

**SYLLABUS**  
**THE COMMUNITY COLLEGE OF BALTIMORE COUNTY,**  
**CATONSVILLE CAMPUS**  
**DIVISION OF MATHEMATICS, SCIENCES,**  
**AND ENGINEERING**

**BIOL 230**  
**MICROBIOLOGY**  
**FALL 2009**

**BASIC COURSE INFORMATION:**

**INSTRUCTOR:**

Gary E. Kaiser, Ph.D.  
Professor of Microbiology

**SECTIONS:**

**BIOL 230 CRA (CRN 91390)**

- **Lab:** M, W; 4:10pm – 5:35pm; D-207
- **Lecture:** M, W; 5:45pm – 7:10pm; D-001

**BIOL 230 CRB (CRN 91389)**

- **Lecture:** M, W; 5:45pm – 7:10pm; D-001
- **Lab:** M, W; 7:20pm – 8:45pm; D-207

**BIOL 230 WCH (CRN 91391)**

- **Lecture:** on-line
- **Lab:** M, W; 8:55pm – 10:15pm; D-207

**BIOL 230 CNA (CRN 91388)**

- **Lab:** Tu, Th; 11:10am - 12:30pm; D-207
- **Lecture:** Tu, Th; 12:45pm – 2:05pm; D-001

**BIOL 230 CNB (CRN 91610)**

- **Lecture:** Tu, Th; 12:45pm – 2:05pm; D-001
- **Lab:** Tu, Th; 2:20pm - 3:40pm; D-207

**OFFICE HOURS:**

Monday, Wednesday	12:30– 2:30
Tuesday, Thursday	9:30 – 10:30

## SYLLABUS - BIOL 230 - G. E. KAISER

**OFFICE LOCATION:** D-203F

**TELEPHONE/VOICE MAIL:** (443) 840-4289

**E-MAIL:** gkaiser@ccbcmd.edu

**FAX:** (443) 840-5547

**WEB PAGE:** My E-text/Lecture Guide and my Lab Manual are on my web page. The URL is <http://student.ccbcmd.edu/~gkaiser/goshp.html>. **Students should use both the hard copy and on-line versions of the E-text/Lecture Guide and Lab Manual for studying. The on-line versions allow you to see more illustrations, photographs, and photomicrographs than in the printed version and these are in color. The website also contains hundreds of animations that relate to the lectures.** It also provides you with interactive links such as definitions, self-quiz questions with answers, and links to other microbiologically related www sites and my Lab Manual.

### **COURSE DESCRIPTION:** BIOL 230 (4:3,3) MICROBIOLOGY

**Microbiology** is an introduction to the study of bacteria, viruses, and fungi and their interrelationships with humans. General microbiological concepts such as microbial structure, growth, and metabolism are applied to such medically related topics as control and pathogenicity of microorganisms as well as to body defense mechanisms and the immune responses. The lab exercises stress basic clinical laboratory techniques such as staining, aseptic technique, and the biochemical and serological testing for microorganisms. Both laboratory and lecture relate current microbiological principles to the understanding of infectious disease.

**PREREQUISITE:** (BIOL 110 or BIOL102) and (ENGL 052 or ESOL 052 or LVE2 or LVE3) and (MATH 082 or MATH 013 or LVM2 or LVM3).

## **COURSE GOALS:**

### **Overall Course Objectives**

Upon completion of this course the student will be able to:

1. Explain relationships and apply appropriate terminology relating to the structure, metabolism, genetics, and ecology of prokaryotic microorganisms, eukaryotic microorganisms, and viruses.
2. Explain interactions between opportunistic and pathogenic microorganisms and susceptible hosts in contacts that result in infection and/or disease and apply these interactions to disease symptoms.
3. Explain nonspecific body defenses and the immune responses and apply this understanding to the infectious disease process as well as the prevention and control of infectious diseases.
4. Explain principles of physical and chemical methods used in the control of microorganisms and apply this understanding to the prevention and control of infectious diseases.
5. Demonstrate appropriate laboratory skills and techniques related to the isolation, staining, identification, assessment of metabolism, and control of microorganisms.
6. Develop the ability to work both independently and with others in the laboratory and draw appropriate conclusions from laboratory results.
7. Develop an information base for making personal health decisions in regard to infectious diseases.

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### Major Topics

The major topics covered in this course include but are not limited to the following:

#### Lecture Topics

- I. Introduction to Microbiology
- II. The Prokaryotic Cell: Bacteria
- III. The Eukaryotic cell
- IV. The Fungi
- VI. Viruses
- VII. Microbial Growth and Reproduction
- VIII. Microbial Metabolism
- XIX. Microbial Genetics
- X. Microbial Mechanisms of Pathogenicity
- XI. Nonspecific Body Defenses
- XII. The Immune Responses
- XIII. Control of Microorganisms
- XIV. Microorganisms and Human Diseases

For a more detailed list of lecture topics, see the **Lecture Outline** at the end of the syllabus.

#### Laboratory Topics

- I. Microscopy
- II. Aseptic Technique
- III. Enumeration of Microorganisms
- IV. Staining of Microorganisms
- V. Identification of Bacteria
- VI. Viruses
- VII. Serology
- VIII. Control of Microorganisms

For a more detailed list of laboratory topics, see the **Laboratory Outline** at the end of the syllabus.

**Rationale for the Course:** This course is designed to present general microbiological concepts and apply them to infectious diseases and related medical problems, with a special emphasis on the **biological basis of host-parasite interaction**. (See the last page of this syllabus)

### COURSE EVALUATION:

#### LECTURE

##### Testing and Grading for Lecture:

The **Lecture Guide**, your textbook for this course, has been created as a series **nesting Learning Objects**. A Learning Object is basically a digital resource that is used as an element to support learning experiences. In constructing each of my Learning Objects I've tried to include:

- A list of learning objectives for that object telling the learner what they should be able to do after completing that Learning Object;
- Illustrations, photographs, and/or animations to help the visual learner; and
- A self-assessment component.

**Lecture is worth 65% of your grade** in the course. Your lecture grade will be based on **six**

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### lecture exams.

