

# MICROBIOLOGY 301

## PRINCIPLES OF MICROBIOLOGY

### FALL 2011

**LECTURE:** Lawson Hall, Room 151, 9:00 a.m. M/W/F

**LABORATORY:** Life Science II, Room 113 or 119

<b>Section</b>	<b>Day</b>	<b>Time</b>	<b>Room</b>
<b>1</b>	Monday	10:00–11:50 a.m.	119
	Wednesday	10:00 a.m.	119
<b>2</b>	Monday	10:00–11:50 a.m.	113
	Wednesday	10:00 a.m.	113
<b>3</b>	Monday	12:00–1:50 p.m.	113
	Wednesday	12:00 p.m.	113
<b>4</b>	Monday	12:00–1:50 p.m.	119
	Wednesday	12:00 p.m.	119
<b>5</b>	Tuesday	9:00–10:50 a.m.	113
	Thursday	9:00 a.m.	113
<b>6</b>	Tuesday	10:00–11:50 a.m.	119
	Thursday	10:00 a.m.	119
<b>7</b>	Tuesday	11:00 a.m.–12:50 p.m.	113
	Thursday	11:00 a.m.	113
<b>8</b>	Tuesday	2:00–3:50 p.m.	113
	Thursday	2:00 p.m.	113

**PROFESSORS**

Dr. Antje Rusch  
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**OFFICES**

Life Science II, Room 191  
Phone: 453-6132

Life Science II, Room 126  
Phone: 453-8161

**OFFICE HOURS**

M 10:00 a.m.–noon  
or by appointment

W 10:00 a.m.–noon  
or by appointment

**TEACHING ASSISTANTS**

1. Mark Murskyj
2. Jordan Wright
3. Joseph McElyea
4. Shaer Islam

**SECTION(S)**

- 1 and 4
- 2 and 3
- 5 and 7
- 6 and 8

**OFFICES**

- LSII Rm 112 (453-4797)  
LSIII Rm 1011 (453-3812)  
LSIII Rm 1011 (453-3812)  
TBA

Please take advantage of the people that are here to help you in MICR 301. If you need help with either lecture or laboratory material, don't wait until the day before an exam or quiz to see your instructors; get things straightened out early. TAs will post their office hours and give you their e-mail addresses during the first week of class. For help in MICR 301, feel free to see your own TA or any of the other TAs, in addition to your professors.

**LABORATORIES BEGIN PERIOD 2 OF WEEK 1.** During Labor Day week (week of Sep 5th) there will be minor rescheduling for Monday labs; see the Lecture Schedule below.

**COURSE OBJECTIVES:**

**Lecture:** *To develop a fundamental understanding of the basic principles of microbiology.* Students will develop a working understanding of the structure, growth, nutrition, metabolism, genetics, diversity and ecology of prokaryotes, acquire basic knowledge of pathogenesis and immunology, and become familiar with medical, agricultural and some other applied aspects of the field of microbiology.

**Laboratory:** *To acquire the basic laboratory skills of microbiology.* At the end of the course students will be able to: (1) handle and grow pure cultures of microorganisms safely; (2) perform manipulations involved in aseptic technique, diluting, pipetting and enumerating microorganisms; (3) use a light microscope correctly; (4) sample and isolate bacteria from natural environments, including the human body, (5) perform and interpret basic immunological assays; and (6) accurately record, interpret and present microbiological data in written form.

**REQUIRED RESOURCES:**

**Lecture:** ***BROCK BIOLOGY OF MICROORGANISMS***, 13th edition, 2011, Michael T. Madigan, John M. Martinko, David A. Stahl and David P. Clark (Benjamin Cummings/Pearson), available at the Student Center, 710 Bookstore and Saluki bookstores. Purchase EITHER the hardcover OR the loose leaf edition, not both. Assigned readings from the text are listed by section number (see pages 6–9 of the syllabus). Readings and course materials are subject to change, and any changes will be announced in class.

**Lab:** ***Laboratory Manual for MICR 301***, available at The Printing Plant (606 S Illinois Avenue). Some laboratory supplies (lab coat or apron, Sharpie marking pen, microscope slides, lens paper and notebooks) are also required; these are available in all of the bookstores. In addition, the book "A Photographic Atlas to the Microbiology Laboratory" (M.J. Leboffe & B.E. Pierce, 3rd or 4th edition) is available in the bookstores; you may find it helpful for interpreting some of your laboratory work, but it is not required.

**Web Sites:** Lecture outlines will be posted on Blackboard. They are not a substitute for attendance and taking your own notes. In addition, your textbook supports a web site at <http://www.microbiologyplace.com/>. This site offers study questions, animations and current readings.

