

**MICR/MBMB 425**  
**BIOCHEMISTRY AND PHYSIOLOGY OF MICROORGANISMS**  
**M, W, F 12:00 PM Agriculture Room 168**  
**Fall 2018 - Dr. Derek Fisher**

**COURSE DESCRIPTION**

The course will provide a detailed look into the chemical composition, cellular structure, and metabolism of microorganisms. Classes will consist of traditional lecture, use of multimedia resources, and classroom discussion. Student participation is expected. Out-of-class topical readings and primary literature pertinent to lectures will be provided.

**OBJECTIVES**

At the completion of the course, students should have: 1) developed a global view of how bacteria obtain energy, acquire nutrients, and subsequently convert nutrients into metabolites and ultra-structures required for bacterial growth, division, survival, and group interactions, 2) gained an understanding of how bacteria sense and respond to abiotic and biotic environmental stimuli, 3) a basic understanding of experimental methods used to study bacterial physiology, and 4) become comfortable reading and comprehending basic primary literature.

**PREREQUISITE**

Organic Chemistry; or consent of instructor.

**RECOMMENDED TEXT**

**The Physiology & Biochemistry of Prokaryotes - David White, James Drummond, and Clay Fuqua. Oxford Univ. Press, 4th Ed. 2012**

I will place a 3<sup>rd</sup> edition on reserve in the library. Not all of the chapters in the 3<sup>rd</sup> edition line up with the 4<sup>th</sup> edition and the 4<sup>th</sup> edition has material not found in the 3<sup>rd</sup> edition.

Lecture slides/notes, recommended reading materials, and old exams/practice questions will be made available on D2L.

**FISHER RESEARCH BACKGROUND**

<http://www.ncbi.nlm.nih.gov/myncbi/browse/collection/48341232/?sort=date&direction=ascending>

[https://scholar.google.com/citations?user=Y\\_NNihkAAAAJ&hl=en&oi=ao](https://scholar.google.com/citations?user=Y_NNihkAAAAJ&hl=en&oi=ao)

<https://orcid.org/0000-0002-1663-8389>

<http://micro.siu.edu/faculty-staff/faculty/fisher.php>

## CONTACT INFORMATION

LSIII 1007 (office), LSIII 1026/1032 (labs)  
618-453-5201 (office phone)  
[dfisher@siu.edu](mailto:dfisher@siu.edu) or [fisher@micro.siu.edu](mailto:fisher@micro.siu.edu)

Departmental Mailbox: LSII, Room 131

## OFFICE HOURS

11 AM – 12 PM on Monday and Wednesday or by appointment.

## GRADING OVERVIEW

SCALE:     A ≥90%  
              B 89-80%  
              C 79-70%  
              D 69-60%  
              F <60%

1) Five one-hour exams plus the final, 70 points each, **lowest score dropped**:

a) Lectures 1-9	70
b) Lectures 10-17	70
c) Lectures 18-25	70
d) Lectures 26-33	70
e) Lectures 34-39	70
<b>f) Final – Cumulative</b>	<b>70</b>

**Exam points:               350**

2) 15 (weekly), 5-point quizzes/homework/group assignments; **60**  
**12 count** towards your grade, the remaining 3 are bonuses

3) Three literature assignments (packet grading, see below): **0/65/85/100**

**Due dates:   Mon 9-17     Mon 10-22     Mon 12-3**

**Total   510**

## LITERATURE ASSIGNMENTS

Literature will be posted to D2L at least two weeks in advance of the scheduled due date. You must read the assigned literature and answer the three questions listed at the end of the: “How to read a scientific paper” PDF provided on D2L. Each assignment is due by the start of class on the scheduled due date. Assignments must be submitted as Word documents via the D2L assignment submission folder. A detailed rubric with formatting guidelines will be provided on D2L – follow the rubric and formatting guidelines! Each assignment will be graded as pass/fail using the provided rubric. **Passing one assignment = 65/100, two = 85/100, three = 100/100.**

**GENERAL COURSE TIMELINE****Fall 2018 Holidays and Drop Information**

(<https://registrar.siu.edu/calendars/academic1819.php>)

Semester Begins	Monday, August 20
Labor Day Holiday	Monday, September 3
Fall Break	<u>NONE</u>
Thanksgiving Vacation	November 17 – 25
Last day <u>to file</u> drop paperwork, eligible for a refund	Friday, August 31
Last day <u>to file</u> drop paperwork, <u>NOT</u> eligible for a refund	Friday, October 26

