

543H Cardiovascular Biology

Fall 2020

Tues -Thurs 3:00-4:15 pm, Virtual Classroom (via ZOOM)

(<https://us02web.zoom.us/j/83118973795?pwd=YjVUMjVBTEhzUmh0ZEpESVEwd0ZlQT09>)



Photo: Molly Kulikauskas

### Course Description:

An experimental approach to understanding cardiovascular development, function, and disease. This class will cover development of the cardiovascular system (heart, blood vasculature, lymphatic vasculature), and cardiovascular function as linked to selected diseases. We will investigate the molecular, genetic, cell biological, and biochemical techniques used to study the cardiovascular system, with an emphasis on the genes and signaling pathways involved in cardiovascular development and disease. It is

assumed that students will have some familiarity with animal development and cell and molecular biology. This course will focus deeply on selected aspects of cardiovascular development, function and disease rather than taking a superficial approach to the subject. To facilitate a deeper understanding of the scientific method, most topics will be paired with a research paper from the primary literature.

### Expectations:

We all learn from each other! Students will be expected to do assigned readings and view assigned materials before class. Participation is a must in this course. We will do this virtually via synchronous presentation, with students listening and participating in interactive lectures and paper discussions. You will be expected to contribute to class discussions on a daily basis, and you will be expected to work in breakout groups on occasion.

### Course Objectives:

Upon completion of the course, students will be able to...

- articulate the big questions being addressed in cardiovascular biology, such as those related to development and patterning, genetic signaling pathways, and links between development and disease.
- read and interpret primary literature in basic cardiovascular biology.
- understand the tools used by researchers to investigate the mechanisms underlying basic cardiovascular biology and selected diseases/pathologies.
- know the criteria for proof, and recognize good and bad experimental design.
- propose solutions to address unanswered questions in basic cardiovascular biology.
- use team approaches to discuss both information and ideas

## Textbook

This course will not use a textbook. I will provide reading assignments in the form of reviews, articles, and primary research papers, as well as information from other forms of media.

## Course Policies:

### 1. General

Please note that I reserve the right to make changes to the syllabus, including project due dates and test dates (excluding the officially scheduled final examination), when unforeseen circumstances occur. These changes will be announced as early as possible so that students can adjust their schedules.

### 2. Grading

The course grade will be based on 2 exams during the semester (25%, 25%), final exam (30%), a poster presentation (10%), and participation in class paper discussions, poster discussions, and other in-class discussion (10%). Grading will be on a curve. Final will be cumulative with emphasis on untested material.

### 3. Attendance

All registered students are expected to:

- be on time for all class periods.
- attend all classes (more than 3 unexcused absences will incur grade penalties).
- meet assignment deadlines

### 4. Participation

Participation during the class period is required. Every student should strive to participate verbally in every class. This would include asking a question, commenting on other student's comments (respectfully), responding when asked questions directly, and participating in small group work.

Students are expected to:

- be courteous and respectful to other participants and ideas.
- actively contribute in a substantial way to class discussions and small group work.
- honor the Honor Code.

### 5. Assignments outside class

Reading and other assignments will be assigned in advance as much as possible; however, the flexible and dynamic nature of this class may make it difficult to do so far in advance.

**HONOR CODE:** *All work done in this class must be carried out within the letter and spirit of the UNC Honor Code. You must sign a pledge on all graded work certifying that no unauthorized assistance has been given or received. You are expected to maintain the confidentiality of examinations by divulging no information about any examination to a student who has not yet taken that exam. You are also responsible for consulting with your professors if you are unclear about the meaning of plagiarism or about whether any particular act on your part constitutes plagiarism. Please talk with the professor if you have any questions about how the Honor Code pertains to this course.*



**DIVERSITY, EQUITY AND INCLUSION:** *I am committed to creating an inclusive environment in which all participants are respected and valued. I will not tolerate disrespectful language or behavior, especially if based on visible or non-visible differences.*



Photo: Lyndsay Wylie

**Course Copyright Information:**

All course materials including your notes and assignments are covered by University Copyright Policy

<http://policies.unc.edu/files/2013/05/Copyright.pdf>

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<b>Date</b>	<b>TOPIC</b>
Aug 11 (Tu)	LECT1: Introduction to cardiovascular biology
Aug 13 (Th)	LECT2: Cardiovascular biology and COVID19/Mouse Genetic Manipulations
Aug 18 (Tu)	LECT3: Heart development
Aug 20 (Th)	Heart development - PAPER 1
Aug 25 (Tu)	LECT4: Great arteries development
Aug 27 (Th)	Great arteries development – PAPER 2
Sep 1 (Tu)	LECT5: Congenital heart disease
Sep 3 (Th)	Congenital heart disease – PAPER 3
Sep 8 (Tu)	LECT6: Vascular development and function 1
Sep 10 (Th)	Special Topics: Development and function of the cardiac conduction system (Dr. M Bressan, guest lecturer)
Sep 15 (Tu)	LECT7: Vascular development and function 2
Sep 17 (Th)	LECT8: Vascular disease
Sep 22 (Tu)	SPECIAL TOPICS - TBD
Sep 24 (Th)	<b>EXAM 1</b>
Sep 29 (Tu)	SPECIAL TOPICS: Blood hemostasis and thrombosis – venous thromboembolism (Dr. A Wolberg, guest lecturer)
Oct 1 (Th)	LECT9: Neurovascular development and disease
Oct 6 (Tu)	Neurovascular development and disease – PAPER 4
Oct 8 (Th)	LECT 10: Cardiovascular stem/progenitor cells
Oct 13 (Tu)	SPECIAL TOPICS: Programming and reprogramming – what does it take to make a cardiomyocyte (Dr. L Qian, guest lecturer)
Oct 15 (Th)	LECT 11: Aging and the cardiovascular system

Oct 20 (Tu) LECT12: Lymphangiogenesis

Oct 22 (Th) **EXAM 2**

Oct 27 (Tu) SPECIAL TOPICS: Translational research – atherosclerosis (Dr. J Schisler, guest lecturer)

**Oct 29 (Th) POSTER SESSION - GROUP 1**

Nov 3 (Tu) LECT 13: Atherosclerosis

**Nov 5 (Th) POSTER SESSION - GROUP 2**

Nov 10 (Tu) Atherosclerosis – PAPER 5

**Nov 12 (Th) POSTER SESSION - GROUP 3**

Nov 17 (Tu) SPECIAL TOPICS: Mechanical forces in cardiovascular development (Dr. W Polacheck, guest lecturer)

**NOV 19 (Th) noon FINAL EXAM**

PLEASE NOTE THE CLASS SCHEDULE IS SUBJECT TO CHANGE  
FINAL EXAM DATE/TIME SET BY UNC REGISTRAR