

# **Syllabus: INTD 531 Advanced Cell Biology**

(offered each fall semester)

**Course Director: Dr. Axel H. Schönthal (schontha@usc.edu)**

## **Course Information:**

INTD 531 is an advanced graduate level course in cell biology that is offered on the Health Sciences Campus. Three major areas of active cell biological research will be emphasized:

- Section I: Cellular Growth Control and Regulation
- Section II: The Dynamic Architecture and Composition of Cells
- Section III: Cells In Their Social Context

Each of these areas is covered in a different section of the course and is coordinated by a different faculty member as shown on the course schedule. The course will use the material in the required textbook as a starting point, and original recent work and advances in the individual areas will be emphasized.

## **Course Goals:**

Students who successfully complete this course will acquire in depth understanding and advanced knowledge of a range of general and specialized areas in cell biology. They will develop insight into the complexities of cell structure and function, the molecular controls that govern the cells' dynamic properties, and cellular interactions with the organism as a whole.

A further goal of this course is to educate and train the students in grant writing skills. Therefore, an important component of this course will be homework assignments consisting of developing research proposals based on selected hypothesis from the course topics. These assignments will receive written feedback from faculty who will comment on strengths and weaknesses of the students' proposals.

## **IMPORTANT!**

All correspondence between instructors and students will be made using email. All information regarding lectures, reading assignments, and homework will be posted on a Blackboard web site for INTD 531. The Blackboard web site may be entered at <https://blackboard.usc.edu/> . Only students who are registered for the course will have access to the Blackboard web site. If you cannot access the web site, inform Dr. Schönthal at schontha@usc.edu

## **THE FIRST DAY OF CLASS IS AUGUST 27, 2013**

The course will consist of 2 two-hour sessions per week. Classes will meet 9-11 AM on Tuesdays and Thursdays in McKibben 256. Exams will be held in MCA 149.

## **Textbook:**

The required text is the Fifth edition (2008) of *MOLECULAR BIOLOGY OF THE CELL*, by Alberts, Johnson, Lewis, Raff, Roberts and Walter.

**Class Format:**

The course will consist of 2 two-hour class sessions per week. Classes will meet 9-11 AM on Tuesdays and Thursdays in McKibben 256. The lecture schedule and assigned lecturers are listed in the document entitled "Course Schedule" (and below). Lecture dates may vary with advance notice. Homework and pre-class assignments will be required for most classes. Pre-class assignments will be posted on Blackboard. It is advisable that students login to the course on Blackboard and check for updates regularly.

Each class meeting will consist of no more than one hour of didactic presentation by the instructor. Some instructors may have prerecorded content available on the course Blackboard site in lieu of didactic presentations in class; other instructors may post introductory reading assignment on Blackboard, which students need to review in order to be sufficiently prepared for that class.

At least one hour of each class will be used for interactive exercises that will emphasize data analysis, experimental design, research proposal preparation, or discussion of primary research reports and relevant research methods.

**Exams:**

Each of the three sections of the course will conclude with a two-part exercise/exam, as follows:

*Part 1* will be a take-home assignment, which consists of writing a research proposal. Topics for this research proposal will be given to students about 5 days before the deadline. This typed research proposal must be emailed (in PDF format) to the course director (Dr. Schönthal: [schontha@usc.edu](mailto:schontha@usc.edu)) at the latest 24 hours before Part 2 of the exam.

*Part 2* will be an exam in the format of a multiple-choice test, based on topics presented during the course section immediately preceding the exam. This exam will be administered on the final day of the respective section of the course and will take about 45 minutes. Immediately following this multiple-choice test, there will be a discussion concerning Part 1.

**Exam Dates for Fall 2013:**

Exam for course section I:

- Monday, September 30, 9:00 a.m.: Deadline for emailing research proposal.
- Tuesday, October 1, 9:00 a.m.: Multiple-choice test for course section I.

Exam for course section II:

- Wednesday, October 30, 9:00 a.m.: Deadline for emailing research proposal.
- Thursday, October 31, 9:00 a.m.: Multiple-choice test for course section II.

Exam for course section III:

- Monday, December 9, 9:00 a.m.: Deadline for emailing research proposal.
- Tuesday, December 10, 9:00 a.m.: Multiple-choice test for course section III.