Lecture exams one through five will be approximately **two-thirds multiple choice/matching questions and one-third discussion**. Questions will directly **test your understanding of the Learning Objectives** provided at the beginning of each new Learning Object in your Lecture Guide. The remaining test is a **take home exam reviewing DNA, RNA, protein synthesis, and enzymes**. This exam and the objectives it covers will be passed out the first day of class. Since this is a review of topics covered in your general biology course, you will do this on your own using part of your Unit 6 Lecture Guide. You can print a copy of the take home molecular genetics exam if you wish at <http://student.ccbcmd.edu/courses/bio141/pdflg/index.html>.

**Discussion/short answer questions** will come directly from those objectives indicated by **asterisks**. Questions will test your knowledge of the factual objectives as well as your **ability to apply this factual knowledge**. **The answers to any essay questions on exams or quizzes must be paraphrased**. If a student writes an essay question word-for-word from the Lecture Guide or does poorly on the multiple choice/matching section but writes near perfect essay questions, **your instructor reserves the right to ask you to orally answer the essay** question after the exam has been graded.

After your exam is graded, your Score Sheet will be posted in a box located in the Microbiology Lab (D-207). Exams will not be returned, however you may go over the exam with your instructor if you wish.

**No one** will be allowed to make up more than **one** missed lecture exam during the course.

Finally each student will write a **formal paper on a selected viral infection**. The paper will be written following the instructions and format provided by your instructor in a separate handout and will be graded based on the rubric in that handout. The paper is worth **50 points**. Selected student papers with the student listed as author may be incorporated in your instructor's website as a "Highlighted Viral Infections" in Unit 3. **Your paper will be submitted through the anti-plagiarism software site Turnitin.com, so be sure it is your original work!** You can print an extra PDF copy of the instructions for the viral paper by going to the menu at your instructor's website at <http://student.ccbcmd.edu/~gkaiser/goshp.html> and clicking on "PDF Lecture E-Text."

Finally, there will be an **optional crossword puzzle** that each student can do for Units 1-5. These are designed to help students learn vocabulary and are worth **1 point extra credit each**. The crossword puzzles can be found at your instructor's website at <http://student.ccbcmd.edu/~gkaiser/goshp.html> and clicking on "Puzzles." The completed puzzle must be stapled to your exam answer sheet after completing each exam in order to receive credit.

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### LABORATORY

#### Testing and Grading for Lab:

**Lab is worth 35% of your grade** in the course. Since lab provides a critical hands-on component to the understanding of Microbiology, attendance in the majority of labs is essential. **The following 12 lab exercises are considered "core labs" and students will be graded on their mastery of lab techniques for each of these labs.**

1. Introduction to the Microscope and Comparison of Size and Shape of Microorganisms
2. Aseptic Technique and Transfer of Microorganisms
3. Isolation of Pure Cultures from Mixed Populations
4. Enumeration of Microorganisms
5. Direct Stain and Indirect Stain
6. Gram Stain and Capsule Stain
8. Biochemical Testing to Identify Microorganisms
12. Isolation and Identification of *Enterobacteriaceae* and *Pseudomonas*: Part 1
13. Isolation and Identification of *Enterobacteriaceae* and *Pseudomonas*: Part 2
14. Isolation and Identification of Streptococci
15. Isolation and Identification of Staphylococci
21. Control of Microorganisms by Using Antimicrobial Chemotherapeutic Agents

**Student performance during each of these 12 core labs is worth 10 points for a total of 120 points.** Your instructor will allow you to miss **only one** core labs and only for a **valid and documented reason**.

If the core lab involves inoculation and incubation, **5 core points will be based on performance during the inoculation lab and 5 points for the results the following lab period.** Unless you are able to attend one of the other lab sections doing the lab you miss the week it is missed, **there is no way to make up a missed core lab.**

In addition, there will be **six lab quizzes** worth between 38 and 60 points each. One will be given after approximately every four labs. Lab quizzes will be a combination of multiple choice, matching, short answer, and practical questions. **Questions will come directly from the Performance Objectives found at the end of each lab exercise.** Lab quizzes will be given **in lab** prior to beginning that day's assigned lab exercise.

If you miss a lab quiz, you will **not be allowed to make it up unless you have a valid excuse.** **No one** will be allowed to make up more than **one** missed lab quiz during the course.

There is also a required **Creative Project** worth 20 points. The purpose of this is to have some fun with microbiology. It could be a drawing, painting, poster, mobile, sculpture, song, poem, game, something edible -- virtually anything creative that also shows an understanding of some aspect of microbiology. **The Creative Project is due by the last day of class.**

### DETERMINATION OF FINAL GRADE

This sheet is to enable you to determine your current average at any point during the course. Each time you receive a grade for a lab quiz, a unit-5 quiz, or a unit lecture exam, record the numerical grade below. **Lab is worth 35% of your grade.** To determine your current average in the course:

1. Divide the total points you have earned to date (top numbers) **in lab** by the total possible points you have taken thus far (bottom numbers) **in lab** and multiply by **35**.
2. Now divide the total points you have earned to date (top numbers) **in lecture** by the total possible points you have taken thus far (bottom numbers) **in lecture** and multiply by **65**.

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3. Finally, **add the results of steps 1-2** above and this is your current average in the course.

### Lab

Lab Quiz 1: \_\_\_\_ out of 48

Lab Quiz 2: \_\_\_\_ out of 40

Lab Quiz 3: \_\_\_\_ out of 63

Lab Quiz 4: \_\_\_\_ out of 59

Lab Quiz 5: \_\_\_\_ out of 50

Lab Quiz 6: \_\_\_\_ out of 54

Core Labs: \_\_\_\_ out of 120

### Lecture

Lecture Exam 1: \_\_\_\_ out of 75

Lecture Exam 2: \_\_\_\_ out of 78

Lecture Exam 3: \_\_\_\_ out of 69

Lecture Exam 4: \_\_\_\_ out of 60

Lecture Exam 5: \_\_\_\_ out of 72

Unit 6 Take Home Exam: \_\_\_\_ out of 60

Virus Paper: \_\_\_\_ out of 50

Creative Project: \_\_\_\_ out of 20

Total Points Earned (Lab)  
----- X 35 = A  
Total Possible Points (Lab)

Total Points Earned (Lecture)  
----- X 65 = B  
Total Possible Points (Lecture)

A + B = your average in the course.

