

**MCB 320**  
**Mechanisms of Human Disease**  
**Spring 2020, 2:00 - 2:50 PM, 2310 Everitt Laboratory**

## **COURSE OVERVIEW**

### **COURSE DESCRIPTION**

The advent of molecular biology and the Human Genome Project have dramatically increased our understanding of the mechanisms of human disease. The underlying molecular causes for many diseases have been elucidated. This course examines how abnormalities that occur at the molecular and cellular level manifest as pathologies affecting the structure and function of human tissues and organs. In addition, this course focuses on the pathophysiology of common human diseases and the environmental, genetic and epigenetic causes of specific disease types.

**Prerequisite:** MCB 252 (Cells, Tissues, and Development) or instructor consent.

### **COURSE GOALS**

The molecular causes (mechanisms) for an overwhelming number of diseases have been partially elucidated. However, there is simply no way that we can discuss each disease or each organ system in this course. Thus, our intention is not to make this course all-encompassing; rather, we will try to present the material in a conceptual framework, providing a survey of the topic to cover some breadth, while using specific examples to add depth. With this in mind, we have two main goals for this course:

(1) The first goal is that students learn some fundamental concepts related to the mechanisms of human disease. Although we do think it is important to understand and have a good working knowledge of a specific disease, we are more concerned with students understanding the general principles common to a family of similar diseases.

(2) The second goal is that students synthesize and apply information from a variety of disciplines (*e.g.*, biochemistry, molecular biology, cell biology, genetics, physiology, pathology, endocrinology, immunology, etc.) to better understand the mechanisms of disease. Learning how to synthesize material from multiple disciplines is an important part of the intellectual process and can be extremely rewarding.

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**COURSE INFORMATION AND POLICIES**

**INSTRUCTOR INFORMATION**

Prof. Eric Bolton, Ph.D.      Instructor  
[boltonec@illinois.edu](mailto:boltonec@illinois.edu)  
Office hours: Thursday, 2:00-3:00 PM and by appointment  
Office: 446 Burrill Hall (Phone: 217-244-0535)  
<http://mcb.illinois.edu/faculty/profile/boltonec>

**TEACHING ASSISTANT INFORMATION**

Jiaren Zhang                      Teaching Assistant  
[jzhan118@illinois.edu](mailto:jzhan118@illinois.edu)  
Office hours: Monday, 4:00-5:00 PM  
Office: MCB Learning Center, 101 Burrill Hall

Consultation outside office hours should be arranged by appointment.

**COURSE WEBSITE**

You will be able to download relevant course information and lecture notes for MCB 320, which is now hosted on the Campus Moodle server. The Campus Moodle server can be found at <https://learn.illinois.edu/>. Access to MCB 320 content on the Campus Moodle server is password protected. If you are registered for MCB 320, you can login using your Campus NetID and Active Directory (AD) password.

**TIME AND LECTURE HALL**

MCB 320 lectures begin on Wednesday, January 22, 2010, at 2:00 PM in 2310 Everitt Laboratory. The Class meets every Monday, Wednesday, and Friday from 2:00-2:50 PM in 2310 Everitt Laboratory, except on University-designated holidays.

**REQUIRED AND RECOMMENDED MATERIALS**

The following is a specific list of items required or recommended for MCB 320.

**Required Material**

*Attendance will be recorded in each class using the iClicker.* A total of *28 points* will be set aside to give credit for regular class attendance. Please see ATTENDANCE POLICY AND ABSENCES and COURSE GRADING for more information on class attendance. Each iClicker has a unique serial number (clicker ID). You *must* register your iClicker to receive credit. Go to <https://www1.iclicker.com/register-clicker/> and enter the following information. We will use **iClicker Classic (formerly iClicker 7)** software. Select **My institution does not use an LMS** and enter your NetID in the Student ID field. The **iClicker 2** should be available at the Illini Union Bookstore (IUB).

### **Recommended Lecture Slides**

Please download pdf copies of the lecture slides from the MCB 320 course website and bring them to class. Address: <https://learn.illinois.edu/>.

