# BCMP 236: Principles of Drug Action in People Harvard Medical School January 25 – April 28, 2022 TMEC 250

### **Syllabus**

**Course Directors:** Dr. Phil Cole, Dr. Sara Buhrlage, Dr. Catherine Dubreuil **Head Teaching Fellow**: Dr. Chelsea Powell

## **IN PERSON Meeting Times:**

Required Class sessions: TMEC250 Tuesday and Thursday, 3:30 pm – 5:00 pm EST; Tues March 1 will be in the Cannon room of Building C (room 114); Rooms for journal clubs on March 31 and April 7 TBD

### **Course Outline:**

This course will discuss principles of drug discovery drug modalities and drug pharmacology. In the first part of the course, fundamental aspects of receptor and enzyme targeting agents, drug mechanism, drug metabolism, pharmacokinetics and pharmacodynamics, small molecules, proteins, and nucleic acid drugs will be described. In the second part of the course, pharmacology of therapeutics that act on the cardiovascular, immunologic, and central nervous systems will be covered. The course will include frontier lectures on antiviral agents, cardiac drugs, and treatments for brain diseases and a journal club on specialized topics in drug discovery. A range of knowledgeable instructors enlisted from the Harvard Medical School faculty and pharmaceutical scientists will participate in teaching this course.

### **Student Evaluation:**

All students will be evaluated on the basis of class participation and on 6 take home problem sets that align with the content blocks/topics in the course. Problem sets will be available at 9am the Monday after a content block is completed and will be due Tuesday of the following week at the start of class (3:30pm). These due dates are: 2/15, 3/1, 3/29, 4/12, 4/26, and 5/10. Submission will be through the course website. If an extension is needed, please email Chelsea Powell (Chelsea Powell@hms.harvard.edu) with advance notice to arrange a suitable due date.

### **Office Hours:**

Office hours will be held over Zoom by the head teaching fellow the Friday before problem sets are due. Times will be based on student demand/availability as assessed by a scheduling poll that week. Please look to course announcements for polling links and office hour times.

### **Faculty Evaluation:**

Lecture and Journal Club surveys about the content and delivery will be distributed throughout the course. Real time feedback is requested to assist in improving the course quality.

### **Course Website Access:**

All students must be officially registered in the course in order to have full access to the course website. This is necessary for students to be assigned to a discussion section and to access all the course materials. If you are not officially enrolled in the course, please e-mail Catherine Dubreuil or Chelsea Powell (<u>catherine\_dubreuil@HMS.harvard.edu</u> or <u>Chelsea\_Powell@hms.harvard.edu</u>) for permission to attend lectures and access the course site.

# Important Course Policies:

# Academic Integrity

All work in this course is governed by the academic integrity policies of GSAS (<u>https://gsas.harvard.edu/codes-conduct/academic-integrity</u>) and HMS (<u>https://mastersstudenthandbook.hms.harvard.edu/409-academic-dishonesty-and-plagiarism</u>). It is the students' responsibility to be aware of these policies and to ensure that their work adheres to them both in detail and in spirit. Unless otherwise specified by the instructor, the assumption is that all work submitted must reflect the student's own effort and understanding. Students are expected to clearly distinguish their own ideas and knowledge from information derived from other sources, including from conversations with other people. When working with others you must do so in the *spirit of collaboration*, not via a unidirectional transfer of information. Note that sharing or sending completed assignments to others will nearly always violate this collaborative standard. If you have a question about how best to complete an assignment in light of these policies, ask the instructor for clarification.

## **Community Standards**

HMS is committed to supporting inclusive learning environments that value and affirm the diverse ideas and unique life experiences of all people. An equitable, inclusive classroom is a shared responsibility of both instructors and students,

and both are encouraged to consider how their own experiences and biases may influence the learning environment. This requires an open mind and respect for differences of all kinds.

Students are encouraged to contact the course director if they are experiencing bias or feel that their learning experience – including a course's content, manner of instruction, or learning environment -- is not inclusive. Curriculum Fellows, program administrators and directors, the <u>DMS Office of Diversity</u>, the <u>GSAS Office of Diversity and Minority</u> <u>Affairs</u>, the <u>Title IX Office</u>, and the <u>Ombuds Office</u> are also available to discuss your experiences and provide support. Additionally, students can utilize Harvard's Anonymous Reporting Hotline (<u>https://reportinghotline.harvard.edu/</u>) to report issues related to bias.

# **Reasonable Accommodations**

As an institution that values diversity and inclusion, our goal is to create learning environments that are usable, equitable, inclusive and welcoming. Harvard University complies with federal legislation for individuals with disabilities and offers reasonable accommodations to qualified students with documented disabilities and temporary impairments. To make a request for reasonable accommodations in a course, students must first connect with their local disability office. The primary point of contact for GSAS students is the Accessible Education Office (www.aeo.fas.harvard.edu). The HMS Director of Disability Services, Timothy Rogers (timothy rogers@hms.harvard.edu) is another potential source of accommodation information for PhD students and is the primary contact for MD and master's students.