**Letter grades will be based on the following grade scale:**

Final Average	Letter Grade
90-100	A
80-89	B
70-79	C
60-69	D
59 or less	F

## COURSE PROCEDURES

### ATTENDANCE POLICY

#### **Lab**

Since lab provides a critical hands-on component to the understanding of Microbiology, attendance in the majority of labs is essential. **Twelve of the lab exercises are considered "core labs" and students will be graded on their mastery of lab techniques for each of these labs. Student performance during each of these 12 core labs is worth 10 points for a total of 120 points.** Your instructor will allow you to miss **only one** core labs and only for a **valid and documented reason**.

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If the core lab involves inoculation and incubation, **5 core points will be accessed for performance during the inoculation lab and 5 points for the results the following lab period. Unless you are able to attend one of the other lab sections doing the lab you miss the week it is missed, there is no way to make up a missed core lab.**

### Lecture

While attendance is not used in directly determining points earned during the course, experience has shown that seldom do students who do not regularly attend lecture and lab successfully complete the course. Furthermore, if a student who has regularly attended lecture and lab is border line for a letter grade (defined as **within ONE percentage point of the next higher letter grade**), that student will be given the benefit of the doubt and assigned the higher grade.

### REQUIRED TEXTBOOK AND SUPPLEMENTS:

- **BIOL 230 - Microbiology: Lecture Guide and Performance Objectives** by Kaiser

The Lecture Guide can be purchased at the college bookstore or you can print a PDF copy from the menu on my website at <http://student.cbcemd.edu/~gkaiser/goshp.html>.

**The Grapes of Staph: A Microbiology Laboratory Manual** by Kaiser

The Laboratory Manual can be purchased at the college bookstore or you can print a PDF copy from the menu on my website at <http://student.cbcemd.edu/~gkaiser/goshp.html>.

### **COURSE SCHEDULE: IMPORTANT DATES FOR MONDAY- WEDNESDAY BIOL 230 CLASSES: CRA (CRN=91390), CRB (CRN=91389), AND WCH (CRN=91391)**

College classes **begin** Monday, August 31 and **end** Saturday, December 12.

**On Monday, September 7 the school will be closed for Labor Day.**

#### **Tentative Lecture Exam Dates:**

- Take Home Molecular Genetics Review Test: due on or before M, Sept. 14
- Unit 1 Exam: W, Sept. 30
- Unit 2 Exam: M, Oct. 19
- Unit 3 Exam: W, Nov. 4
- Unit 4 Exam: M, Nov. 17
- Viral Infection Paper Due: W, Nov. 18
- Thanksgiving Break: Nov. 25 – Nov. 27
- Unit 5 Exam: Final Exam week, Monday, Dec. 13, 5:30pm – 7:30pm

#### **Lab Quiz Dates:**

- Quiz 1: M, Sept. 28 (Introduction, Labs 1-4)
- Quiz 2: W, Oct. 14 (Labs 5-8)
- Quiz 3: M, Nov. 2 (Labs 9-13)

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- Quiz 4: M, Nov. 16 (Labs 14-16)
- Quiz 5: M, Nov. 30 (Labs 17-20)
- Thanksgiving Break: Nov. 25 – Nov. 27
- Quiz 6: W, Dec. 9 (Labs 21-22)

**50% Refund Ends Friday, Sept. 18 by 4:00.**

**Last Day to withdraw with a "W" or change to audit "AU" is Friday, Nov. 6 by 4:00.**

### **COURSE SCHEDULE: IMPORTANT DATES FOR TUESDAY-THURSDAY BIOL 230 CLASSES: CNA (CRN=91388) AND CNB (CRN=91610)**

College classes **begin** Monday, August 31 and **end** Saturday, December 12.

**On Monday, September 7 the school will be closed for Labor Day.**

#### **Tentative Lecture Exam Dates:**

- Take Home Molecular Genetics Review Test: due on or before Tu, Sept. 15
- Unit 1 Exam: Tu, Sept. 29
- Unit 2 Exam: Th, Oct. 15
- Unit 3 Exam: Tu, Nov. 3
- Unit 4 Exam: Th, Nov. 19
- Viral Infection Paper Due: Tu, Nov. 17
- Thanksgiving Break: Nov. 25 – Nov. 27
- Unit 5 Exam: Final Exam week, Thursday, Dec. 17, 12:00pm - 2:00pm

#### **Lab Quiz Dates:**

- Quiz 1: Th, Sept. 24 (Introduction, Labs 1-4)
- Quiz 2: Tu, Oct. 13 (Labs 5-8)
- Quiz 3: Th, Oct. 29 (Labs 9-13)
- Quiz 4: Th, Nov. 12 (Labs 14-16)
- Quiz 5: Tu, Nov. 24 (Labs 17-20)
- Thanksgiving Break: Nov. 25 – Nov. 30
- Quiz 6: Tu, Dec. 8 (Labs 21-22)

**50% Refund Ends Sept. 18 by 4:00.**

**Last Day to withdraw with a "W" or change to audit "AU" is F, Nov. 6.**

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At all times, an informal atmosphere of question and discussion is encouraged. The instructor is **available and willing** to answer any questions and give individual help on any portion of the course during class or outside of class. **If you have any questions or need help, please ask.**

### HINTS FOR SUCCESS:

To be successful not only in BIOL 230 but also in any other college level course, you must be proactive. **Earning the grade means you have to do the work!** You may find the following study tips useful:

