

**COURSE APPROVAL DOCUMENT**  
Southeast Missouri State University

Department: Biology

Course No. BI 173

Title of Course: Cell and Organismal Biology

Date: Spring 2017

Please check:  New  
 Revision

I. Catalog Description (Credit Hours of Course):

An introduction to cellular organization, energetics and physiology, and how these topics relate to organismal physiology. Three lectures and one two-hour lab. (4)

II. Prerequisites: CH 185; MA 134 or MA 137 or MA 139 or MA 140; BI 163 with C grade or better.

III. Purposes or Objectives of the Course (optional):

1. Explain fundamental mechanisms of energy transduction in cells.
2. Explain the structure and role of biological membranes as dynamic partitions and organizing surfaces.
3. Explain the relationships among amino acid sequence, structure, and function in proteins.
4. Understand and describe the fundamentals of eukaryotic cell organization.
5. Explain the factors that affect the flow of water in organisms
6. Explain how organisms maintain homeostasis.
7. Explain the processes of energy and nutrient acquisition at the cellular and multicellular level.
8. Explain the processes of internal transport in cells and multicellular organisms.
9. Explain the processes of reception, transduction and response at the cellular and multicellular level.

IV. Student Learning Outcomes (Minimum of 3):

- 1) Students will be able to identify the mechanisms and environmental influences of membrane transport
- 2) Students will be able to identify the structural and environment influences of enzyme function.
- 3) Students will be able to explain the results of an experiment in physiological context.

V. Optional departmental/college requirements:

A.

VI. Course Content or Outline (Indicate number of class hours per unit or section):

- Topic (Hours for Lecture/Lab)
- A. Organic and Biomolecules (2/2)
  - B. Energetics (2/0)
  - C. Enzymes (3/4)
  - D. Cell membranes (3/0)
  - E. Water movement, Water potential (3/0)
  - F. Homeostasis (3/2)
  - G. Nutrient acquisition: Autotrophs (4/4)
  - H. Nutrient acquisition: Heterotrophs (4/4)
  - I. Secretion and transport in cells (3/0)
  - J. Transport in multicellular organisms (3/2)
  - K. Respiration (3/2)
  - L. Cell signaling (2/2)
  - M. Hormones (4/2)
  - N. Neurotransmission (3/2)
  - O. Movement (3/2)
  - P. Lab Safety and Skills (0/2)

Please Attach copy of class syllabus and schedule as an example

Signature: \_\_\_\_\_  
Chair

Date: \_\_\_\_\_

Signature: \_\_\_\_\_  
Dean

Date: \_\_\_\_\_

## **BI 173: Cell and Organismal Biology: Spring 2016**

An introduction to cellular organization, energetics and physiology, and how these topics relate to organismal physiology. Three lectures and one two-hour lab. (4 credit hours)

Instructor: Dr. Timothy Judd

Office: 225 Rhodes Hall

Phone: 651-2365

e-mail: [tjudd@semo.edu](mailto:tjudd@semo.edu)

webpage: <http://cstl-csm.semo.edu/tjudd/>

Office hours: M,W,F 9-10am or by appointment

### Teaching Assistants:

Friedrich Henle

Office MG134

e-mail: [fgjhenle5s@semo.edu](mailto:fgjhenle5s@semo.edu)

Office Hours: M, W, F 1-2 or by appointment

Leon Dufour

Office MG134

e-mail: [ljmdufour6s@semo.edu](mailto:ljmdufour6s@semo.edu)

Office Hours: M, W, F 1-2 or by appointment

### **Class Meeting Times**

Lecture: M,W, F 10:00-10:50 in RH121

Labs in RH315:

Section 1: M 1:30-3:20

Section 2: T: 9:00-10:50

Section 3: T: 11:00-12:50

Section 4: T: 3:00-4:50

Section 5: W: 1:00-2:50

### **Learning Objectives**

#### **Course Learning objectives**

- A. Explain fundamental mechanisms of energy transduction in cells.
- B. Explain the structure and role of biological membranes as dynamic partitions and organizing surfaces.
- C. Explain the relationships among amino acid sequence, structure, and function in proteins.
- D. Understand and describe the fundamentals of eukaryotic cell organization.
- E. Explain the factors that affect the flow of water in organisms
- F. Explain how organisms maintain homeostasis.
- G. Explain the processes of energy and nutrient acquisition at the cellular and multicellular level.
- H. Explain the processes of internal transport in cells and multicellular organisms.
- I. Explain the processes of reception, transduction and response at the cellular and multicellular level.

#### **Student Learning Objectives**

- 1) Students will be able to identify the mechanisms and environmental influences of membrane transport.
- 2) Students will be able to identify the structural and environment influences of enzyme function.
- 3) Students will be able to explain the results of an experiment in physiological context.

### **Book**

**Text book:** Urray et al. 2014 *Campbell Biology in Focus*. Pearson.

### **Grading**

You will be graded in the following ways:

3 Exams: 280 pts

Homework	140 pts
14 Lab Quizzes	70 pts
<u>14 Lab Reports</u>	<u>140 pts</u>
Total	630 pts

If you get the following percentages, you will be guaranteed the following grades. However, I may lower the cutoffs **at the end of the semester.**

90-100%: A

80-89%: B

70-79%: C

60-69%: D

0-59%: F

Detailed information on the exams and assignments can be found in the on-line syllabus

### **Class Policies**

#### **Attendance and Absences**

You are expected to attend every class period. If you have an excusable absence I will ask for some form of evidence. If you miss a class without an excused absence you will not be able to make up the missed work.

**Excusable absences** will be dealt with on a case by case basis. I reserve the right to ask you to provide evidence for your absence. If you obtain a doctor's note, I only need to know that you were unable to come to class due to medical reasons. I do not need to know the specific reason (i.e. the medical condition).