**GRADES:** **The total points for MICR 301 are 600. Of these 600 possible points, 400 are allotted to Lecture and 200 to the Laboratory.** Grade and point distributions are as follows:

**Lecture:** Three sectional exams (100 points, 1 hour each) will be given during the semester (see **LECTURE SCHEDULE** for exam dates) along with a comprehensive final exam (200 points, 2 hours). Your final exam score will be divided in half to give two "section-exam equivalents". Along with your 3 sectional exam scores, this will give you a total of 5 exam scores. The top 4 of these 5 scores will be summed to yield your lecture exam points (maximum lecture points: 400). **NO MAKEUP EXAMS WILL BE GIVEN.** All exams will be multiple-choice and will cover material from both the lecture and the assigned readings. You are responsible for assigned readings whether or not the material is covered in lecture. Any bonus points that you may earn increase your score, but do not increase the number of points required to get a specific grade.

On exam days:

1. Be on time. If you are late, you will have less time to finish the exam.
2. After the first student has finished the exam and left the classroom, exams will no longer be given out to latecomers.
3. If you have a baseball cap on, turn it around.
4. Scantron answer sheets will be machine scored. Thus, bring a sharpened #2 pencil and an eraser. Do not use ink on scantron sheets.

5. Instructors will seat you as you come into the auditorium. If you seat yourself, the instructors may reseat you. As you enter the classroom, move to the front as far as possible. You should be seated with one empty desk between you and a classmate if at all possible. Use only a single desk to do your work.
6. No resource materials may be open or operated during the test. This includes printed and hand-written materials and electronic devices.
7. Once an exam has started, you may not leave your seat without permission from an instructor until you have finished the exam.
8. It goes without saying that you will be academically honest and do your own work. Cheating will be dealt with according to SIU academic dishonesty policies.

<b>Lab:</b>	1. Notebook (see instructions in your lab manual):	75 points
	2. Research project:	25 points
	3. Lab practical exam:	25 points
	4. Four 15-point quizzes (best three will count) plus a comprehensive 15-point quiz in week 16:	60 points
	5. Technique Points (see below):	<u>15 points</u>
	<b>TOTAL</b>	<b>200 points</b>

Your attendance is essential to meeting the objectives of the lab. For the lab to be meaningful and for you to do well in lab, you must attend every lab period and be well prepared as you come to lab. Attendance will be recorded. If you miss more than two lab sessions, you will lose 40 lab points. Three tardies (you are tardy, if you are more than 5 minutes late for class) equal one absence. There are **no make-up labs** in MICR 301. Because new materials are only available the first period of each week's labs, the labs are run on the stated schedule. Also note that laboratory quizzes are given at the beginning of lab periods; if you are late, you will miss the quiz or have less time to finish it than normal.

#### **How to do well in Lab:**

- (1) Attend and be on time for every lab
- (2) Take the laboratory exercises and your notebook seriously
- (3) Be prepared for quizzes
- (4) Follow both written and oral directions

Your lab notebook is the written record of your laboratory experience. Your notebook will be collected three times during the semester and graded from 0 to 25 points each time (see grading criteria in the lab manual). Follow the protocol in the laboratory manual and do the laboratory manipulations as instructed. Up to 15 technique points will be awarded to you by your lab instructor based on their assessment of how well you are prepared for lab and follow directions and whether you do the required manipulations both correctly and consistently. If you are lazy or careless in your technique, expect to lose both technique points and points in the lab practical exam (see below). Also, if your TA has to constantly remind you how to do things, this will not help your technique points. During week 14 of the semester (Thanksgiving week), a laboratory practical exam will be given. This exam is designed to test key microbiological skills (dilutions, plating, aseptic technique, etc.) you will develop by doing the weekly laboratory exercises (see the last two pages of your lab manual for lab practical exam details).

Four 15-point quizzes will be given periodically in lab throughout the semester, and the top three scores will count. The comprehensive final quiz (15 points) cannot be dropped; this quiz will be given during the lab practical exam.