1. For those students taking the traditional lecture:
  - a. **Attend lecture** regularly;
  - b. **Concentrate** on what is being said; and
  - c. **Try to understand what is being explained** - much easier now than later. If you don't understand, **ask questions** right away.
2. For those taking **lecture via the Internet**:
  - a. **Establish a routine schedule** for working on the course;
  - b. **Keep up with the course objectives**; and
  - c. **Do all interactive activities** provided.
  - d. The minute you **have any questions** or need help, **E-mail me!**
3. **As you complete each lecture learning object, write out the answers to each objective covered.** Many find it helpful to write each objective on one side of a note card and then write the answer on the back. Studies show that people learn material faster and retain it longer if that information is written by hand, or even better, written and spoken aloud, rather than just read. In other words, combine visual memory, muscle memory (writing), and auditory memory. The more senses you use, the better you remember.
4. **Quiz yourself.**
  - a. Using the Performance Objectives as a guide, make up and ask yourself possible test questions and write and say the answers.
  - b. **Make sure you do the on-line practice quizzes.** Do not just click on the answers and write them out. This will not test your understanding of the topic.
5. **Do not cram!**
  - a. **The number one reason why students do not successfully complete this course is procrastination! The estimated amount of time you should spend is 12 hours/week outside of class.**
  - b. It is your responsibility to read and study the E-text and Lab Manual each week, preferably before class, so that you are ready for each lab quiz or lecture exam on the date assigned in your syllabus.
  - c. Set up a **regular weekly study schedule in a location free of distractions** and stick to that study schedule. However, make the schedule reasonable.

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d. **Study the information in small, regular amounts**, maybe one or two hours at a time, and then **review the accumulated information weekly**.

e. Before you take the exam, **review all material a final time until you feel confident**. Again, studies show that in doing this, you spend less total time studying and you retain the information longer.

6. To **remember the information**, be creative rather than using rote repetition.

a. Write and rewrite the answers to the objectives;

b. Say it aloud to yourself;

c. Explain it aloud to yourself - or a patient friend;

d. Devise clue words to remember important points;

e. Use word associations;

f. Create visual pictures or images in your mind of the topic and the clue words you are studying;

g. To view a website illustrating how to use mnemonics to learn medical terminology, see <http://www.medicalmnemonics.com/>.

h. To view a site to learn the correct pronunciation of medical terminology, see <http://www.merck.com/mmhe/resources/pronunciations/index/a.html>.

i. Create acronyms and abbreviations for lists of information, etc.

7. To help you understand and learn the material presented in the E-text, an extensive series of **illustrations, animations, photomicrographs, electron micrographs, crossword puzzles**, and links to other Microbiology sites on the web has been included. **Make use of these visual aids!**

**When using the hard copy of your E-text and Lab Manual for studying, make sure you use it in conjunction with the on-line version** to take advantage of all the illustrations, animations, photomicrographs, and electron micrographs

8. After you feel you understand the information, study with a friend or small study group - but only after you think you understand the material. Explaining the material to others helps you remember it better and catches any misinformation you may have learned.

9. If, after the first lab quiz or first lecture exam, **you find that you are not doing well in the course, make an appointment with me as soon as possible** so we can review your study skills and look for ways to improve your performance. It is your responsibility to be proactive in your learning.

10. Make sure that you **follow the instructions and format provided in your hand out when writing your formal paper** on a viral disease. Complete your paper ahead of the deadline so that you can **submit it as often as you wish to Turnitin.com**.

11. Not sure what kind of learner you are? Take the VARK test on-line. They even give you study tips appropriate to the type of learner that you are.

<http://www.vark-learn.com/english/page.asp?p=questionnaire>

12. Other useful tips:

- Keep in touch with me and your classmates by e-mail and in lab.

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- Try to form small study groups with others in your class.
- Familiarize yourself with the deadlines published in this syllabus.
- The course Web Page is best viewed with a screen area of 1024/768 pixels.

### CLASSROOM POLICIES FOR BIOL 230

1. While any person may on occasion be late for or have to leave class early for a valid reason, **students are expected to arrive for class on time and not leave early**. Arriving late or leaving early is not only rude but is also disruptive to other students and classroom activities.
2. **No student can make up more than one missed lab quiz and one missed lecture exam during the course**. An incomplete grade will be given only when a student needs to make up **one** lecture exam and/or lab quiz. Students have **six weeks** after an incomplete grade is submitted to Records and Registration to make up the incomplete.
3. **CHEATING WILL NOT BE TOLERATED**. When honest students working hard to receive a good grade and obtain knowledge in the course see another student using a crib sheet or looking at another's exam or quiz, **they do report this to the instructor**. As stated below under Code of Academic Integrity, **"Students who do not accept responsibility for the integrity of their own work will experience sanctions, including a written reprimand, failure of the assignment, failure of the course, and/or dismissal from the program. For repeat and extreme offenses, the College reserves the right to suspend or expel students."** In addition, your instructor will never write a letter of recommendation for a student he knows or strongly suspects cheated during the course.
4. **The answers to any essay questions on exams or quizzes must be paraphrased**. If a student writes an essay question word-for-word from the Lecture Guide or does poorly on the multiple choice/matching section but writes nearly perfect essay questions, **your instructor reserves the right to ask you to orally answer the essay question** once the exam has been graded.
5. Unfortunately, because it is a common cheating technique published in "How to Cheat" websites and used in this course, **students are not allowed to leave the exam room and go to the bathroom during the exam**. This is also Testing Center Policy.

### ATTENDANCE POLICY

Attendance at each class and lab is essential. Please be on time. Students with a legitimate problem about attendance should discuss the situation with their instructor.

NOTE: The deadline for withdrawing from a course or changing to an audit for the Spring 2009 semester is Monday, April 20, 2009 by 7 p.m. Failure to officially withdraw from a class you have stopped attending may result in an "F" grade.

### COURSE REPEAT POLICY

Students who have already received two grades (including W, AU, I, and R) in any course are prohibited from registering for the course for the third or subsequent time without the written permission of an academic dean or his/her designee. (Note: If the course is developmental, the recommendation of a support team [including at least one individual selected by the Dean of Developmental Education and Special Academic Programs and at least one individual selected by the academic unit] must be included in the decision making process of the

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academic dean or his/her designee.)