The students will receive written feedback regarding strengths and weaknesses of their research proposals for course sections I and II. The intent is to educate and train the students in grant writing skills, and to prepare them for their final research proposal at the end of section III (where no further feedback will be provided).

**Grading:**

The final grade for each student will be assigned based on the student's performance on the three research proposals and the three multiple-choice tests. Each of these 6 components is worth up to 100 points, and receiving 500 points total will result in a grade of A.

Part 1 of Section I will provide an opportunity for extra credit of up to 100 points. This means that some students may obtain more than 500 points. In case the number of points is substantially above 500, the student will receive a grade of A+.

The breakdown of points for each homework assignment (Part 1) and multiple-choice test (Part 2) is as follows:

Exam for course section I:

- Part 1: 100 (extra credit)
- Part 2: 100

Exam for course section II:

- Part 1: 100
- Part 2: 100

Exam for course section III:

- Part 1: 100
- Part 2: 100

**Class Schedule:**

<i>Date</i>	<i>Topic</i>	<i>Lecturer</i>
Aug. 27	Introduction to the Course	Schönthal
<b><u>Section I: Growth Control and Regulation:</u></b>		
	<b>Section Organizer:</b>	<b>Schönthal</b>
Aug. 29	Introduction to Growth Control and Cell Cycle	Schönthal
Sept. 03	Regulation of Stem Cell Self-Renewal and Growth	Ying
Sept. 05	Cell Signaling and Functions Controlled by Kinases	Li
Sept. 10	Cell Signaling and Functions Controlled by Phosphatases	Stiles
Sept. 12	<i>How To Write A Research Proposal</i>	Chow
Sept. 17	Apoptosis	Schauwecker
Sept. 19	Mitochondrial Dysfunction and Cell Death	Schauwecker

Sept.	24	Introduction to Cancer Cell Biology	Schönthal
Sept.	26	Autophagy	Liang
Oct.	01	<b><u>Growth Control and Regulation: Multiple-Choice Test + Discussion of Student Research Proposals</u></b>	Schönthal

## **Section II: The Dynamic Architecture and Composition of Cells**

		<b>Section Organizer:</b>	<b>TBD</b>
Oct.	03	High-resolution imaging techniques in cell biology	Chow
Oct.	08	The Structure of Cell Membranes	Farley
Oct.	10	Deformation of Membranes	Langen
Oct.	15	Laws of Thermodynamics. How cells manipulate them to regulate their volume.	Mircheff
Oct.	17	Biological Transport Mechanisms: Cells are gated communities.	Farley
Oct.	22	How does faulty biological transport lead to disease? Lessons from cystic fibrosis	Farley
Oct.	24	Exocytosis, Endocytosis, and Secretion	Dominguez
Oct.	29	Molecular Motors in Cell Biology: <i>Are the locations of organelles and macromolecules within a cell random?</i>	Okamoto
Oct.	31	<b><u>The Dynamic Architecture and Composition of Cells: Multiple-Choice Test + Discussion of Research Proposals</u></b>	TBD

## **Section III: Cells In Their Social Context**

		<b>Section Organizer:</b>	<b>DeClerck</b>
Nov.	05	Overview of the Microenvironment of the Cell	DeClerck
Nov.	07	Self Study (class does not meet)	
Nov.	12	The ECM: Structure, Function, and Role in Wound Healing	Tuan

Nov.	14	Cell-Matrix Interactions: Integrins and Other ECM Adhesion Molecules	Swenson
Nov.	19	Cell-Cell and Epithelial-Mesenchymal Interactions	Widelitz Chuong
Nov.	21	Cell Migration and its Control Mechanisms	Wei Li
Nov.	26	Cell Migration and Neurite Outgrowth	Le Ma
Nov.	28	Thanksgiving – No class	
Dec.	03	The Tumor Microenvironment: The Social Environment of The Cancer Cell	DeClerck
Dec.	05	Inflammation: A Disease of the Social Environment Paper review and discussion session	DeClerck
Dec.	10	<b><u>Cells In Their Social Context: Multiple-Choice Test</u></b> <b>+ <u>Discussion of Research Proposals</u></b>	DeClerck

End of course