**NO MAKEUP QUIZZES OR LAB PRACTICAL EXAM WILL BE GIVEN.**

## FINAL COURSE GRADE

Points	Grade	%
≥ 540	A	≥ 90
480 - 539	B	80 - 89
420 - 479	C	70 - 79
360 - 419	D	60 - 69
< 360	F	<60

### MORE TIPS FOR DOING WELL IN MICR 301:

- (1) **Attend every class period, take careful notes and study with your classmates.** Nothing substitutes for being in class, listening, taking *your own* notes and asking questions. Many years of teaching this course have shown that students who get the best grades in MICR 301 are those who *come to class all the time*. During class instructors will emphasize key concepts and illustrate them with figures and tables from the text; it is important that you note which text figures and tables are shown (see next paragraph on this). Also, read the assigned text readings BEFORE you come to class so that the material rings bells when it is presented. As you sit in lecture, take careful notes — writing is a form of learning. In MICR 301 it is critical that you take good notes during class; your notes are your lifeline to success in the course. Finally, if at all possible, study with a classmate. After you've "heard it" and "written it", "say it". Explaining concepts to a classmate and vice-versa will strengthen your learning experience. Quiz each other, in order to detect those gaps that the own eyes easily overlook.
- (2) **Study on a continuous basis, not on a crisis basis.** Review of lecture material *as soon as possible after the lecture* is the most effective way of studying. This means that the evening following a class period (if not before), you should sit down and go through your notes in detail, highlighting the important points and filling in any gaps. Think about the lecture while you are doing this; what points were emphasized or seemed most important? Then re-read the text passages relating to the lecture while you have your notes in front of you; pay particular attention to what you perceived as key points and to figures from the text that were presented in class. If you study two weeks (or even two days) following a lecture instead of *the day of* a lecture, you will not achieve the same learning benefit of *immediate* reinforcement. Staying on top of the material and eliminating gaps right away will make it much easier to follow along with the next lecture and to prepare for exams. In addition, careful review of the BigIdeas at the end of each chapter of your text and answering the Review and Application Questions will help enhance your progress in studying.

# LECTURE SCHEDULE<sup>1</sup>

WEEK	DATE	LECTURE NUMBER	TOPIC	READING ASSIGNMENT <sup>2</sup>
<b>1</b>	Aug 22	1	Introduction, History of Microbiology	Chapter 1
	<b>**LABORATORIES BEGIN AUGUST 24/25**</b>			
	Aug 24	2	Microbial cells, microbial diversity	Chapter 2
	Aug 26	3	Cell structure and function	Chapter 3
<b>2</b>	Aug 29	4	Microbial nutrition and metabolism	4.1 - 4.7
	Aug 31	5	Glycolysis, fermentation and respiration	4.8 - 4.12
	Sep 2	6	Growth of microbial cells and populations	5.1 - 5.11
<b>3</b>	Sep 5	<b>LABOR DAY—NO CLASS</b> (Laboratories will be held this week. M/W sections will have their 1st lab on Wednesday and 2nd lab on Friday)		
	Sep 7	7	Factors affecting microbial growth	5.12 - 5.18, 26.1, 26.2, 26.4, 26.5
	Sep 9	8	Microbial phototrophy	13.1 - 13.5, 17.2, 18.7, 18.15, 18.18
<b>4</b>	Sep 12	9	Fermentation	14.1 - 14.5
	Sep 14	10	Respiration, acetogenesis, methanogenesis	14.6 - 14.10
	Sep 16	11	Nucleic acids, proteins and the Central Dogma	6.1 - 6.4, 6.16

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<b>5</b>	Sep 19	12	DNA replication	6.8 - 6.11, 7.1
	Sep 21	13	Review session	
	<b>Sep 23</b>	—	<b>EXAM I (Lectures 1–13)</b>	—

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<b>6</b>	Sep 26	14	Transcription	6.12 - 6.15, 7.2
	Sep 28	15	Translation	6.17 - 6.20, 7.3, 7.4
	Sep 30	16	Regulation of gene expression	8.1 - 8.5, 8.14 - 8.16

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<b>7</b>	Oct 3	17	Structure and replication of viruses	9.1 - 9.7
	Oct 5	18	Viral diversity	9.8 - 9.15
	Oct 7	19	Bacterial genetics	6.5 - 6.7, 10.1 - 10.5

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<b>8</b>	Oct 10		<b>FALL BREAK—NO CLASS</b> (Laboratories will be held on Wednesday and Thursday.)	
	Oct 12	20	Bacterial genetics	10.6 - 10.13
	Oct 14	21	Molecular biological methods	22.3 – 22.7

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<b>9</b>	Oct 17	22	Genetic engineering, Biotechnology	11.1 - 11.5, 15.10 - 15.14
	Oct 19	23	Industrial microbiology	15.1 - 15.3, 15.7 - 15.9
	Oct 21	24	Microbial ecology of the N and S cycle	23.1, 23.2, 24.3, 24.4, 17.3, 17.4, 17.9, 17.18

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<b>10</b>	Oct 24	25	Syntrophy and microbial symbioses	14.5, 25.1, 25.3, 25.10 - 25.12, 25.14
	Oct 26	26	Review session	
	<b>Oct 28</b>	—	<b>EXAM II (Lectures 14–26)</b>	—