### DISABLED STUDENTS

In accordance with the Americans with Disabilities Act, CCBC is committed to providing an environment that is conducive to learning for all students. Any student who is disabled and requires special accommodation should contact the appropriate campus as follows:

<b>Campus:</b>	<b>Office:</b>	<b>Room:</b>	<b>Phone:</b>
Catonsville	Office of Disabilities Support Services	K-205	443-840-5246 443-840-4553 (TTY)
Dundalk	Office of Disabilities Support Services	A-100	443-840-3774 443-840-3529 (TTY)
Essex	Office of Disabilities Support Services	A-210	443-840-1741 443-840-1601 (TTY)

### CODE OF ACADEMIC INTEGRITY

For the College to make its maximum contribution as an institution of high learning, the entire college community must uphold high standards of integrity, honesty, and ethical behavior. In seeking the truth, in learning to think critically, and in preparing for a life of constructive service, honesty is imperative. Each student has a responsibility to submit work that is uniquely his or her own, or to provide clear and complete acknowledgement of the use of work attributable to others. To these ends, the following actions are expected of students:

- Complete all work on exams without assistance.
- Follow the professor's instructions when completing all class assignments.
- Ask for clarification when instructions are not clear.
- Report to the instructor any unauthorized information related to an exam.
- Provide proper credit when quoting or paraphrasing.
- Submit only one's own work.

Students who do not accept responsibility for the integrity of their own work will experience sanctions, including a written reprimand, failure of the assignment, failure of the course, and/or dismissal from the program. For repeat and extreme offenses, the College reserves the right to suspend or expel students.

### WRITING POLICY

The College recognizes that clear, correct, and concise use of language is characteristic of an educated person. Therefore, whenever possible, faculty members in all disciplines should require written assignments in their courses in order to encourage effective writing by their students. Also, instructors should consider the quality of writing in determining a grade for a written assignment. Poor writing can be a sufficient cause for a failing grade on a paper and, in extreme cases, a failing grade in a course.

### INCLEMENT WEATHER/EMERGENCY CLOSING POLICY

In the event that the college (or a specific campus) opens late due to weather-related or other emergency conditions, classes will commence at the announced opening time and resume the normal schedule thereafter for the remainder of the day. Faculty, students, and classified staff should report to wherever they would normally have been at the announced opening time. \*\*

Students and faculty engaged in field placement programs (such as internships, clinical placements, etc.) should

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discuss the handling of emergency situations at the beginning of the placement period. Both the requirements of the program and the safety of persons involved should be considered in planning a course of action in those cases where students are expected to report to off-campus locations.

\*\* For example, if you had a class that began at 9:35 and the college opened at 10:00 because of snow, you would report to your 9:35 class at 10:00.

When the college closes because of severe weather or emergency conditions, announcements of class cancellations are made on local radio and television stations and the college website ([www.ccbcmd.edu](http://www.ccbcmd.edu)). Closings and delays will also be recorded on the campus weather line:

Catonsville	443-840-1711
Dundalk	443-840-1711
Essex	443-840-1711

## TUTORING SERVICES

Students are encouraged to seek help from their instructors whenever they encounter academic difficulty (either during scheduled office hours or by appointment). In addition, each campus offers free academic support services. For more information, contact:

Campus:	Office:	Room:	Phone:
Catonsville	Student Success Center	F-304	443-840-5959
Dundalk	Student Success Center	J-211	443-840-3666
Essex	Student Success Center	A-307	443-840-1820

## CIVILITY AND COMMUNITY BUILDING EXPECTATIONS

Creating a Culture of CARE© (Compassion, Appreciation, Respect, Empowerment)

As members of the CCBC community of learners, we are expected to act with respect, honesty, responsibility and accountability. Each of us is expected to be aware of the impact our behavior has on the community. CCBC wishes to each learner to commit to the following actions:

- Become an active and engaged learner
- Celebrate the richness of our diversity
- Respect the campus and its code of conduct
- Practice empathy and compassion
- Promote the empowerment of others

## MAJOR RELIGIOUS HOLIDAY POLICY

Students not attending class because they are observing major religious holidays shall be given the opportunity, to the maximum extent possible, to make up, within a reasonable amount of time, any academic work or tests they miss. Arrangements between the student and the faculty member(s) for the student to make up missed assignments or tests **must be made in advance of the religious holiday, at the initiation of the student.**

## STUDENT E-MAIL ACCOUNTS

CCBC has joined the ranks of the very few community colleges in Maryland who provide email accounts to all credit students. Each student who is registered in credit classes now has an email account and up to 5 Mb of storage in their mail box. This account will not be deleted even if the student graduates or leaves CCBC for any reason.

## **SYLLABUS - BIOL 230 - G. E. KAISER**

For information about the system and how students can determine their email address, go the CCBC Home Page and click on "Student Email". From here students can find their email address, get to an on-line user manual and access instructions on how to forward the CCBC email to the system of choice (AOL, Comcast, Hot Mail, etc.)

LECTURE SCHEDULE

M, Aug. 31 & Tu, Sept. 1: Introduction

The syllabus, testing and grading, course materials, etc.

W, Sept. 2 & Th, Sept. 3: Unit 1, Lecture 1

UNIT 1: Introduction; The Prokaryotic Cell (Bacteria)

I. INTRODUCTION

A. Basic Groups of Microbes

B. Cellular Organization: Prokaryotic and Eukaryotic Cells

C. Classification: The Three Domain System

II. THE PROKARYOTIC CELL: BACTERIA

A. Sizes, Shapes, and Arrangements of Bacteria

Tu, Sept. 8 & W, Sept. 9: Unit 1, Lecture 2

UNIT 1: Introduction; The Prokaryotic Cell (Bacteria)

II. THE PROKARYOTIC CELL: BACTERIA

B. Prokaryotic Cell Structure of the *Bacteria*: An Overview

1. The Cytoplasmic Membrane

2. The Peptidoglycan Cell Wall

Th, Sept. 10 & M, Sept. 14: Unit 1, Lecture 3

**UNIT 1: Introduction; The Prokaryotic Cell (Bacteria)**

**II. THE PROKARYOTIC CELL: BACTERIA**

**B. Prokaryotic Cell Structure of the *Bacteria*: An Overview**

**2. The Peptidoglycan Cell Wall**

- a. The Gram-Positive Cell Wall
- b. The Gram-Negative Cell Wall
- c. The Acid-Fast Cell Wall