**LECTURE/EXAM SCHEDULE\***

Day / Date			Topic	Recommended Reading	Lecture Number
M	Aug	20	Introduction To Cell Structure & Metabolism	Chps 1 and 2	1
W		22	Introduction To Cell Structure & Metabolism	Chps 1 and 2	2
F		24	DNA Replication and Growth	Chps 2 and 3	3
M		27	Plasmids	D2L	4
W		29	RNA synthesis	Chp 11	5
F		31	Protein Synthesis	Chp 11	6
<b>M</b>	<b>Sep</b>	<b>3</b>	<b>No Class: Labor Day</b>		
W		5	Cell Envelope	Chp 12	7
F		7	Cell Envelope	Chp 12	8
M		10	Cell Envelope	Chp 12	9
<b>W</b>		<b>12</b>	<b>Exam 1 Lectures 1-9</b>		
F		14	Solute Transport	Chp 17	10
<b>M</b>		<b>17</b>	<b>Solute Transport Lit Assignment 1</b>	Chp 17	11
W		19	Protein Transport and Secretion	Chp 18	12
F		21	Protein Transport and Secretion	Chp 18	13
M		24	Responses to Environmental Stress	Chp 16	14
W		26	Responding to Environmental Cues	Chps 19 and 20	15
F		28	Responding to Environmental Cues	Chps 19 and 20	16
M	<b>Oct</b>	1	Biofilms / Cell to Cell Communication	Chps 21 and 22	17
<b>W</b>		<b>3</b>	<b>Exam 2 Lectures 10-17</b>		

F	5	Bioenergetics	Chp 8	18
M	8	Membrane Bioenergetics	Chp 4	19
W	10	Membrane Bioenergetics	Chp 4	20
F	12	Electron Transport	Chp 5	21
M	15	Electron Transport	Chp 5	22
W	17	Photosynthesis	Chp 6	23
F	19	Photosynthesis	Chp 6	24
<b>M</b>	<b>22</b>	<b>Regulation of Metabolic Pathways Lit Assignment 2</b>	Chp 7	25
W	24	Central Metabolism	Chp 9	26
<b>F</b>	<b>26</b>	<b>Exam 3 Lectures 18-25</b>		
M	29	Central Metabolism	Chp 9	27
W	31	Central Metabolism	Chp 9	28
F <b>Nov</b>	2	Fermentation	Chp 15	29
M	5	Fermentation	Chp 15	30
W	7	Metabolisms of Lipids/Nucleotides/Amino Acids	Chp 10	31
F	9	Inorganic Metabolism	Chp 13	32
M	12	Inorganic Metabolism	Chp 13	33
W	14	C1 Metabolism	Chp 14	34
<b>F</b>	<b>16</b>	<b>Exam 4 Lectures 26-33</b>		
<b>M</b>	<b>19</b>	<b>No Class: Thanksgiving Break</b>		
<b>W</b>	<b>21</b>	<b>No Class: Thanksgiving Break</b>		
<b>F</b>	<b>23</b>	<b>No Class: Thanksgiving Break</b>		
M	26	C1 Metabolism	Chp 14	35
W	28	Bacterial development	Chp 23	36
F	30	Bacterial Virulence and Metabolism	D2L	37
<b>M Dec</b>	<b>3</b>	<b>Lit Assignment 3 Bacterial Virulence and Metabolism</b>	D2L	38
W	5	Bacterial Virulence and Metabolism	D2L	39

**F            7        Exam 5   Lectures 34-39**

**M            10-    Final Date and Time TBD**  
**14**

Lectures 1-39

**\*Lecture dates and material are tentative; exam dates and literature assignment due dates are not. Students will only be responsible for material covered in class prior to the exam date.**

## **ADDITIONAL INFORMATION**

### **HINTS for SUCCESS:**

- 1) Attend class.
- 2) Study often, not just the night before an exam.
- 3) Review lecture material the evening after a lecture. This will help you learn the material and will make studying for exams much easier.
- 4) Read the chapters cited next to each lecture prior to class. It will help you better comprehend the lecture material.
- 5) Ask questions!
- 6) Seek out academic help before it is too late – it is very difficult to recover from two failed exams.
- 7) LEARNING ASSISTANCE and DISABILITY SERVICES:  
<http://tutoring.siu.edu/index.html> and <http://disabilityservices.siu.edu/>

### **ATTENDANCE:**

Attendance is not mandatory, but absences are likely to negatively affect your grade **as material covered exclusively in the classroom will appear on exams**. In addition, **weekly quizzes will be administered, and no make ups will be offered for missed quizzes**.

