

B RTP 824 – Cell Signaling

Spring 2009, 3 Credit Hours

Class will meet **M-F at 3-4 pm in DRC 1004**, except where noted below. **Exams** will be administered at **3-6 pm**.

Co-Directors: Pamela K. Carmines, Ph.D., 9-9343, DRC 6046
Joyce C. Solheim, Ph.D., 9-4539, ESH 8006

Textbook: *Molecular Cell Biology* by Lodish, Berk, Kaiser, Krieger, Scott, Bretscher, Ploegh & Matsudaira (6th Ed.)

Course Description: An introduction to the fundamental concepts of cell signaling. Ligand-receptor interactions and intracellular signal transduction. Membrane electrophysiology, ion channels, neurotransmission and sensory transduction. Cellular interactions in development. Basics of cancer biology and immunobiology.

Lecture Schedule:

Date	Lecture No.	Lecture Topic	Lodish Chapter	Lecturer
2/24	1	Receptor Binding	15	Toews
2/25	2	Receptor Signaling	15	Toews
2/26	3	G Protein-Coupled Receptor Subtypes & Structure	15	Toews
2/27	4	G Protein Structure & Function	15	Toews
3/2	5	Cyclic AMP Signaling Pathways	15	Toews
3/3	6	Other GPCR Signaling Pathways	15	Toews
3/4	7	Calcium as an Intracellular Messenger I	11/15	Carmines
3/5	8	Calcium as an Intracellular Messenger II	11/15	Carmines
3/6	9	Receptor Tyrosine Kinases	16	Padanilam
3/9	10	Activation of Ras	16	Padanilam
3/10	11	MAP Kinase Pathways and Cytokine Receptors	16	Padanilam
3/11	12	TGF β Receptors and Activation of Smads	16	Padanilam
3/12	13	Nontraditional Signaling Events	16	Toews
3/13	14	Signaling by Reactive Oxygen Species	—	Zimmerman
	—	4-5 pm: Review Session	—	Toews, Carmines, Padanilam & Zimmerman

SPRING BREAK

3/23	—	EXAMINATION 1 – Covers Lectures 1-14 (34% of final grade) – DRC 1002		
3/24	15	Stem Cells & Cell-type Specification	21	Jackson
3/25	16	Cell Death & its Regulation I	21	Padanilam
3/26	17	Cell Death & its Regulation II – DRC 1005	21	Padanilam
3/27	18	Implantation & Gastrulation – DRC 1005	22	Gelineau-van Waes
		Last Day to Drop the Course		
3/30	19	Neurulation & Heart Development	22	Gelineau-van Waes
3/31	20	Limb Patterning & Development	22	Gelineau-van Waes
4/1	21	Membrane Potential	11/23	Rozanski
4/2	22	Action Potential & Conduction of Electric Impulses	11/23	Rozanski
4/3	23	Molecular/Conductive Properties of Ion Channels I	11/23	Rozanski
4/6	24	Molecular/Conductive Properties of Ion Channels II	11/23	Rozanski
4/7	25	Communication at Synapses I	23	Thoreson
4/8	26	Communication at Synapses II	23	Thoreson
4/9	27	Sensory Transduction I	15/23	Thoreson
4/10	28	Sensory Transduction II	15/23	Thoreson
	—	4-5 pm: Review Session	—	Jackson, Padanilam, van Waes, Rozanski & Thoreson

Date	Lecture No.	Lecture Topic	Lodish Chapter	Lecturer
4/13	—	EXAMINATION 2 – Covers Lectures 15-28 (34% of final grade) –	DRC 1002	
4/14	29	Blood Cell Formation/Overview of Host Defenses	21/24	Jackson
4/15	30	Innate Immunity	24	Jackson
4/16	31	Cytokines and Immune Regulation	24	Jackson
4/17	32	Immunoglobulins: Structure and Function	24	Thiele
4/20	33	Generation of Antibody Diversity and B-Cell Development	24	Thiele
4/21	34	MHC and Antigen Presentation	24	Solheim
4/22	35	T Cells, T-Cell Receptors and T-Cell Development	24	Solheim
4/23	36	Tolerance, Autoimmunity and Transplantation	24	Thiele
4/24	37	Helper T Cells and Lymphocyte Activation	24	Jackson
4/27	38	Tumor Cells and the Onset of Cancer –	25	Joshi
4/28	39	Carcinogens and Caretaker Genes in Cancer	25	Joshi
4/29	40	Genetic Basis of Cancer and Treatment	25	Joshi
4/30	41	Oncogenic Mutations in Growth-Promoting Proteins and Cell Cycle Regulators	25	Joshi
5/1	—	Review Session	—	Jackson, Thiele, Solheim & Joshi
5/4	—	EXAMINATION 3 – Covers Lectures 29-41 (32% of final grade) –	DRC 1002	

