



General Information

Course Title:	Flow of Cellular Information	Course Designation: BMS 503	Credits: 3
Semester:	Fall	Year:	2008
Department:	Graduate Studies		
Director:	Dr. Sarah Bronson Dr. Laura Carrel	Phone #	5194 5419
		Email:	skb8@psu.edu lcarrrel@psu.edu
Time :	9-10 unless noted	Days:	M, T, R unless noted
		Location:	C1845 unless noted
			C4734B C5736B

Course Information

Description and/or Overview:

Medicine in the 21st century must incorporate an understanding of the genetic information that underlies all biological processes in every cell, tissue, and organism together with an appreciation of how genetic differences impact complex cellular pathways and individual traits or disorders. Further, with the culmination of the human genome project and high-throughput analysis, this information can now be considered in the context of whole genomes and proteomes. This course provides students with a fundamental understanding of the basic processes that convert this genetic DNA information to produce RNA and proteins and the genetic principles that underlie transmission of this information at each cell division and to subsequent generations. This topic is of importance for all biomedical disciplines at the Penn State University College of Medicine.

The course explores how DNA is inherited, replicated, transcribed, translated, mutated, repaired, and manipulated, and how this information is utilized by cells, tissues and organisms and in the context of genomes and populations. Central dogma (DNA to protein) is studied with a focus on mechanisms by which these processes are controlled. Other topics include non-coding RNAs and protein degradation. Course objectives include understanding the mechanisms of how these processes occur and how they are regulated; and developing an appreciation for the genetic and molecular biology approaches that have allowed insight into these processes.

Goals and/or Objectives:

This course will cover classical and contemporary experimental approaches in genetic and molecular biology topics and is intended to provide knowledge that will be fundamental to graduate students beginning biomedical research careers in the several disciplines represented by the various graduate programs that are participating in the core graduate curriculum. From examples in the literature the student will develop an understanding of: 1) the principles of inheritance, 2) the central dogma of molecular biology, 3) DNA replication, mutation and repair, 4) protein degradation, 5) DNA and chromosome behavior, and 6) will be introduced to bacterial, yeast, mouse and human genetic model systems. Students will develop the ability to critically read the scientific literature, to design experiments and to interpret data.

Pre-requisites:

None

Successful completion of undergraduate courses in genetics and biochemistry are advised, but not required.

Requirements; course-specific policies and expectations:

Student knowledge will be tested in approximately three exams during the semester. Tests may take the form of take-home and/or in-class examinations. Exams may include questions requiring short answers, essay composition, as well as brief proposal writing. Exams will be designed to test the acquisition of knowledge as well as the ability to apply the acquired knowledge to analyze problems, formulate hypotheses, and propose experiments in response to research questions. At their discretion, instructors may assign additional homework assignments for the purpose of student evaluation.

Required Texts and Resources:

Molecular Biology of the Cell 5th Edition, Alberts et al.

Lehninger 5th Edition

Other readings as assigned

Electronic Links:

ANGEL <https://cms.psu.edu/frames.aspx>

Attendance Policy:

Attendance at lectures and review sessions is highly recommended but is the student's responsibility. Arrangements should be made with the appropriate instructor in cases of unavoidable absence. Completion of examinations at the time indicated on the syllabus is required.

Examination Policy:

Three exams are dispersed throughout the semester. These exams will be scheduled independent of the lecture times and students will be allowed 4 hours to complete each exam. In-class exams will be given at the times listed on the syllabus (please note locations of exams as they often differ from the normal classroom). Students **MUST** be present at examinations; absences will be excused for medical reasons that are verified by a signed note from a licensed physician. Unless informed otherwise by the instructor, all exams are closed book and closed notes. All electronic devices (except those medically necessary) must be turned off and put away during the examination. Exam materials may not be removed from the room during an in-class examination.

In addition, faculty may assign questions or problems to be answered outside of class for homework or as part of a take-home exam. All exam questions and graded homework **MUST** be done individually without assistance from **ANY** other person. Students are responsible for completing and turning in all homework and take-home exam materials on or before the deadlines set by the lecturer or course director. At the discretion of the lecturer or course director, late homework and take-home exam material may not be accepted or will be subject to a substantial grading penalty.

Grading Criteria:

Exam points will be assigned based on lectures. Thus, the first exam will have 120 pts, the second 150 points, and the third 130 points, with each lecture receiving 10 points, so a lecturer that gave 4 lectures should write 40 points worth of exam. Typically the mean for the total points (400) corresponds to a letter grade of "B". The points for take home exam questions/homework will not, in combination with any in-class exam points, exceed 10 pts/lecture.

Academic Integrity

Academic Integrity at Penn State is defined by Faculty Senate Policy 49-20 as “the pursuit of scholarly activity in an open, honest and responsible manner”. The University's Code of Conduct states that “all students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts.