### **ACADEMIC COURTESY (modified from Dr. Brad Stiles, Wilson College):**

Please arrive to class on time and be prepared to discuss the material. Cell phones must be turned to silent or off during class. Ringing and buzzing cell phones bother others in the class (and the instructor) and detract from a fruitful educational environment. Sleeping, reading newspapers, talking to friends, texting, or other activities distracting the students and instructor are strictly forbidden.

### **SCHEDULING of EXAMS, ASSIGNMENTS, and QUIZZES:**

Exams may only be rescheduled for extreme circumstances (death of an immediate family member, illness requiring hospitalization, etc.) or an absence due to a pre-approved academic/athletic conflict. Proof may be required (for example, a doctor's note) and permission to reschedule will be granted on a case by case basis at the discretion of the instructor. Failure to take an exam on the scheduled date without an approved absence will result in a 0 (F) for the exam. Note – the first missed exam would be your drop exam. Make-up quizzes will not be offered. As 3 quizzes are bonuses, you essentially have 3 drops before points would be deducted from your overall score. Literature assignments will not be accepted after the due date.

**ACADEMIC DISHONESTY POLICY (adapted from the College of Science policy**

**[http://www.science.siu.edu/ common/pdfs/oppaper](http://www.science.siu.edu/common/pdfs/oppaper)):**

Students may be subject to disciplinary proceedings resulting in an academic penalty or disciplinary penalty for academic dishonesty. Academic dishonesty includes, but is not limited to, cheating on a test, plagiarism, or collusion. Sanctions for academic dishonesty available to an instructor include: assigning a failing grade, or zero, for a paper or exam; assigning a failing grade for a course (the instructor shall assign an “incomplete” in lieu of a letter grade pending adjudication and final resolution of the complaint.); recommending that a student be dropped from a program; and recommending that a student be suspended from the University.

**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 <http://emergency.siu.edu/>, Department of Safety's website <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 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.

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I have read the syllabus.

\_\_\_\_\_  
Name – Sign and Print

\_\_\_\_\_  
Date

You will earn 10 bonus points for completing and turning in this form (cut below the dotted line). Must be received no later than the end of class on Wednesday August 29<sup>th</sup>, 2018 for points.

# Syllabus Attachment

Fall 2018

## MISSION STATEMENT FOR SOUTHERN ILLINOIS UNIVERSITY CARBONDALE

*SIU embraces a unique tradition of access and opportunity, inclusive excellence, innovation in research and creativity, and outstanding teaching focused on nurturing student success. As a nationally ranked public research university and regional economic catalyst, we create and exchange knowledge to shape future leaders, improve our communities, and transform lives.*

### IMPORTANT DATES \*

Semester Classes Begin:.....**08/20/2018**  
Last day to add full-term course (without Dean's signature): .....**08/26/2018**  
Last day to withdraw from the University with a full refund:.....**08/31/2018**  
Last day to drop a full-term course for a credit/refund:.....**09/02/2018**  
Last day to drop a full-term course (W grade, no refund):.....**10/28/2018**  
Final examinations: .....**12/10–12/14/2018**

*Note: Please verify the above dates with the Registrar calendar and find more detailed information on deadlines at <http://registrar.siu.edu/calendars>. For add/drop dates that apply to shorter-than-full-term courses, please look at the Schedule of Classes search results at <http://registrar.siu.edu/schedclass/index.php>*

### FALL SEMESTER HOLIDAYS

Labor Day Holiday 09/03/2018  
Thanksgiving Break 11/17–11/25/2018

### WITHDRAWAL POLICY ~ Undergraduate only

Students who officially register for a session must officially withdraw from that registration in a timely manner to avoid being charged as well as receiving a failing grade for those classes. An official withdrawal must be initiated by the student, or on behalf of the student through the academic unit, and be processed by the Registrar's office. For the proper procedures to follow when dropping courses and when withdrawing from SIU visit: <http://registrar.siu.edu/students/withdrawal.php>

### INCOMPLETE POLICY~ Undergraduate only

An INC grade may be assigned when, for reasons beyond their control, students engaged in passing work are unable to complete all class assignments for the course. An INC must be changed to a completed grade within one full semester (undergraduates), and one full year (graduate students), from the close of the term in which the course was taken or graduation, whichever occurs first. Should the student fail to complete the remaining course requirements within the time period designated, the incomplete will be converted to a grade of F and such grade will be computed in the student's grade point average. *For more information visit:* <http://registrar.siu.edu/grades/incomplete.php>

### REPEAT POLICY

An undergraduate student may, for the purpose of raising a grade, enroll in a course for credit more than once. For students receiving a letter grade of A, B, C, D, or F, the course repetition must occur at Southern Illinois University Carbondale. Effective for courses taken Summer 2013 or later, only the most recent (last) grade will be calculated in the overall GPA and count toward hours earned.