Accommodations are determined through an interactive process and are not retroactive. Therefore, students should contact their local disability office to initiate the accommodation process as soon as possible, preferably at least two weeks before accommodations are needed in a course or immediately following an injury or illness. Students are strongly encouraged to discuss their needs with their instructors; however, instructors cannot independently institute individual accommodations without prior approval from the disability office. Student privacy surrounding disability status is recognized under FERPA. Information about accommodations is shared on a need-to-know basis, and with only those individuals involved in instituting the accommodation.

# Academic and other Support Services

We value your well-being and recognize that as a graduate student you are asked to balance a variety of responsibilities and potential stressors: in class, in lab, and in life. If you are struggling with experiences either in- or outside of class, there are resources available to help. Danielle Farrell, the GSAS Director of Student Services (617-495-5005) is available to assist students navigating academic or personal difficulties and connect them to university resources. HILS PhD students have access to free academic tutoring, arranged through the DMS office. A variety of academic support services are also available to GSAS students through the Academic Resource Center (<u>https://academicresourcecenter.harvard.edu</u>) and the Center for Writing and Communicating Ideas (<u>https://gsas.harvard.edu/center-writing-and-communicating-ideas</u>).

# Special Note for Remote Learning

If learning remotely presents specific challenges for you, it is critical that you contact the course director so appropriate actions can be taken. Potential issues include, but are not limited to, reliable access to technology or an appropriate private work space, time-zone related scheduling issues, and challenges balancing other responsibilities. In addition to the course director, your program's leadership and the Academic Resource Center are available to help.

All students have access to Counseling and Mental Health Services (CAMHS) available in Longwood, Cambridge or remotely via webcam or phone. The use of CAMHS is included in the student health fee, regardless of insurance, at no additional cost. More information is available at <a href="https://camhs.huhs.harvard.edu">https://camhs.huhs.harvard.edu</a> or by calling the main office at 617-495-2042. Urgent care can be reached 24/7 at 617-495-5711.

# BCMP 236: Principles of Drug Action in People: Schedule

Part I: Fundamentals of Pharmacology				
Month	Date	Block Topic	Class Content	Lecturers 2022
Jan	25	Introduction	Overview, Introduction, definitions, history to modern drug discovery	Phil Cole
Jan	27	Block 1: Enzyme and receptor targeting	Enzyme assays, inhibitor mechanisms	Phil Cole
Feb	1		Drug-receptor interactions 2: receptor and binding assays, ligand mechanisms	Andrew Kruse
Feb	3		Lecture-lab at macromolecular structure unit	Kelly Arnett
Feb	8	Block 2: pharmacokinetics and drug metabolism	Pharmacokinetics 1	Tim Mitchison
Feb	10		Pharmacokinetics 2	Tim Mitchison
Feb	15		Pharmacokinetics 3	Francoise Berlioz-Seux
Feb	17		Drug metabolism, P450s, drug-drug interactions (DDI)	Francoise Berlioz-Seux
Feb	22	Block 3: Small molecule, protein, nucleic acid therapeutics and drug delivery	Small molecules 1	Sara Burhlage
Feb	24		Small molecules 2	Sara Burhlage
March	1		Frontier lecture	Michael Sofia
March	3		Biologics-antibodies, ADCs, Abs	Will Somers
March	8		Drug Delivery and Formulation	Dan Kohane
March	10		Gene therapies-ASO, editing, RNA drugs, vector issues	Luk Vandenberghe
March	15		Spring Brook	
March	17	Spring bleak		
Part II- Cardiovascular, Immune, and Neuro Pharmacology				
March	22	Block 4: Cardiovascular system	Cardiac disease and anti-hypertensives	Naomi Fisher
March	24		Lipid lowering drugs	Rajat Gupta
March	29		Antiplatelets and blood thinners	Phil Cole
March	31		Journal club	
April	5	Block 5: Immune system	Immunomodulator drugs- small molecules	Jon Clardy
April	7		Journal club	
April	12		Immunomodulator drugs- protein and cell therapies	Marcela Maus
April	14		Frontier lecture in immunologic therapies	<b>Catherine Sabatos-Peyton</b>
April	19	Block 6: Central nervous system	Neurodegenerative diseases and therapeutic approaches 1	Gregory Petsko
April	21		Neurodegenerative diseases and therapeutic approaches 2	Gregory Petsko
April	26		Psycho-therapeutics	Mark Namchuk
April	28		Treatment of pain and the placebo effect	Clifford Woolf