**BB445/545**

**Instructor:** Marit Nilsen-Hamilton (marit@iastate.edu)

**Meets:** 2:10 pm, Tuesdays and Thursdays

**Location:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| Jan 12: | **Introduction and general discussion of cell signaling** |
| Jan 14: | **Receptors as enzymes ‑ tyrosine protein kinases - EGF; PDGF; FGF** |
| Jan 19: | **Receptors as enzymes ‑ serine kinases (TGF-beta) and guanylate cyclases (ANF)** |
| Jan 21: | **Hormone receptors and their interactions (insulin, lymphokine, leptins)** |
| Jan 26: | *Journal article discussion* |
| Jan 28: | Intermolecular interactions ‑ monomeric and heteromeric G‑proteins - EGF |
| Feb 2: | Regulation of receptor availability; down-regulation & desensitization |
| Feb 4: | Proteases in receptor activation and signaling - thrombin; notch |
| Feb 9: | *Journal article discussion* |
| Feb 11 | Signaling systems using cyclic nucleotides as mediators - glucagon |
| Feb 16: | Signaling systems using gases as mediators – NO ***[BBMB545 proposal topic due]*** |
| Feb 18: | Signaling systems of proteases - caspases and apoptosis |
| Feb 23: | *Journal article discussion* |
| Feb 25: | **Basal transcription mechanisms - initiation, elongation** |
| Mar 2: | Transcription factors /proximal elements - families |
| Mar 4: | Mechanisms of regulation of transcription factors by modification- phosphorylation, cleavage |
| Mar 4: | *Journal article discussion* ***[BBMB545 proposal letter of intent due]*** |
| Mar 11: | Receptor trafficking between the nucleus and the cytoplasm - glucocorticoids |
| **SPRING BREAK** |
| Mar 23: | Nuclear localized receptors - estrogen, progesterone, VitD, or retinoids |
| Mar 25: | Chromatin structure and nuclear organization |
| Mar 30: | *Journal article discussion* |
| Apr 1: | Genomic imprinting ***[BBMB545 proposal specific aims due]*** |
| Apr 6: | RNA export and transport |
| Apr 8: | RNA splicing, alternative splicing  |
| Apr 13: | *Journal article discussion* |
| Apr 15: | RNA turnover |
| Apr 20: | RNAi, shRNA |
| Apr 22 | microRNAs |
| Apr 27: | *Journal article discussion* ***[BBMB545 proposal due]*** |
| Apr 29:  | General discussion and societal/medical impacts of cell biology research including ethical considerations ***[BBMB545 proposal critiques due]*** |

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***STUDENT REQUIREMENTS FOR COMPLETING THE COURSE***

**A verbal presentation (BBMB 445/545):** Each student will present verbally on one of the topics of their choice listed in the syllabus. The bolded presentations will be presented by the instructor in addition to any topic not presented by students. For each presentation, a particular hormone or growth factor will be chosen to illustrate the topic. Preparation of the presentation will include a private meeting with the instructor to discuss the topic. At this meeting, which will be arranged for the week prior to your presentation, you will be expected to have completed the literature search and provide a outline of the talk as a basis of our discussion. One-third of your grade for the presentation will be based on your preparation as evidenced in this meeting. The class‑day before your presentation you will be expected to provide each member of the class with a 2‑page handout outlining the topic and containing a brief discussion of the topic you have chosen. The presentation (about 40 min) should include an introductory discussion of the hormone or growth factors on which you plan to focus (15-20 minutes). The introduction should include a description of the protein/hormone and its receptor in terms of their molecular structures, and cellular and physiological functions. It should also include information such as tissues and physiological state in which the hormone/growth factor and its receptor are ex­pressed and functional, and disease states that involve this hormone or growth factor. The remaining 20-25 min of discussion should explore in depth the specific topic for which this growth factor/hormone was chosen to illustrate. 50% of grade (BBMB445)/30% of grade (BBMB545).

**Journal discussions (BBMB 445/545):** These activitieswill involve the entire class with teams assigned by the instructor. Each team will be responsible for discussing a particular set of data in the publication as assigned by the instructor. 40% of grade (BBMB445)/20% of grade (BBMB545).