Academic integrity includes a commitment not to engage in or tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others”. Academic dishonesty (including, but not limited to cheating, plagiarism, or falsification of information) will not be tolerated and can result in academic or disciplinary sanctions such as a failing (F) grade in the course.

Plagiarism

[For more information, see: <http://tlt.its.psu.edu/suggestions/cyberplag/cyberplagstudent.html>]

Statement on Remediation

The basis for grades, as stated in [Senate Policy 47-20](#), is "...the instructor's judgment of the student's scholastic achievement..." Occasionally, a disagreement arises in the assignment of a grade. A student who wishes to question or challenge the grade assigned in a course must first discuss grading practices and assignments with the instructor. It is expected that the student and instructor will try to eliminate any misunderstandings and will attempt to work out any disagreements over grades.

On the rare occasion that a student and instructor fail to resolve the grade dispute through informal means, the student may request that the head of the academic program offering the course act as a mediator. If this mediation does not resolve the dispute, the student who is a graduate student may request further mediation from the associate dean for graduate studies.

[For more information, see: <http://www.psu.edu/dept/oue/aappm/G-10.html>]

Educator's Code of Conduct

The Penn State Milton S. Hershey Medical Center and Penn State College of Medicine are dedicated to developing and maintaining a strong commitment to ethical teaching practices at all levels of the education process.

The foundation for this Educator's Code of Conduct is provided by the Penn State University Graduate School Statement on Teaching Ethics (1). The development of this Graduate School statement was based on a special issue of the journal, *New Directions for Teaching and Learning*. In this special issue, entitled *Ethical Dimensions of College and University Teaching: Understanding and Honoring the Special Relationship between Teachers and Students* (2), several authors provided theoretical and practical guidelines for honing ethical college teaching skills. Some of the authors' recommendations have been used to formulate the Educator's Code of Conduct provided herein. Some of these recommendations were modified to specifically fit the needs of both educators and students at the Hershey Medical Center and the Penn State College of Medicine. Both the Unified Campus Commitment to Excellence of the Hershey Medical Center and Penn State College of Medicine (3) and the Code of Ethical Behavior of the Hershey Medical Center, Policy A-20 HAM (4) were also consulted in preparing this Educator's Code of Conduct.

Four Norms to Govern Teaching

Honesty

Honesty and integrity must be practiced during all aspects of the education process.

Promise-Keeping

Promise keeping requires the educator to fulfill the "promises" made at the beginning of the semester or any other learning activity. Syllabi, assignments, grading principles, and class and office hour schedules each involve promises that are made to students and that must be adhered to under normal circumstances.

Respect for Persons

The educator must approach the learner with personal respect. In addition, the educator ought to encourage mutual respect among students. In particular, respect for race, religion, sexual orientation, disability gender, age, marital status, cultural differences, and political conviction should be supported and encouraged in all aspects of the educational process. Additionally, educators ought to show respect and common courtesy for students both during interpersonal interactions and in responding promptly to students' need for guidance and feedback. An environment free from harassment and discrimination, verbal abuse, physical violence, and intimidation in any form must also be provided for all learning activities.

Fairness

Recognizing the inherent subjectivity involved in grading, an educator ought to ensure that their grading practices are as objective as possible by creating and adhering to unambiguous criteria.

Principles of Ethical College and University Teaching

Content Competence

An educator maintains a high level of subject matter knowledge and ensures that the content of the educational experience is current, accurate, representative, and appropriate to the position of the learning experience within the students' program of study. The educator must be capable of approaching each learner with a commitment to meeting his or her educational needs.

Pedagogical Competence

A pedagogically competent educator communicates the objectives of the educational experience to students, is aware of alternative instructional methods or strategies, and selects methods of instruction that are effective in helping students to achieve the course objectives.

Dealing with Sensitive Topics

Topics that students are likely to find sensitive or discomfiting are dealt with in an open, honest, and positive way.

Student Development

The overriding responsibility of the educator is to contribute to the intellectual development of the student, at least in the context of the educator's own area of expertise, and to avoid actions such as exploitation and discrimination that detract from student development.

Dual Relationship with Students

To avoid conflict of interest, an educator does not enter into dual-role relationships with students that are likely to detract from student development or lead to actual or perceived favoritism on the part of the educator. The establishment of a romantic/sexual relationship between an educator and a student should be reported to the immediate supervisor of the educator. Such relationships should be dealt with consistent with Penn State Administrative Policy AD41 — Sexual Harassment (5).

Student Confidentiality

Student grades, letters of evaluation, attendance records, and private communications are treated as confidential materials and are released only with student consent, for legitimate academic purposes, or if there are reasonable grounds for believing that releasing such information will be beneficial to the student or will prevent harm to the student or to others.