**3. Structures Within the Cytoplasm**

- a. Cytoplasm
- b. The Nucleoid
- c. Plasmids and Transposons

Tu, Sept. 15 & W, Sept. 16: Unit 1, Lecture 4

**UNIT 1: Introduction; The Prokaryotic Cell (Bacteria)**

**II. THE PROKARYOTIC CELL: BACTERIA**

**B. Prokaryotic Cell Structure of the *Bacteria*: An Overview**

**3. Structures Within the Cytoplasm**

- d. Ribosomes
- e. Endospores
- f. Inclusion Bodies and Organelles Used for Photosynthesis

Th, Sept. 17 & M, Sept. 21: Unit 1, Lecture 5

**UNIT 1: Introduction; The Prokaryotic Cell (Bacteria)**

**II. THE PROKARYOTIC CELL: BACTERIA**

**B. Prokaryotic Cell Structure of the Bacteria: An Overview**

**4. Structures Outside the Cell Wall**

- a. Glycocalyx (Capsules)
- b. Flagella
- c. Pili

**C. Selected Atypical Pathogenic Bacteria**

**END OF UNIT 1**

Tu, Sept. 22 & W, Sept. 23: Unit 2, Lecture 1

**UNIT 2: Bacterial Pathogenicity; Using Antibiotics and Chemical Agents to Control Bacteria**

**I. BACTERIAL PATHOGENICITY**

**A. Overview**

**B. Virulence Factors that Promote Bacterial Colonization of the Host**

- 1. The Ability to Contact Host Cells
- 2. The Ability to Adhere to Host Cells and Resist Physical Removal
- 3. The Ability to Invade Host Cells
- 4. The Ability to Compete for Iron and Other Nutrients

Th, Sept. 24 & M, Sept. 28: Unit 2, Lecture 2

**UNIT 2: Bacterial Pathogenicity; Using Antibiotics and Chemical Agents to Control Bacteria**

**I. BACTERIAL PATHOGENICITY**

**B. Virulence Factors that Promote Bacterial Colonization of the Host**

**5. The Ability to Resist Innate Immune Defenses such as Phagocytosis and Complement**

**a. The Ability to Resist Phagocytic Engulfment (Attachment and Ingestion)**

**b. The Ability to Resist Phagocytic Destruction and Serum Lysis**

**6. The Ability to Evade Adaptive Immune Defenses**

**C. Virulence Factors that Damage the Host**

**1. The Ability to Produce Cell Wall Components that Bind to Host Cells causing them to Synthesize and Secrete Inflammatory Cytokines and Chemokines**

**a. Overview**

**Tu, Sept. 29 & W, Sept. 30: LECTURE EXAM # 1**

Th, Oct. 1 & M, Oct. 5: Unit 2, Lecture 3

**UNIT 2: Bacterial Pathogenicity; Using Antibiotics and Chemical Agents to Control Bacteria**

**I. BACTERIAL PATHOGENICITY**

**C. Virulence Factors that Damage the Host**

**1. The Ability to Produce Cell Wall Components that Bind to Host Cells causing them to Synthesize and Secrete Inflammatory Cytokines and Chemokines**

**b. Gram-Negative Cell Wall Components**

**c. Gram-Positive Cell Wall Components**

**d. Acid-Fast Cell Wall Components**

**2. The Ability to Produce Harmful Exotoxins**

**a. Superantigens**

Tu, Oct. 6 & W, Oct. 7: Unit 2, Lecture 4

**UNIT 2: Bacterial Pathogenicity; Using Antibiotics and Chemical Agents to Control Bacteria**

**I. BACTERIAL PATHOGENICITY**

**C. Virulence Factors that Damage the Host**

**2. The Ability to Produce Harmful Exotoxins**

**b. A-B Toxins and other Toxins that Interfere with Host Cell Function**

**c. Toxins that Damage Host Cell Membranes**

**3. The Ability to Induce Autoimmune Responses**

Th, Oct. 8 & M, Oct. 12: Unit 2, Lecture 5

**UNIT 2: Bacterial Pathogenicity; Using Antibiotics and Chemical Agents to Control Bacteria**

**II. USING ANTIBIOTICS AND CHEMICAL AGENTS TO CONTROL BACTERIA**

**A. Using Antibiotics and Chemical Agents to Control Bacteria**

**B. Ways in which Control Agents Affect Bacterial Structures or Functions**

**C. Ways in which Bacteria May Resist Our Control Agents**

**END OF UNIT 2**

Tu, Oct. 13 & W, Oct. 14: Unit 3, Lecture 1

**UNIT 3: The Eukaryotic Cell; Fungi; Protozoa; Viruses**

**I. THE EUKARYOTIC CELL**

**A. Composition and Functions of Eukaryotic Cellular Structures**

**1. The Cytoplasmic Membrane**

**2. The Cell Wall**

**3. The Endomembrane System**

**a. The Nucleus**

**b. The Endoplasmic Reticulum**

**c. The Golgi Complex**

**4. Other Internal Membrane-Bound Organelles**

**a. Mitochondria**

**b. Chloroplasts**

**c. Lysosomes, Peroxisomes, Vacuoles, and Vesicles**

**5. Ribosomes**

**6. The Cytoskeleton**

**7. Flagella and Cilia**

**B. The Endosymbiotic Theory**

**Th, Oct. 15 & M, Oct. 19: LECTURE EXAM # 2**

**Tu, Oct. 20 & W, Oct. 21: Unit 3, Lecture 2**

**UNIT 3: The Eukaryotic Cell; Fungi; Protozoa; Viruses**

**III. THE FUNGI**

- A. Overview
- B. Yeasts
- C. Molds
- D. Fungal Pathogenicity
- E. Chemotherapeutic Control of Fungi

**IV. PROTOZOA**

- A. Characteristics of Protozoa
- B. Medically Important Protozoa

**V. VIRUSES**

- A. General Characteristics of Viruses
- B. Size and Shapes of Viruses
- C. Viral Structure

**Th, Oct. 22 & M, Oct. 26: Unit 3, Lecture 3**

**UNIT 3: The Eukaryotic Cell; Fungi; Protozoa; Viruses**

**V. VIRUSES**

- C. Viral Structure
- D. Classification of Viruses
- E. Viroids and Prions
- F. Animal Virus Life Cycles: An Overview
  - 1. The Productive Life Cycle of Animal Viruses

