February 1  JJ Baldassare, Ph.D.
Lecture 1  Introduction to Signaling
   Reading: Signal Transduction, Gomberts et. al.  pages 20 to 32

   Overview of cell signaling
   Cell communication
   Ligands- first messengers
   Receptors
   Receptor binding
February 2  JJ Baldassare
Lecture 2 Tyrosine Kinase Receptors
   Reading: Signal Transduction, Gomberts et. al. Chapter 11

   Growth factor receptors-Receptor structure
   Activation-dimerization
   Tyrosine motifs and their role in signaling
   Effectors/adaptors-Ras, PI 3-Kinase, PI PLCγ
   Jak/Stats

February 3  JJ Baldassare, Ph.D.
Lecture 3 G-protein Receptors 1
   Readings: Reading: Signal Transduction, Gomberts et. al. Chapter 4 and Molecular Cell Biology, Lodish et. al. Chapter 15 pages 852-870

   Overview of family
   Structure
   Heterotrimeric G-protein structure
   GTP cycle
   Signaling mechanisms and downstream effectors
      Adenylate cyclase and cAMP
      PI PLC cycle
      PI PLC and PIP2 hydrolysis and release of IP3
   Calcium signaling

February 4  JJ Baldassare, Ph.D.
Lecture 4 G-protein Receptors 2
   Readings: Readings: Reading: Signal Transduction, Gomberts et. al. Chapter 4 and Molecular Cell Biology, Lodish et. al. Chapter 15 pages 852-870

   Nature of binding to receptors
   Specificity in Gβγs coupling
   Desensitization, downregulation
   Cross Talk Between G-protein and Tyrosine Kinase Receptors
February 7  J. Chrivia, Ph.D.
Lecture 5  PKA/Creb
Readings: Signal Transduction, Gomberts et. al. 190-197

Regulation of transcription by the cAMP/PKA/CREB signaling pathway.
PKA holoenzyme
C (catalytic) subunit and R regulatory subunit subtypes and substrate specificity
Phenotype of mice with specific PKA subunits gene knockouts.
AKAPs target PKA to different cellular locations
Terminating PKA activity.

February 8  J. Chrivia, Ph.D.
Lecture 6  PKA/Creb
Readings: Signal Transduction, Gomberts et. al. 403-409

Transcriptional regulation by cAMP and PKA
Transcription directed by consensus CRE
Activation of CREB by phosphorylation
CREB related proteins
Terminating CREB activity
ICER and dephosphorylation
CREB interaction with coactivators

February 9  Jan Ryerse, Ph.D.
Lecture 7  Extracellular Matrix

Topics to be covered:
Collagens
Hyaluronan and proteoglycans
glycosaminoglycans
laminin and fibronectin
ECM in signaling processes
February 10  Jan Ryerse, Ph.D.
Lecture 8  **Cell Adhesion Molecules**
Background Reading: Molecular Cell Biology, Lodish et al, 

Topics to be covered:
- classes of matrix-cell and cell-cell adhesion molecules
- structure/function of cadherins and integrins

February 11  Jan Ryerse, Ph.D.
Lecture 9  **Cell Adhesion Molecules**
Background Reading: Molecular Cell Biology, Lodish et al, 

Topics to be covered:
- structure/function of selectins
- CAMs in leukocyte extravasation
- cadherin and cancer

February 14  Jan Ryerse, Ph.D.
Lecture 10  **Intercellular Junctions**
Background Reading: Molecular Cell Biology, Lodish et al, 

Topics to be covered:
- structure/function of ICJs
- strategies used in identifying ICJ proteins
- ICJs and disease

February 15  Mary Ruh, Ph.D.
Lecture 11  **Introduction and Receptor Structure**
Background Reading Textbook of Endocrine Physiology 5th ed, 2004 Chapter 3 pages 51-55, 73-83

- Ligands
- History
- General Mechanisms of action
- General structure of steroid receptor superfamily
- Role of hsp90
- Role of phosphorylation
February 16  Mary Ruh, Ph.D.
Lecture 12 **Nuclear Receptors and Hormone Action**
Background Reading see Handouts

- Nuclear receptors as transcriptional activators
- Chromatin remodeling and hormone action
- Role of coactivators and corepressors
- Combinatorial diversity

February 17  Mary Ruh, Ph.D.
Lecture 13 **Non-Classical Mechanisms**
Background Reading see Handouts

- Receptor action through other elements
- Ligand independent activation
- Membrane and/or cytoplasmic action
- Adopted orphan receptors

February 18  JJ Baldassare, Ph.D.
Lecture 14 **Signaling Pathways**

- Linear signaling pathway signaling
  - Map kinases - linear signaling pathways, targets
  - PI 3-kinase signaling
  - NFκB - Role of degradation in signaling

February 21  JJ Baldassare, Ph.D.
Lecture 15 **Cell Cycle**
Readings: Cherr Cancer Cell Cycle (not required) and Molecular BIOLOGY OF the Cell, Alberts et. al.-pages 988-1000-

- Cell cycle overview
- CDKs/cyclins
- Role of Growth factors-Retinoblastoma proteins/E2F
- Cyclin dependent kinase inhibitors
February 22  **JJ Baldassare, Ph.D.**  
Lecture 16  **Cell Cycle 2**  
Readings: Bartex and Lukas “Mammalian G1 and S-Phase checkpoints in response to DNA damage” Current Opinion in Cell Biology: 13,738-747  
Tumor suppressors, p53/Arf/MdM2

February 23  **Andrew Lonigro, M.D.**  
Lecture 17  **Apoptosis**  
Readings: Molecular Biology of the Cell, Alberts et al., Pages 1010-1026  
Definitions- Distinctions between apoptosis and necrosis  
The Proteolytic Cascade-the caspases  
Regulators of the Cell Death Program-Bcl-2 and IAP  
Activation of Apoptosis-pathways

February 24  **George Eliceiri, M.D.**  
Lecture 18  **Cancer**  
Readings: Cancer chapter in Molecular Biology of the Cell, Alberts et al. and in Molecular Cell Biology, Lodish et al.  
Causes  
Cancer-critical genes  
Signaling pathways  
Properties  
Metastasis  
Treatment