Patient Privacy and Confidentiality

Educators who utilize patient information as part of any educational experience must follow patient privacy and confidentiality guidelines as outlined by the Health Insurance Portability and Accountability Act of 1996 (HIPAA).

Respect for Colleagues

An educator respects the dignity of his or her colleagues and works cooperatively with colleagues in the interest of fostering student development.

Valid Assessment of Students

An educator is responsible for taking adequate steps to ensure that the assessment of a student's performance is valid, open, fair, and congruent with the course/educational experience objectives. An educator must be aware that such assessments are important in students' lives and in the development of their careers.

Respect for Institution and Profession

In the interest of student development, an educator is aware of and respects the educational goals, policies, and standards of the institution in which he or she teaches and the profession which he or she represents.

Citing Sources of Educational Material

An educator acknowledges and documents, as appropriate, the sources of information and other materials used for teaching.

Violations of the Educator's Code of Conduct

Should a learner experience conduct that is inconsistent with the Educator's Code of Conduct, he/she is encouraged to first address the issue with either the educator responsible for the inconsistency or the director of the course in which the educator teaches. Should this attempt to resolve the problem fail, or if the nature of the inconsistency is such that the learner does not feel comfortable addressing the issue with either the educator or the course director, the student may consult other individuals. These individuals may include but are not limited to: faculty advisor, student ombudsman, departmental chair, the Vice Dean for Educational Affairs, and the Vice Dean for Faculty and Administrative Affairs. The decision of who to contact may be dependent on the educational program of the learner and/or type of violation that was encountered.

References:

- (1) <http://www.gradsch.psu.edu/research/ethics.html#teaching>
- (2) <http://cte.uncwil.edu/et/br030697.htm>
- (3) Unified Campus Commitment to Excellence of the Penn State Milton S. Hershey Medical Center and College of Medicine; 05/11/01
- (4) Code of Ethical Behavior of the Hershey Medical Center, Policy A-20 HAM; Effective Date October, 2001
- (5) <http://guru.psu.edu/POLICIES/Ad41.html>

Developed by the Unified Campus Academic Team Endorsed by Teams Council — May 21, 2003

Course Schedule

Title: Flow of Cellular Information		Designation: BMS 503		Director: Bronson/Carrel	
Time :	9:00-10:00 exceptions noted	Days:	M, T, R exceptions noted	Location:	C1845 unless indicated otherwise
Date	#	Instructor Last, first	Instruction Type	Projected Lecture Topic - Titles and content are subject to change	
8/25	1	Bronson, Sarah	Lecture	Mendelian Genetics	
8/26	2	Bronson, Sarah	Lecture	Beyond Mendel	
8/28	3	Bronson, Sarah	Lecture	Chromosome Theory Probability & Pedigrees	
9/2	4	Bronson, Sarah	Lecture	Genetic Mapping/Meiosis	
9/4	5	Keil, Ralph	Lecture	Genome Fluidity: Recombination I	
9/8	6	Keil, Ralph	Lecture	Genome Fluidity: Recombination II	
9/9	7	Keil, Ralph	Lecture	DNA Replication I	
9/11	8	Keil, Ralph	Lecture	DNA Replication II	
9/15	9	Spratt, Tom	Lecture	DNA Damage Tolerance: Mutation I	
9/16	10	Spratt, Tom	Lecture	DNA Damage Tolerance: Mutation II	
9/18	11	Spratt, Tom	Lecture	DNA Repair I	
9/22	12	Spratt, Tom	Lecture	DNA Repair II	
9/23		Bronson, Keil, Spratt	REVIEW	Review Session	
9/25		Bronson, Keil, Spratt	EXAM	NOTE: 1:15-5:30 PM Lecture Room D	
9/26 Note: 8-9 AM	13	Spector, David	Lecture	Transcription: Overview & Initiation	
9/29	14	Spector, David	Lecture	Transcription: Mechanisms & Machines	
10/2 Note: C3621	15	Spector, David	Lecture	Transcription: Activation & Repression	
10/6	16	Spector, David	Lecture	RNA Processing	
10/7	17	Spector, David	Lecture	Posttranscriptional Regulation	
10/10	18	Spector, David	Lecture	Non-coding RNA	
10/13	19	Spector, David	Lecture	The Transcriptome	
10/15	20	Kimball, Scot	Lecture	Translation: Overview & Initiation	
10/16	21	Kimball, Scot	Lecture	Translation: Mechanisms of Regulation	
10/20	22	Kimball, Scot	Lecture	Translation: Pathologies of Disregulation	
10/21	23	Chau, Vincent	Lecture	Proteolysis I	
10/23	24	Chau, Vincent	Lecture	Proteolysis II	
10/27	25	Chau, Vincent	Lecture	Protein: Consequences of Mutation	
10/28	26	Grigoryev, Sergei	Lecture	Mitosis & Cell Cycle I	
10/30	27	Grigoryev, Sergei	Lecture	Mitosis & Cell Cycle II	
11/3		Spector, Kimball, Chau,	REVIEW	Review Session	
11/4		Spector, Kimball, Chau,	EXAM	NOTE: 1-5 pm Lecture Room B	
11/6	28	Wills, John	Lecture	Overview Discovery of Genetic Exchanges in Bacteria	
11/10	29	Wills, John	Lecture	Properties of F and Hfr strains	
11/11	30	Wills, John	Lecture	Plasmid gymnastics; Isolation of F' strains; Chromosome Mapping	
11/13	31	Wills, John	Lecture	Complementation; Chromosome Mapping; Transformation	
11/17	32	Wills, John	Lecture	Transposable Elements; Phage Replication	
11/18	33	Wills, John	Lecture	Phage Genetics; Transduction	
11/20	34	Carrel, Laura	Lecture	Genomics: Complex Genomes & Mapping Approaches	
12/1	35	Carrel, Laura	Lecture	Genomics: Human Disease Gene Mapping	
12/2	36	Carrel, Laura	Lecture	Genomics: Candidate Gene Analysis	
12/4	37	Carrel, Laura	Lecture	Genomics: Mapping Complex Traits	
12/8	38	Carrel, Laura	Lecture	Comparative Genomics	
12/9	39	Shantz, Lisa	Lecture	Genome Manipulation in Animal Systems I	
12/11	40	Shantz, Lisa	Lecture	Genome Manipulation in Animal Systems II	
12/15		Wills, Carrel, Shantz	REVIEW	NOTE: 2-3 PM C1845	
12/17		Wills, Carrel, Shantz	EXAM	NOTE: 1:15-5:15 PM Lecture Room D	