Tu, Oct. 27 & W, Oct. 28: Unit 3, Lecture 4

UNIT 3: The Eukaryotic Cell; Fungi; Protozoa; Viruses

V. VIRUSES

F. Animal Virus Life Cycles: An Overview

2. Productive Life Cycle with Possible Latency
3. The Life Cycle of HIV
4. Natural History of a Typical HIV Infection

Th, Oct. 29 & M, Nov. 2: Unit 4, Lecture 1

UNIT 3: The Eukaryotic Cell; Fungi; Protozoa; Viruses

V. VIRUSES

F. Animal Virus Life Cycles: An Overview

5. The Role of Viruses in Tumor Production

G. Bacteriophage Life Cycles: An Overview

1. The Lytic Life Cycle of Bacteriophages
2. The Lysogenic Life Cycle of Bacteriophages

H. Pathogenicity of Animal Viruses

I. Bacteriophage-Induced Alterations of Bacteria

J. Control of Viruses

K. Types of Viral Infections

**END OF UNIT 3**

**Tu, Nov. 3 & W, Nov. 4: LECTURE EXAM # 3**

Th, Nov. 5 & M, Nov. 9: Unit 4, Lecture 2

**UNIT 4: Innate Immunity; Antigens**

**I. THE INNATE IMMUNE SYSTEM**

**A. The Innate Immune System: An Overview**

**B. Pathogen-Associated Molecular Patterns (PAMPs), Pattern-Recognition Receptors (PRRs), and Cytokines**

1. Pathogen-Associated Molecular Patterns (PAMPs)
2. Pattern-Recognition Receptors (PRRs)
3. Cytokines Important in Innate Immunity
4. Harmful Effects Associated with Abnormal Pattern-Recognition Receptor Responses and/or Cytokine Production

Tu, Nov. 10 & W, Nov. 11: Unit 4, Lecture 3

**UNIT 4: Innate Immunity; Antigens**

**I. THE INNATE IMMUNE SYSTEM**

**C. Cells Involved in Body Defense**

1. Defense Cells in the Blood: The Leukocytes
2. Defense Cells in the Tissue: Dendritic Cells, Macrophages, and Mast Cells

Th, Nov. 12 & M, Nov. 16: Unit 4, Lecture 4

**UNIT 4: Innate Immunity; Antigens**

**I. THE INNATE IMMUNE SYSTEM**

**D. Anatomical Barriers, Mechanical Removal, Intraepithelial T-Lymphocytes and B-1 Cells, Bacterial Antagonism by Normal Flora, and Antigen-Nonspecific Antimicrobial Chemicals Produced by the body**

**E. The Complement System : An Overview**

**1. The Classical Complement Pathway**

**2. The Lectin Pathway**

**3. The Alternative Complement Pathway**

**4. Ways in which Microorganisms can Resist Body Defenses by Circumventing the Complement Pathways**

**F. Phagocytosis**

**1. An Overview of Phagocytic Defense**

Tu, Nov. 17 & W, Nov. 18: Unit 4, Lecture 5

**UNIT 4: Innate Immunity; Antigens**

**I. THE INNATE IMMUNE SYSTEM**

**F. Phagocytosis**

**2. The Process of Phagocytosis**

**G. Natural Killer (NK) Cells**

**H. Inflammation**

**I. Nutritional Immunity**

**J. Fever**

**K. The Acute Phase Response**

**II. ANTIGENS**

**END OF UNIT 4**

**Th, Nov. 19 & M, Nov. 23: LECTURE EXAM # 4**

Tu, Nov. 24 & M, Nov. 30: Unit 5 Lecture 1

**UNIT 5: Adaptive Immunity**

**I. INTRODUCTION**

**A. An Overview**

**B. Major Cells and Key Cell Surface Molecules Involved in the Immune Responses**

1. MHC Molecules
2. Antigen-Presenting Cells (APCs)
3. B-Lymphocytes (B-Cells)
4. T4-Lymphocytes (T4-Cells)
5. Th1,Th2, and Th17 Cells
6. Regulatory T-Lymphocytes (T-reg Cells)
7. T8-Lymphocytes (T8-Cells)
8. Natural Killer T- Lymphocytes (NK cells)
9. Natural Killer Cells (NK Cells)

**C. The Lymphoid System**

**D. An Overview of the Steps Involved in Adaptive Immune Responses**

Tu, Dec. 1 & W, Dec. 2: Unit 5 Lecture 2

**UNIT 5: Adaptive Immunity**

**I. INTRODUCTION**

**II. HUMORAL IMMUNITY**

**A. Antibodies (Immunoglobulins)**

1. An Overview
2. Antibody Structure
3. The 5 Classes (Isotypes) of Human Antibodies
4. Generation of Antibody Diversity
5. Clonal Selection and Clonal Expansion
6. The Steps Involved in Antibody Production
7. Anamnestic (Memory) Response

Th, Dec. 3 & M, Dec. 6: Unit 5 Lecture 3

**UNIT 5: Adaptive Immunity**

**II. HUMORAL IMMUNITY**

**B. Ways That Antibodies Help to Defend the Body**

- 1. An Overview**
- 2. Opsonization**
- 3. Cytolysis by the Membrane Attack Complex (MAC)**
- 4. Antibody-dependent Cellular Cytotoxicity (ADCC) by NK Cells**
- 5. Neutralization of Exotoxins**
- 6. Neutralization of Viruses**
- 7. Preventing Bacterial Adherence**
- 8. Agglutination of Microorganisms**
- 9. Immobilization of Bacteria and Protozoans**