### **Recommended Textbook**

Coleman W. B. and Tsongalis G. J. (2017) Molecular Pathology: The Molecular Basis of Human Disease. 2nd ed. Academic Press. ISBN = 978-0128027615.

Rent or buy a used copy of the textbook from Illini Union Bookstore or Amazon.com. Buy a new copy from the Illini Union Bookstore, Elsevier.com, or Barnesandnoble.com.

Two copies of the recommended textbook are available for students. One copy is on reserve at the **MCB Learning Center, 101 Burrill Hall**. Another copy is on reserve at the **College of Agricultural, Consumer and Environmental Sciences (ACES) Library**.

### **Other textbooks that you may wish to consult for background information**

Cox, M. M., et al. (2012) Molecular Biology, Principles and Practice, 1st ed. W. H. Freeman. ISBN = 978-0716779988.

Lodish, H., et al. (2008) Molecular Cell Biology, 6th ed. W. H. Freeman. ISBN = 978-0716776017.

Strachan, T. and Read, A. P. (2004) Human Molecular Genetics, 3rd ed. John Wiley and Sons. ISBN = 978-0815341826.

Kumar V, et al. (2007) Robbins Basic Pathology, 8th ed. Saunders Elsevier. ISBN = 978-1416029731.

## **LECTURE AND EXAM SCHEDULE**

The lectures are divided into 6 parts according to distinct topics in human disease.

PART 1: Essential Concepts of Human Disease (6 lectures)

PART 2: Respiratory Diseases (4 lectures)

PART 3: Neoplastic Diseases (10 lectures)

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PART 4: Reproductive Disorders (4 lectures)  
PART 5: Metabolic Disorders (6 lectures)  
PART 6: Circulatory Diseases (10 lectures)

Please download the lecture and exam schedule from the MCB 320 course website.  
Address: <https://learn.illinois.edu/>.

## EXAM INFORMATION

There will be 3 hourly examinations during regular class time (2:00-2:50 PM in 2310 Everitt Laboratory) and a non-comprehensive final exam in May.

### Exam Schedule

Friday, February 14, 2:00-2:50 PM	Exam 1
Wednesday, March 11, 2:00-2:50 PM	Exam 2
Monday, April 13, 2:00-2:50 PM	Exam 3
May TBA	Exam 4 (Final Exam, location TBA)

The exams will cover material from the lectures. The exams will include multiple-choice questions. Each exam will count 118 points toward the overall grade. A total of 472 points is assigned for the four exams. Electronic devices including cellular phone are prohibited during these exams. Participation in all four exams is crucial for completing the course. Conflict (i.e., makeup) exams will be given to individuals who have a documented excuse, and they will be given by special arrangement with Prof. Bolton.

For additional exam information, instructions, and policies, please see **EXAM INFORMATION AND SCHEDULE** on the MCB 320 course website.  
Address: <https://learn.illinois.edu/>.

## STATEMENT ON ACADEMIC INTEGRITY

The University's policy on Academic Integrity and Procedure can be found in the *Code of Policies and Regulations Applying to All Students* under Article One, Part IV which can be found at: <https://studentcode.illinois.edu/article1/part4/1-401/>. The following policies support and reinforce that policy.

1. Science cannot exist without honesty. The faculty and staff of MCB 320 require students, as scientists-in-the-making, to hold the highest standards of scientific and academic conduct. Any form of cheating on any graded work in this course is unacceptable, and will be dealt with as outlined below, and in accordance with the University-wide standards in the *Code of Policies and Regulations Applying to All Students*.
2. We require that all graded work be entirely your own, and that anything you write using the words of other writers be correctly attributed. Some specific points follow:

*On exams*, the answers that you turn in for grading must be your own, formulated *during* the exam from your own understanding of the material and without any supporting information, be it written, verbal or electronic. Copying the work of another student, or allowing another to copy your work, or copying work from any other source, is unacceptable. Since we cannot always monitor you as you complete your work, we must rely upon appearance of your work from which to judge. If the work you submit resembles that of another student or another source too closely, we may conclude that it was not your original work. Always make a conscious effort to complete your work on your own and to protect it from the view of others, in order to ensure that it will be seen as your own. Failure to adhere to these standards, for any portion of an exam, may result in a grade of *zero for the entire exam or quiz, for all persons involved*. Texting, or the use of a cell phone for any purpose during an exam, is prohibited. Doing so may earn you a zero on the exam, or a more extreme penalty at the discretion of the instructor. Use of any social or electronic media to share information, request information or make confidential information public is prohibited. Failure to adhere to these standards, for any portion of an exam, may result in a grade of *zero for the entire exam, for all persons involved*.

*On notebook assignments, worksheets, quizzes, and presentations*, the answers that you turn in for grading must be written in your own words, formulated from your own understanding of the material. While you may be working with a partner or two, and the data that you have will be the same, the write-up of this work and data must be uniquely your own. Copying or paraphrasing the work of another student, or allowing another to copy or paraphrase your work, is unacceptable. Since we cannot monitor you as you complete your work, we have only the appearance of your work from which to judge. If the work you submit resembles that of another student too closely, we may conclude that it was not your original work. Always make a conscious effort to complete your work on your own and to protect it from the view of others, in order to ensure that it will be seen as your own. Failure to adhere to these standards may result in a grade of *zero for the entire assignment, for all persons involved*.

*On assignments*, if you use another source to obtain the facts and/or opinions necessary to complete your assignment, you must credit the source (see next point below) and rephrase the information so that your assignment is entirely your own words. A good practice is to read the source until you have a thorough understanding of the material, and then put it away. Write your assignment as if you are explaining the information you learned from reading the source to a classmate, member of your family, or to your teaching assistant. You may wish to look at the source again for clarification, but be certain that you do not use statements taken directly from the text in your assignment. Your entire assignment should be in your own words. Furthermore, paraphrasing does NOT mean replacing key words in a statement with synonyms. For an example of proper paraphrasing of a statement, consult the University's Code of Policies and Regulations Applying to All Students.

*On assignments*, if you use a statement taken directly from any book or other publication, including the course textbook, you must provide a citation. That is, you must put the text in quotes and, using APA format, place a parenthetical reference to the source at the end

of the quote. Direct quotations should be severely limited in your assignments; they should be used ONLY in the following situations:

- A definition of a term.
- A profound statement made by an expert in the field

Furthermore, any direct quotation should then be restated in your own words in order that your instructor may evaluate your understanding of the material.

Failure to adhere to these standards may result in zero credit for the entire assignment.

## ATTENDANCE POLICY AND ABSENCES

1. ***Attendance will be recorded at every lecture using the iClicker.***
2. Attendance at every lecture (if possible) is crucial, as some lecture material is not described in the suggested readings that are listed in the lecture notes.
3. We understand that students become ill and that family emergencies arise. To accommodate absences due to illness, emergency, or conflicts, we allow up to 4 unexcused absences without penalty.
4. A total of 28 points will be set aside to give credit for regular class attendance. Students with 4 or fewer unexcused absences during the entire course will earn 28 points for attendance (see **COURSE GRADING**). A student having more than 4 unexcused absences during the semester will forfeit *all credit* for class attendance.
5. If you experience an illness that causes you to miss class, you should visit the McKinley Health Center or your private physician to seek medical assistance and documentation of your visit.
6. Absences may be excused for individuals who have a documented excuse.
7. **Students with foreseeable schedule conflicts will provide written notification to the instructor at least 10 days in advance.** Excused absences may be given to individuals who find themselves in one of the following situations and who have documentation:
  - A regularly scheduled course for credit at the University that takes place during the scheduled exam time
  - Scheduled activities of officially recognized groups such as athletic teams, performing groups, and the Urbana-Champaign Senate
  - Employment (if possible you should reschedule your work shift or job interview)
  - Religious observances. Students seeking an excused absence for religious reasons should complete the Request for Accommodation for Religious Observances Form, which can be found on the Office of the Dean of Students website, <http://odos.illinois.edu/community-of-care/resources/students/>. Students should submit this form to the instructor and the Office of the Dean of Students by the end of the second week of the course.
  - Travel associated with a job, secondary school interviews (if possible schedule interviews around exams), or scientific conferences (not general meetings)
  - Significant and compelling circumstances beyond a student's control, including medical treatment related to a prolonged illness or injury; pregnancy; legal matters; serious illness, injury or death of a family member; citizenship or naturalization processes; or acts of nature which cause destruction to the student's primary residence. Students seeking an excused absence for any of these reasons should request an absence letter from the Student Assistance Center in the Office of the

