
E. Methods Ch. 8: 439-463

**Module II: Working Parts** (May 30 – June 10) | A. Cell Signaling Ch. 15 
B. Transcription Ch. 6: 299-327 
C. Translation Ch. 6: 333-362 
D. Post-translational modifications Ch. 12: 710-750 
E. Genetic Manipulation Ch. 8: 463-509

**Module III: Cell as a Machine** (June 11 – June 21) | A. Systems Biology Ch. 8: 509-525 
B. Non-coding RNAs Ch. 7: 429-436 
C. Cell Cycle Ch. 17 
D. Cell Death Ch. 18 
E. Cytoskeleton Ch. 16 
F. Cancer Ch. 20 
G. Stem Cell Biology Ch. 22: 1217-1227; 1251-1260 
H. Extracellular Matrix Ch. 19: 1057-1087