Contact Information

Faculty / Title	Department	Phone #	EMAIL	Office Room #	Mail Code
Kathy Simon, Adm. Asst.	Graduate Student Affairs	6608	ksimon@psu.edu	1712	H170
<i>Comments: (i.e. preferred method of contact, contact hrs.)</i>	<i>Student Walk In Days – Tuesday & Thursday</i>				
Dr. Sarah Bronson Course Director	Cellular & Molecular Physiology	5194	sbronson@psu.edu	C4734B	H166
<i>Comments: (i.e. preferred method of contact, contact hrs.)</i>	<i>arrange appointments after class or by e-mail or phone</i>				
Dr. Laura Carrel Course Director	Biochemistry & Molecular Biology	5419	lcarrel@psu.edu	C5736B	H171
<i>Comments: (i.e. preferred method of contact, contact hrs.)</i>	<i>arrange appointments after class or by e-mail or phone</i>				
Dr. Vincent Chau	Cellular & Molecular Physiology	0020	vchau@psu.edu	C4756	H166
<i>Comments: (i.e. preferred method of contact, contact hrs.)</i>	<i>arrange appointments after class or by e-mail or phone</i>				
Dr. Sergei Grigoryev	Biochemistry & Molecular Biology	8588	sag17@psu.edu	C5739	H171
<i>Comments: (i.e. preferred method of contact, contact hrs.)</i>	<i>arrange appointments after class or by e-mail or phone</i>				
Dr. Ralph L. Keil	Biochemistry & Molecular Biology	8595	rkeil@psu.edu	C5715	H171
<i>Comments: (i.e. preferred method of contact, contact hrs.)</i>	<i>arrange appointments after class or by e-mail or phone</i>				
Dr. Scot Kimball	Cellular & Molecular Physiology	8970	skimball@psu.edu	C3528B	H166
<i>Comments: (i.e. preferred method of contact, contact hrs.)</i>	<i>arrange appointments after class or by e-mail or phone</i>				
Dr. Lisa Shantz	Cellular & Molecular Physiology	6987	lshantz@psu.edu	C4731	H166
<i>Comments: (i.e. preferred method of contact, contact hrs.)</i>	<i>arrange appointments after class or by e-mail or phone</i>				
Dr. David Spector	Microbiology & Immunology	8250	dspector@psu.edu	C6751	H107
<i>Comments: (i.e. preferred method of contact, contact hrs.)</i>	<i>arrange appointments after class or by e-mail or phone</i>				
Dr. Tom Spratt	Biochemistry & Molecular Biology	4623	tes13@psu.edu	C5711	H171
<i>Comments: (i.e. preferred method of contact, contact hrs.)</i>	<i>arrange appointments after class or by e-mail or phone</i>				
Dr. John Wills	Microbiology & Immunology	3528	jwills@psu.edu	C6712	H107
<i>Comments: (i.e. preferred method of contact, contact hrs.)</i>	<i>arrange appointments after class or by e-mail or phone</i>				