Dean of Students. Instructions for absence letter requests can be found on the Office of the Dean of Students website, <http://odos.illinois.edu/community-of-care/resources/students/>.

8. **If you experience an illness, an emergency, or a conflict that causes an absence from class and you wish to request that your absence be excused, a written explanation and supporting evidence of the illness/conflict *must* be given to Prof. Bolton. Students *must* also submit an Absence Report Form, which can be accessed through a link on the course website.**
9. **Whether it is an illness, an emergency, or a conflict that prevents you from taking an exam at the appointed time, you *must* contact the Student Assistance Center in the Office of the Dean of Students.** The Office of the Dean of Students is located in the Turner Student Services Building, 610 E. John Street, Champaign, 217-333-0050, <http://odos.illinois.edu/>. Students seeking an excused absence for an exam should request an absence letter from the Student Assistance Center in the Office of the Dean of Students. Instructions for absence letter requests can be found on the Office of the Dean of Students website, <http://odos.illinois.edu/community-of-care/resources/students/>. **A written explanation and supporting documentation of the illness/conflict *must* be given to Prof. Bolton. Students *must* also submit an Absence Report Form and a Conflict Exam Request Form so that a conflict exam can be arranged or prorated (see **EXAM INFORMATION AND SCHEDULE** on the course website). Links to these online forms can be found on the course website. You must make these arrangements for each exam for which you require a conflict—your request for a conflict exam will not be carried to subsequent exams.**
10. Any student requiring special accommodations for disabilities (physical, learning or otherwise) should request provisions for such as soon as possible from the instructor.

## COURSE GRADING

Student grades in MCB 320 will be based on a total of 500 points. There will be 3 hourly examinations and a non-comprehensive final exam, each worth 118 points. In addition, 28 points will be set aside to give credit for regular class attendance.

4 Exams (118 points/exam)	472
Attendance	28
<hr/>	<hr/>
Total	500 points

The point totals contained in the following table represent the use of the plus/minus grading system coupled with a 4.0 grade point system. The University has assigned the grade point values shown for each letter grade. Students who earn the points shown below (see standard grade scale) will be guaranteed the indicated letter grade. At the end of the semester after the final exam, the instructor will analyze the course grade distribution, and may decrease (to accommodate poor class performance on an examination), but will not increase the points needed for each grade.

Scores on exams will be available for student review in the MCB 320 Gradebook, which can be accessed from the course website. Address: <https://learn.illinois.edu/>.

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Students are responsible for checking their scores in the Gradebook after each exam is returned to them. Each student is responsible for reporting possible discrepancies to the TA and if action is not taken, the student is responsible for bringing this to the attention of the Prof. Bolton within *one week* of receiving their exam score. Students are encouraged to keep all graded papers returned to them until after final grades are issued.

**MCB 320 Standard Grade Scale**

Letter Grade	Point Ranges	Grade Point Value
A+	500–460	4.000
A	459-442	4.000
A-	441-425	3.667
B+	424-409	3.333
B	408-392	3.000
B-	391-375	2.667
C+	374-359	2.333
C	358-342	2.000
C-	341-325	1.667
D+	324-309	1.333
D	308-292	1.000
D-	291-275	0.667
F	274-0	0.000

**GENERAL INFORMATION AND POLICY FOR MCB 320**

- Neither food nor drink is allowed in the lecture hall. Smoking is not allowed in the building.
- The course faculty and staff are in charge of the orderly conduct of discussions and may exclude a student who does not comply with a reasonable request in this regard.
- Students are assumed to have read and understood the Student Code and are expected to act accordingly. The Student Code is available online at <https://studentcode.illinois.edu/>.
- Concerns about exam grading, attendance, and exam absences should be addressed to Prof. Bolton.
- The deadline for grade corrections on all items is one week after corrected items are returned or grades are posted.
- Excused class time compensating for unforeseen school closure (i.e., snow storms) is provided by cancellation of review sessions prior to exams.
- The faculty and staff of MCB 320 are not responsible for any student's personal belongings.