Lecturers

Students are encouraged to seek individual assistance from participating faculty:

(Name; department, office location, campus phone #, campus zip code, email user id)

- Pamela K. Carmines, PhD; Cellular & Integrative Physiology, DRC 6046, 9-9343, Zip 5850, PCARMINES
- Jancee Gelineau-van Waes, DVM, PhD; Genetics, Cell Biology & Anatomy, HBM 3083, 9-6715, Zip 5455, JVANWAES
- John D. Jackson Jr, PhD; Pathology & Microbiology, WHM 4060, 9-7623, Zip 6495, JDJACKSO
- Shantaram S. Joshi, PhD; Genetics, Cell Biology & Anatomy, SWH 3059, 9-4165, Zip 6395, SSJOSHI
- Babu J. Padanilam, PhD; Cellular & Integrative Physiology, DRC 6014, 9-3575, Zip 4575, BPADANILAM
- George J. Rozanski, PhD; Cellular & Integrative Physiology, DRC 5014, 9-6056, Zip 4575, GROZANSK
- Joyce C. Solheim, PhD; Eppley Institute, ESH 8006, 9-4539, Zip 6805, JSOLHEIM
- Geoffrey M. Thiele, PhD; Internal Medicine/Rheumatology, VAH R321, 346-8800 x3550, Zip 8090, GTHIELE
- Wallace B. Thoreson, PhD; Ophthalmology & Visual Sciences, DRC 4026, 9-2019, Zip 5840, WBTHORES
- Myron L. Toews, PhD; Pharmacology & Experimental Neuroscience, DRC 3012, 9-7197, Zip 5800, MTOEWS
- Matthew C. Zimmerman, Ph.D.; Cellular & Integrative Physiology; DRC 5010, 9-7842, Zip 5850, MCZIMMERMAN

Lectures/Review Sessions

Lectures will be delivered daily (3:00-4:00 p.m.) according to the attached schedule. Review sessions will be held prior to each examination (dates and times indicated in the schedule).

Attendance

Students must attend all lectures. If a student is unable to attend a particular lecture he/she should provide an acceptable excuse in a timely manner to the course coordinator. Student attendance at review sessions is optional.

Evaluation

Three examinations will be administered during the semester. The examinations will consist predominantly of subjective, discussion/short-answer questions in which students will be expected to apply their knowledge, often to research-oriented problems. Mastery and use of the material presented in the lectures, the textbook and other reading assignments will be expected. Students must complete each exam in the allotted time (3 hours). There will be no make-up exams for unexcused absences.

Lecturers will entertain “appeals” of points awarded (correct vs incorrect answers) on specific exam questions for 1 week after the graded exams have been returned to the students. Thereafter, no further changes in exam grades will be considered.

Grading Policy

The University of Nebraska guidelines for assigning final letter grades are detailed in the table below. For BRTP 824, these guidelines represent the minimum letter grade associated with a particular percentage score (e.g. A score of 80% will yield a letter grade of **at least** B–; however, the scale may be adjusted such that an 80% might result in a higher letter grade).

A+ 97-100%	A 93-96%	A– 90-92%
B+ 87-89	B 83-86	B– 80-82
C+ 77-79	C 73-76	C– 70-72
D+ 67-69	D 63-66	D– 60-62
F ≤ 59		

Students enrolled in this course are expected to adhere scrupulously to the Standards of Academic Integrity outlined in the UNMC Student handbook under “Standards of Student Academic Performance.” Cheating, academic misconduct, fabrication and plagiarism are viewed as serious matters. Any student found to be cheating on an examination will receive a "0" for that examination and be referred to the Dean for Graduate Studies and Research for appropriate disciplinary action as described in the *UNMC Student Handbook* under Procedural Rules Relating to Student Discipline.