If possible, please contact me ahead of time if you plan to miss class with an excusable absence.

Note: scheduling an advising appointment during class is not an excusable absence.

#### **Lab Rules and Regulations**

You will be in a laboratory for part of this course. You will be expected to abide by the following rules. If you fail to do so you will be asked to correct the issue or, if necessary, asked to leave the lab.

- 1) No food or drink is allowed in the laboratory. If you need to drink or eat, please step outside the lab when time allows. This includes chewing gum.
- 2) All students must wear long pants and may not wear open toed shoes.
- 3) When working with chemicals in the lab students must wear gloves.
- 4) Students must clean up after themselves before leaving the class.

#### **Handouts**

All handouts (including assignments and quizzes) and papers are given to you for your own personal use for this course. They are not to be distributed to any third party or posted on-line on any additional website. Classes may not be recorded without the permission of the instructor. If permission is granted, it is done so for your own personal use. No recordings of this course should be posted on any website or distributed to a third party.

#### **Cell Phones**

Cell phones must be turned off (meaning no power) during class. I reserve the right to ask anyone text messaging or calling on a phone to leave the class. If this occurs, the student will receive a zero for that day's work. If you must have the phone on, please discuss your reason with me before class; if I accept your reason, please keep it on vibrate.

### **University Policies**

#### **Academic Policy Statement**

Students will be expected to abide by the University Policy for Academic Honesty regarding plagiarism and academic honesty. Refer to: <http://www6.semo.edu/judaffairs/code.html>

**Any act of plagiarism will result in a zero for that assignment for all people involved.**

## **Questions, comments and concerns about the course**

Questions, comments or requests regarding this course or program should be taken to your instructor. Unanswered questions or unresolved issues involving this class may be taken to Dr. James Champine (Chair of Biology).

## **Student with Disabilities Statement**

If a student has a special need addressed by the Americans with Disabilities Act (ADA) and requires materials in an alternative format, please notify the instructor at the beginning of the course. Reasonable efforts will be made to accommodate special needs.

## **Civility Statement**

“Every student at Southeast is obligated at all times to assume responsibility for his/her actions, to respect constituted authority, to be truthful, and to respect the rights of others as well as to respect private and public property. In their academic activities, students are expected to maintain high standards of honesty and integrity and abide by the University’s Policy on Academic Honesty. Alleged violations of the Code of Student Conduct are adjudicated in accordance with the established procedures of the judicial system.”  
(From the preamble of the Statement of Student Rights and Code of Student Conduct, revised January 8, 2004, Southeast Missouri State University)

## **Schedule of topics:**

### **Week 1**

#### *Lecture Topics:*

Course Introduction

Organic molecules

    Structure / functional groups

    Solubility – H-bonding

Biomolecules/Macromolecules

    Dehydration synthesis

    Types – Functions in physiologically different groups of species

#### *Lab:*

Introduction/Lab Safety/ Microscopy

### **Week 2**

#### *Lecture Topics:*

Reactions

    Energetics

    Mass action

    Kinetics

#### *Lab:*

Biomolecules

### **Week 3**

#### *Lecture Topics:*

Enzymes – what do they do

Enzymes --how do they do it

    Proteins and protein structure.

*Lab:* Enzymes Pt 1

### **Week 4**

#### *Lecture Topics:*

Cells and membrane systems

ECM

Membrane structure  
Transport phenomena

*Lab:* Enzymes Pt 2

### **Week 5**

*Lecture Topics:*

Water movement / water potential / homeostasis  
    Physiologically different groups.  
Thermoregulation

*Lab:* Plant Water Loss Resistance

### **Week 6**

*Lecture Topics:*

Nutrient/energy acquisition  
    Types of energy  
    Open and closed systems  
    Autotrophs and heterotrophs  
    Carbon oxidation and reduction

### **Exam 1 (Friday)**

*Lab:* Photosynthesis Part 1

### **Week 7**

*Lecture Topics:*

Autotrophs: Photosynthesis  
Autotrophs: Chemosynthesis  
Heterotrophs: Ingestion/digestion/absorption/elimination

*Lab:* Photosynthesis Part 2

### **Week 8**

*Lecture Topics:*

Heterotrophs: Ingestion/digestion/absorption/elimination (Cont.)  
Heterotrophs that have cell walls

*Lab:* Digestion: pH in Digestive Cavities

### **Week 9**

Spring Break – No Class

### **Week 10**

*Lecture Topics:*

Trafficking of materials (proteins) within cells  
    ER/Golgi/Secretory system  
    “lysosomes in endocytosis”  
    Nuclear localization

*Lab:* Digestion 2

### **Week 11**

*Lecture Topics:*

Transport of nutrients

### **Exam 2 (Friday)**

*Lab:* Transport

**Week 12**

*Lecture Topics:*

Respiration: anaerobic and aerobic

Oxygen acquisition

Energy flow through autotrophs and heterotrophs

*Lab:* Respiration

**Week 13**

*Lecture Topics:*

Stimulus response

Cell signaling

Hormones

*Lab:* Cell Signaling

**Week 14**

*Lecture Topics:*

Stimulus response

Hormones, etc. in different groups

Epinephrine/G-protein/cAMP

*Lab:* Hormones

**Week 15**

*Lecture Topics:*

Stimulus response

    Neuro transmission

    Taxis

*Lab:* Taxis

**Week 16**

*Lecture Topics:*

Locomotion

    Cytoskeleton

        Filaments and motors

    Flagella, cilia, pseudopodia

    Muscles

*Lab:* Movement lab

**Final**

Monday 10am in RH121.