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**Mechanisms of Human Disease**  
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**LECTURE AND EXAM SCHEDULE**

<b>Date</b>	<b>Day</b>	<b>Lecture Topic</b>
<b>PART 1: Essential Concepts of Human Disease</b>		
Jan 20	Mon	Marin Luther King, Jr. Day
Jan 22	Wed	Introduction to Mechanisms of Human Disease
Jan 24	Fri	Cell Death
Jan 27	Mon	Cell Death; Inflammation and Tissue Remodeling
Jan 29	Wed	Inflammation and Tissue Remodeling
Jan 31	Fri	Chromosome Organization and Mutation
Feb 3	Mon	Human Genetics and Epigenetics
<b>PART 2: Respiratory Diseases</b>		
Feb 5	Wed	Introduction to the Respiratory System
Feb 7	Fri	Cystic Fibrosis
Feb 10	Mon	Cystic Fibrosis; Asthma and COPD
Feb 12	Wed	Asthma and COPD; Review
Feb 14	Fri	<b>EXAM 1</b> (Lectures of PARTS 1-2)
<b>PART 3: Neoplastic Diseases</b>		
Feb 17	Mon	Introduction to Neoplasia
Feb 19	Wed	Introduction to Neoplasia; Pulmonary Neoplasia
Feb 21	Fri	Pulmonary Neoplasia
Feb 24	Mon	Breast Neoplasia
Feb 26	Wed	Breast Neoplasia; Prostate Hyperplasia and Cancer
Feb 28	Fri	Prostate Hyperplasia and Cancer
Mar 2	Mon	Lymphoid and Myeloid Malignancy
Mar 4	Wed	Lymphoid and Myeloid Malignancy
Mar 6	Fri	Colorectal Neoplasia
Mar 9	Mon	Colorectal Neoplasia; Review
Mar 11	Wed	<b>EXAM 2</b> (Lectures of PART 3)

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<b>PART 4: Reproductive Disorders</b>		
Mar 13	Fri	Introduction to the Reproductive System
Mar 14-22		Spring Break
Mar 23	Mon	Male Infertility
Mar 25	Wed	Female Infertility I (Uterine Disorders)
Mar 27	Fri	Female Infertility II (Turner Syndrome and PCOS)
<b>PART 5: Metabolic Disorders</b>		
Mar 30	Mon	Introduction to Metabolism
Apr 1	Wed	Introduction to Metabolism; Obesity
Apr 3	Fri	Obesity; Diabetes Mellitus
Apr 6	Mon	Diabetes Mellitus
Apr 8	Wed	Metabolic Syndrome
Apr 10	Fri	Metabolic Syndrome; Review
Apr 13	Mon	<b>EXAM 3</b> (Lectures of PARTS 4-5)
<b>PART 6: Circulatory Diseases</b>		
Apr 15	Wed	Introduction to the Circulatory System
Apr 17	Fri	Introduction to the Circulatory System
Apr 20	Mon	Hemostasis
Apr 22	Wed	Hemostatic Diseases
Apr 24	Fri	Atherosclerosis and Coronary Artery Disease
Apr 27	Mon	Atherosclerosis and Coronary Artery Disease; Stroke
Apr 29	Wed	Stroke
May 1	Fri	Cardiomyopathy
May 4	Mon	Marfan Syndrome
May 6	Wed	Marfan Syndrome; Review
May TBA	TBA	<b>EXAM 4</b> (FINAL EXAM, Lectures of PART 6) date, time, and location TBA