**A research proposal and proposal review (BBMB545):** The student will submit a written research proposal to study some aspect of the action of cell signaling. The proposal will be in the format of an NIH grant proposal, although there is no requirement to prepare budget sheets. Portions of the proposal are due at various times in the semester. The students will also be provided with proposals written by other students to critique. Each proposal will be reviewed and critiqued by two members of the class. The period desig­nated by the university for the final examination in this course will be devoted to a discussion of the reviewers’ comments following the format used by NIH and other study sections to review submitted grants. 30% of grade for the proposal and 10% for the critiques (BBMB545).

**Class participation:** Students are expected to attend classes and ask questions of the speaker. 10% of the grade (BBMB445/545).

**Office hours for Marit Nilsen‑Hamilton:** M, F: 2‑3 PM (1210 Mol Biol Blding); marit@iastate.edu

***HOW TO IMPROVE YOUR FINAL GRADE:***

***Class lectures:*** Attend class, answer the in-class questions.

***Journal articles:*** Read the assigned paper and learn about the techniques used to produce the data described prior to speaking with your team to discuss the specific assignment for discussion.

***In class presentations:*** Research the topic by first reading review articles then primary research articles. Focus on understanding and explaining mechanistic aspects of the topic on the molecular level. Organize the materials that you have learned from your studies. Outline the presentation in a powerpoint format. Find the appropriate figures from the literature to accompany your statements. Be sure to cite the journal articles from which you have taken graphic material or that you are citing otherwise.

***Research proposal (BBMB545 only):*** Research the literature and identify an hypothesis that poses an unanswered question in the area of research for the proposal. Consider how you will test that hypothesis. Outline an experimental approach for testing that is divided into logical steps of progression of examination of the hypothesis (each step is a specific aim). Be sure that the specific aims are independent of each other.

**Review of proposals (BBMB545 only):** Read the proposal and evaluate aspects such as whether the proposal has at least one well-defined hypothesis that, when answered, will provide a new understanding of the research topic, if the proposed experiments will adequately test the hypothesis/hypotheses, if the author has proposed adequate control experiments, if the expected results will increase the opportunity for pursuing advances in the area of scientific investigation, such as medical, agricultural or environmental advances.

***GENERAL INFORMATION***

**Academic Dishonesty**

This class will follow Iowa State University’s policy on academic dishonesty. Anyone suspected of academic dishonesty will be reported to the Dean of Students Office.

http://www.dso.iastate.edu/ja/academic/misconduct.html

**Accommodation of special needs**

Iowa State University complies with the Americans with Disabilities Act and Sect 504 of the Rehabilitation Act. If you have a disability and anticipate needing accommodations in this course, please contact the instructor to set up a meeting within the first two weeks of the semester or as soon as you become aware of your need. Before meeting with them, you will need to obtain a SAAR form with recommendations for accommodations from the Disability Resources Office, located in Room 1076 on the main floor of the Student Services Building. Their telephone number is 515-294-7220 or email disabilityresources@iastate.edu. Retroactive requests for accommodations will not be honored.

**Harassment and Discrimination**

Iowa State University strives to maintain our campus as a place of work and study for faculty, staff, and students that is free of all forms of prohibited discrimination and harassment based upon race, ethnicity, sex (including sexual assault), pregnancy, color, religion, national origin, physical or mental disability, age, marital status, sexual orientation, gender identity, genetic information, or status as a U.S. veteran. Any student who has concerns about such behavior should contact his/her instructor, Student Assistance at 515-294-1020 or email dso-sas@iastate.edu, or the Office of Equal Opportunity and Compliance at 515-294-7612.

**Religious Accommodation**

If an academic or work requirement conflicts with your religious practices and/or observances, you may request reasonable accommodations. Your request must be in writing, and your instructor or supervisor will review the request. You or your instructor may also seek assistance from the Dean of Students Office or the Office of Equal Opportunity and Compliance.

**Contact Information**

If you are experiencing, or have experienced, a problem with any of the above issues, email academicissues@iastate.edu.