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<b>11</b>	Oct 31	27	Interactions of humans with microbes	27.1 - 27.5, 35.1.
	Nov 2	28	Microbial virulence and pathogenesis	27.6 - 27.11
	Nov 4	29	Cells and organs of the immune system	28.1 - 28.3

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<b>12</b>	Nov 7	30	Mechanisms of innate immunity	28.2, 29.1, 30.1
	Nov 9	31	Complement	29.9
	Nov 11	<b>VETERANS DAY—NO CLASS</b>		

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<b>13</b>	Nov 14	32	Inflammation	28.5
	Nov 16	33	Acquired (adaptive) immunity	28.3, 29.2
	Nov 18	34	T cells and immune responses	29.5, 29.6, 30.9

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<b>14</b>	Nov 21	35	B cells and antibodies	28.4, 29.7, 29.8, 30.2
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**\*\*LAB PRACTICAL EXAM on November 21/22\*\***

Nov 23                   **THANKSGIVING BREAK—NO CLASS**

Nov 25                   **THANKSGIVING BREAK—NO CLASS**

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<b>15</b>	Nov 28	36	Antigen processing and presentation	29.3 - 29.4
	Nov 30	37	Diseases caused by microbes	Chapter 33, 36.6, 36.8 - 36.12
	Dec 2	38	Artificial immunity - vaccination	28.6 - 28.8

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<b>16</b>	Dec 5	39	Epidemiology	32.1 – 32.5
	Dec 7	40	Immunology and diagnostic methods	31.5 – 31.11
	Dec 9	—	<b>EXAM III (Lectures 27–40)</b>	—

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**DECEMBER 12–16 IS FINAL EXAM WEEK. When the MICR 301 final has been scheduled, day and time will be announced in lecture and labs. It will take place in your usual lecture room, Lawson Hall room 151.**

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<sup>1</sup>Dr. Rusch will lecture in weeks 1–10; Dr. Konjufca will lecture in weeks 11–16.

<sup>2</sup>Reading assignments are from *Brock Biology of Microorganisms*, 13th edition. Reading assignment numbers (4.2, 6.3, etc.) refer to numbered sections within a chapter. Instructors expect that students will have read the assigned sections **before** class. Syllabus readings and content are subject to changes announced in class.

### Emergency Procedures

Southern Illinois University Carbondale is committed to providing a safe and healthy environment for study and work. Because some health and safety circumstances are beyond our control, we ask that you become familiar with the SIUC Emergency Response Plan and Building Emergency Response Team (BERT) program. Emergency response information is available on posters in buildings on campus, available on BERT's website at [www.bert.siu.edu](http://www.bert.siu.edu), Department of Safety's website [www.dps.siu.edu](http://www.dps.siu.edu) (disaster drop down) and in the Emergency Response Guideline pamphlet. Know how to respond to each type of emergency.

Instructors will provide guidance and direction to students in the classroom in the event of an emergency affecting your location. It is important that you follow these instructions and stay with your instructor during an evacuation or sheltering emergency. The Building Emergency Response Team will provide assistance to your instructor in evacuating the building or sheltering within the facility.

# Your MICR 301 Grade Record

## Laboratory:

**Quizzes** (drop the lowest score of quizzes 1–4; maximum of 15 points each)

Quiz 1 \_\_\_\_\_

Quiz 2 \_\_\_\_\_

Quiz 3 \_\_\_\_\_

Quiz 4 \_\_\_\_\_

Final Quiz \_\_\_\_\_

**Total** \_\_\_\_\_

**Notebook** (maximum of 25 points each)

Week 7 \_\_\_\_\_

Week 13 \_\_\_\_\_

Week 15 \_\_\_\_\_

**Total** \_\_\_\_\_

**Independent Research Project** (maximum of 25 points) \_\_\_\_\_

**Lab Practical Exam** (maximum of 25 points) \_\_\_\_\_

**Technique Points** (maximum of 15 points) \_\_\_\_\_

**Poor Attendance** (missed 3 or more labs  
and/or excessive tardies) – 40 points

**Total** \_\_\_\_\_

**Lecture:** Drop the lowest of your sectional exam score OR *one-half* of your final exam

Exam 1 \_\_\_\_\_

Exam 2 \_\_\_\_\_

Exam 3 \_\_\_\_\_

Final Exam \_\_\_\_\_

**Total Points (Lecture plus Lab)** \_\_\_\_\_

**Your Grade** (refer to table on page 5) \_\_\_\_\_