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**EXAM INFORMATION AND SCHEDULE**

**EXAM INSTRUCTIONS**

1. There will be 3 hourly examinations during regular class time (2:00-2:50 PM in 2310 Everitt Laboratory) and a non-comprehensive final exam, which will occur during the UIUC Final Examinations week in May. Exam dates are listed in the table below.
2. Participation in all four exams is crucial for completing the course.
3. The exams will cover material from the lectures. The exams will include multiple-choice questions. Visit the MCB 320 website for additional announcements concerning exams.
4. The instructor may provide students with information regarding the content of a specific exam during a review sessions prior to an exam.
5. Bring your University photo ID, several sharp #2 pencils, and an eraser to each exam.
6. Cell phones, calculators, "cheat sheets", and electronic devices are prohibited.
7. Please do not bring to the exam any backpacks, purses, hats, bags, books, notes, papers, clipboards, or anything other than the items listed in number 3 above. If you do bring them, they (including your jackets/coats) will be placed away from student seating during the exam. No one will be monitoring who deposits and collects these personal effects, so thefts and mistaken identification of belongings can occur. The MCB 320 faculty and staff are not responsible for any of your personal belongings and valuables. We strongly suggest that you do not bring them to the exam room. The Illini Union Bookstore and the Illini Union have lockers available for temporary storage of such items if you are unable to leave them at home prior to an exam.

**EXAM DATES**

<b>EXAM</b>	<b>TIME</b>	<b>DAY</b>	<b>DATE</b>
Exam 1	2:00-2:50 PM	Friday	February 14, 2020
Exam 2	2:00-2:50 PM	Wednesday	March 11, 2020
Exam 3	2:00-2:50 PM	Monday	April 13, 2020
Exam 4 (Final Exam)	TBA	TBA	May TBA, 2020 Location TBA

## INSTRUCTIONS AND POLICY FOR EXAM CONFLICTS AND ABSENCES

1. If you experience an illness that causes you to miss an exam, you should visit the McKinley Health Center or your private physician to seek medical assistance and documentation of your visit.
2. Conflict (i.e., makeup) exams will be given to individuals who have a documented excuse and will be given by special arrangement with Prof. Bolton.
3. **Students with foreseeable schedule conflicts will provide written notification to the instructor at least 10 days in advance.** A conflict exam may be given to individuals who find themselves in one of the following situations and who have documentation:
  - A regularly scheduled course for credit at the University that takes place during the scheduled exam time
  - Scheduled activities of officially recognized groups such as athletic teams, performing groups, and the Urbana-Champaign Senate
  - Employment (if possible you should reschedule your work shift or job interview)
  - Religious observances (Students seeking an excused absence for religious reasons should complete the Request for Accommodation for Religious Observances Form, which can be found on the Office of the Dean of Students website, <http://odos.illinois.edu/community-of-care/resources/students/>. Students should submit this form to the instructor and the Office of the Dean of Students by the end of the second week of the course.)
  - Travel associated with a job, secondary school interviews (if possible schedule interviews around exams), or scientific conferences (not general meetings)
  - Significant and compelling circumstances beyond a student's control, including medical treatment related to a prolonged illness or injury; pregnancy; legal matters; serious illness, injury or death of a family member; citizenship or naturalization processes; or acts of nature which cause destruction to the student's primary residence. **Students seeking a conflict or prorated exam for any of these reasons should request an absence letter from the Student Assistance Center in the Office of the Dean of Students.** Instructions for absence letter requests can be found on the Office of the Dean of Students website, <http://odos.illinois.edu/community-of-care/resources/students/>.
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5. A Conflict Final Exam will only be given to students who have an illness, a personal emergency, or a foreseeable conflict as mentioned above. Please follow the instructions as indicated in numbers 1 to 4 above.
6. Student requests will be reviewed as soon as possible, and students will be contacted via telephone or e-mail regarding the status of their request. Following the review of all requests, a conflict exam time and location will be determined, and students will be informed of their eligibility.