Tu, Dec. 8 & W, Dec. 9: Unit 5 Lecture 4

**UNIT 5: Adaptive Immunity**

**II. HUMORAL IMMUNITY**

**C. Naturally and Artificially Acquired Active and Passive Immunity**

**1. Naturally Acquired Immunity**

**2. Artificially Acquired Immunity**

**D. Monoclonal Antibodies**

**III. CELL-MEDIATED IMMUNITY**

**A. Cell-Mediated Immunity: An Overview**

**B. The Steps Involved in Cell-Mediated Immunity**

**C. Ways That Cell-Mediated Immunity Help to Defend the Body**

**1. Activating Antigen-Specific Cytotoxic T- Lymphocytes (CTLs)**

**2. Activating Macrophages and NK Cells**

**3. Stimulating Cells to Secrete Cytokines**

**IV. IMMUNODEFICIENCY AND V. HYPERSENSITIVITIES: EXTRA CREDIT**

**END OF UNIT 5**

*Lecture Exam #5 Final Exam Week: Unit 5, (Adaptive Immunity)*

**M, Dec. 13, 5:30-7:30 & Th, Dec. 17, 12:00-2:00: LECTURE EXAM # 5**

**SYLLABUS - BIOL 230 - G. E. KAISER**

**LABORATORY OUTLINE**

<b>Introduction.</b>	M, Aug. 31 Tu, Sept. 1
<b>Introduction to the Lab Manual and the Microscope</b>	W, Sept. 2 Th, Sept. 3
<b>Lab 1.</b> Introduction to the Microscope and Comparison of Size and Shape of Microorganisms	Tu, Sept. 8 W, Sept. 9
<b>Lab 2.</b> Aseptic Technique and Transfer of Microorganisms	Th, Sept. 10 M, Sept. 14
<b>Lab 3.</b> Isolation of Pure Cultures from Mixed Populations	Tu, Sept. 15 W, Sept. 16
<b>Lab 4.</b> Enumeration of Microorganisms	Th, Sept. 17 M, Sept. 21
<b>Lab 5.</b> Direct Stain and Indirect Stain	Tu, Sept. 22 W, Sept. 23
<b>Lab Quiz #1: Intro and Labs 1-4</b>	Th, Sept. 24 M, Sept. 28
<b>Lab 6.</b> Gram Stain and Capsule Stain	Tu, Sept. 29 W, Sept. 30
<b>Lab 7.</b> Endospore Stain and Motility Testing	Th, Oct. 1 M, Oct. 5
<b>Lab 8.</b> Biochemical Testing to Identify Microorganisms	Tu, Oct. 6 W, Oct. 7
<b>Lab 9.</b> Yeasts	Th, Oct. 8 M, Oct. 12
<b>Lab Quiz #2: Labs 5-8</b>	Tu, Oct. 13 W, Oct. 14
<b>Lab 10</b> Molds	Th, Oct. 15 M, Oct. 19
<b>Lab 11.</b> Viruses	Tu, Oct. 20 W, Oct. 21
<b>Lab 12.</b> Isolation and Identification of <i>Enterobacteriaceae</i> and <i>Pseudomonas</i> : Part 1	Th, Oct. 22 M, Oct. 26
<b>Lab 13.</b> Isolation and Identification of <i>Enterobacteriaceae</i> and <i>Pseudomonas</i> : Part 2	Tu, Oct. 27 W, Oct. 28
<b>Lab Quiz 3: Labs 9-13</b> and <b>Lab 14.</b> Isolation and Identification of Streptococci	Th, Oct. 29 M, Nov. 2
<b>Lab 15.</b> Isolation and Identification of Staphylococci	Tu, Nov. 3 W, Nov. 4
<b>Lab 16.</b> Isolation and Identification of <i>Neisseria</i> , <i>Mycobacterium</i> , and Anaerobes	Th, Nov. 5 M, Nov. 9
<b>Lab 17.</b> Serological Testing to Identify Antigens	Tu, Nov. 10 W, Nov. 11
<b>Lab Quiz #4: Labs 14-16</b>	Th, Nov. 12 M, Nov. 16
<b>Lab 18.</b> Serological Testing to Detect Antibodies in the Serum	Tu, Nov. 17 W, Nov. 18
<b>Lab 19.</b> Control of Microorganisms by Using Physical Agents <b>Lab 20.</b> Control of Microorganisms by Using Disinfectants	Th, Nov. 19 M, Nov. 23
<b>Lab Quiz #5: Labs 17-20</b>	Tu, Nov. 24 M, Nov. 30
<b>Lab 21.</b> Control of Microorganisms by Using Antimicrobial Chemotherapeutic Agents	Tu, Dec. 1 W, Dec. 2
<b>Lab 22.</b> Protozoans and Helminths	Th, Dec. 3 M, Dec. 6
<b>Lab Quiz #6: Labs 20-21</b>	Tu, Dec. 8 W, Dec. 9

## The Big Picture of Infectious Diseases

One of the most important things you will learn in this course is what I call “The Big Picture of Infectious Diseases,” or as was mentioned earlier, the biological basis of host parasite interaction. There are three interlocking parts to this big picture:

### **A. The microbe's side of the story - why some microbes have more potential to be harmful than others.**

The overwhelming majority of microbes are harmless to humans and, in fact, many are beneficial, being key players in the recycling of nutrients in nature. We will look at the major groups of microbes, learn what they are composed of chemically and structurally, and see how they carry out their metabolism and reproduce. We will learn of a variety of factors some microbes may possess that play a role in increasing their ability to cause disease. Also we will learn how, through mutation, genetic recombination, and natural selection, microbes may adapt to resist our control attempts.

### **B. The body's side of the story - ways in which the body is able to defend itself naturally against infectious disease agents.**

Here will learn about the phenomenal defenses the body has available to defend itself against infectious disease agents, as well as altered body cells such as cancer cells and infected cells. The body is able to do this through the innate immune system and the adaptive immune system. Innate immune defenses are those you are born with and include anatomical barriers, mechanical removal, cytokines, pattern-recognition receptors, phagocytosis, inflammation, the complement pathways, and fever. The adaptive immune defenses are those you develop throughout your life and include antibody production and cell-mediated immunity.

### **C. Ways in which we can artificially help the body defend itself by removing the microbes or enhancing body defenses.**

We will learn how we can artificially help ourselves to avoid or reduce the risk of infection. Also we will learn ways in which we are able to artificially remove microbes from the body and its environment using agents such as antiseptics, disinfectants, physical agents such as heat and cold, antimicrobial chemotherapeutic chemicals, and antibiotics. Finally we will learn ways we are currently able to improve or restore the body's immune responses, or potentially in the future will be able to do so, through such techniques as immunization, adoptive immunotherapy, or immune modulation.

By the end of the course, all of these factors should fit together nicely to give you a good understanding of “The Big Picture of Infectious Diseases.”