This policy will be applied to all transferrable credit in that only the last grade will be used to calculate grade point average. Only those courses taken at the same institution are considered repeats under this policy. *See full policy at*

<http://registrar.siu.edu/students/repeatclasses.php>

### GRADUATE POLICIES

Graduate policies often vary from Undergraduate policies. To view the applicable policies for graduate students, please refer to the graduate catalog at <http://gradschool.siu.edu/about-us/grad-catalog/>

### DISABILITY POLICY

Disability Support Services provides the required academic and programmatic support services to students with permanent and temporary disabilities. DSS provides centralized coordination and referral services. To utilize DSS services, students must contact DSS to open cases. The process involves interviews, reviews of student-supplied documentation, and completion of Disability Accommodation Agreements. <http://disabilityservices.siu.edu/>

### PLAGIARISM

See the Student Conduct Code <http://srr.siu.edu/student-conduct-code/>

**MORRIS LIBRARY HOURS:** <http://libguides.lib.siu.edu/hours>

**ADVISEMENT:** <http://advisement.siu.edu/>

### SAFETY AWARENESS FACTS AND EDUCATION

Title IX makes it clear that violence and harassment based on sex and gender is a Civil Rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, etc. If you or someone you know has been harassed or assaulted, you can find the appropriate resources here:

<http://safe.siu.edu>

### SALUKI CARES

The purpose of Saluki Cares is to develop, facilitate and coordinate a university-wide program of care and support for students in any type of distress—physical, emotional, financial, or personal. By working closely with faculty, staff, students and their families, SIU will continue to display a culture of care and demonstrate to our students and their families that they are an important part of the community. For Information on Saluki Cares: call(618) 453-1492, email [siucares@siu.edu](mailto:siucares@siu.edu), or <http://salukicare.siu.edu/>

### SIU's EARLY WARNING INTERVENTION PROGRAM (EWIP)

Students enrolled in courses participating in SIU's Early Warning Intervention Program might be contacted by University staff during a semester. More information can be found at the Core Curriculum's Overview webpage: <http://corecurriculum.siu.edu/program-overview/>

### EMERGENCY PROCEDURES

We ask that you become familiar with **Emergency Preparedness @ SIU**. Emergency response information is available on posters in buildings on campus, on the Emergency Preparedness @ SIU website, and through text and email alerts. *To register for alerts visit:* <http://emergency.siu.edu/>

### STUDENT MULTICULTURAL RESOURCE CENTER

The Student Multicultural Resource Center serves as a catalyst for inclusion, diversity and innovation. As the Center continues its work, we are here to ensure that you think, grow and succeed. We encourage you to stop by the Center, located in Grinnell Commons, to see the resources available and discover ways you can get involved on the campus. *Visit us at* <http://inclusiveexcellence.siu.edu/>

### LEARNING AND SUPPORT SERVICES

Help is within reach. Learning support services offers free tutoring on campus and math labs. To find more information please visit the Center for Learning and Support Services website:

**Tutoring :** <http://tutoring.siu.edu/>

**Math Labs** <http://math.siu.edu/courses/course-help.php>

### WRITING CENTER

The Writing Center offers free tutoring services to all SIU students and faculty. To find a Center or Schedule an appointment please visit:

<http://write.siu.edu/>

### DIVERSITY

Southern Illinois University Carbondale's goal is to provide a welcoming campus where all of our students, faculty and staff can study and work in a respectful, positive environment free from racism and intimidation. *For more information visit:* <http://diversity.siu.edu/#>

### MILITARY COMMUNITY

There are complexities of being a member of the military community and also a student, and military and veteran related developments can complicate academic life. If you are a member of the military community and in need of accommodations please visit Veterans Services at <http://veterans.siu.edu/>

**SIU ONLINE:** <https://online.siu.edu/>

**Need help with an issue? Please visit SALUKI SOLUTION FINDER at** <http://solutionfinder.siu.edu/>