

# Advanced Cell Biology. Lecture 1

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Minot State University

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# Outline

## Course in general

Description

Grading

Course schedule

## What are cells

Biological hierarchy

Cell theory

## Unity and diversity of cells

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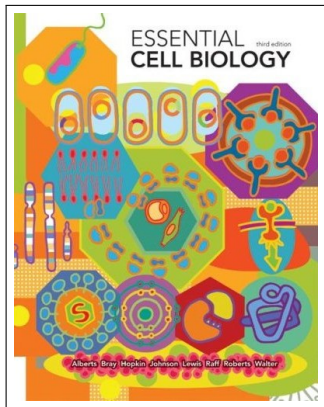
Advanced Cell Biology will penetrate the field of cellular and molecular biological sciences deeper than Introductory Cell Biology (which is a prerequisite to the Biology 250). The course is based on the presumption that students already know basics of cell biology and biochemistry. In turn, several higher-level courses are based on Advanced Cell. Therefore, I will concentrate on topics which are most important for understanding cell structure and functions:

- ▶ chemical components of cell including DNA and protein structure and interactions;
- ▶ genes and genomes: analysis and evolution;
- ▶ membrane structure, transport and cell communication.

## Instructor

- ▶ Dr. Alexey Shipunov
- ▶ Office: Moore 229
- ▶ Office Hours: Wednesdays and Fridays, 9 a.m. to 12 a.m.
- ▶ Phone: 858-3116
- ▶ E-mail: `alexey.shipunov@minotstateu.edu`

## Details



**Lectures** Mondays,  
Wednesdays and  
Fridays, 12:00 a.m. to  
12:50 a.m., Moore  
210

**Laboratories** Mondays, Moore 210

**Textbook** Essential Cell Biology  
(Alberts et al., 3rd  
ed., Garland Science  
publ.)



# Course in general

## Grading

## Exams

- ▶ Four **equal** exams are given during the semester.
- ▶ Only the **three** best exams contribute to the final grade.
- ▶ Missed exams count zero points. There are **no make-up** exams.

## Labs

- ▶ Receiving zero points for **more than one** laboratory results in a failed course.
- ▶ Grading of laboratories is based on reports.
- ▶ Written reports are prepared and finished during laboratory sessions and passed to the instructor right after the particular laboratory session.
- ▶ It is expected that you have reviewed the lecture contents before you come to lab.

## Absence

There are five legitimate reasons for absence:

1. emergency situations,
2. attested medical conditions,
3. military duty,
4. participation in MSU sports events,
5. dependent sick leave.

Absence from exams or laboratories needs to be announced to the instructor in advance **via e-mail**. I strongly recommend attending lectures regularly. Statistically, students who achieved best grades are **always attend lectures**.

## Lecture tests

- ▶ At the end of **every** lecture I will give **one** short test question to answer.
- ▶ The question will require 1–3 min to answer and respectively, will give from 1 to 3 points (depending on the complexity).

## Points

A total of 600 points can be earned and are distributed as follows:

- ▶ Three best exams: 300 points
- ▶ Lecture tests: 60 points total
- ▶ Laboratory: 240 points (20 points per lab)

Grading points may vary between exams, tests, and labs.

## Letter grades

- ▶  $A \geq 90\%$
- ▶  $B \geq 80\%$
- ▶  $C \geq 70\%$
- ▶  $D \geq 60\%$
- ▶  $F < 60\%$

A minimum of one letter grade will be deducted from the grade for academic dishonesty / plagiarism.

# Course in general

## Course schedule



## Tentative course sequence

- ▶ Introduction to cells, microscopy
- ▶ Chemical components of cells
- ▶ Energy, catalysis and biosynthesis
- ▶ Proteins and DNA
- ▶ Genes and genomes
- ▶ Membrane
- ▶ Energy generation
- ▶ Cellular transport and communication
- ▶ Cytoskeleton and cell division

## Course Web site

© Shipunov, A. Advanced Cell Biology [Electronic resource]. 2011—onwards.  
Mode of access: [http://ashipunov.info/shipunov/school/biol\\_250/index.htm](http://ashipunov.info/shipunov/school/biol_250/index.htm)

### BIOL 250: Advanced Cell Biology



Course materials:

- [Syllabus](#) (PDF, 0.15 Mb)

[Back](#)

[http://ashipunov.info/shipunov/school/biol\\_250/](http://ashipunov.info/shipunov/school/biol_250/)

# What are cells

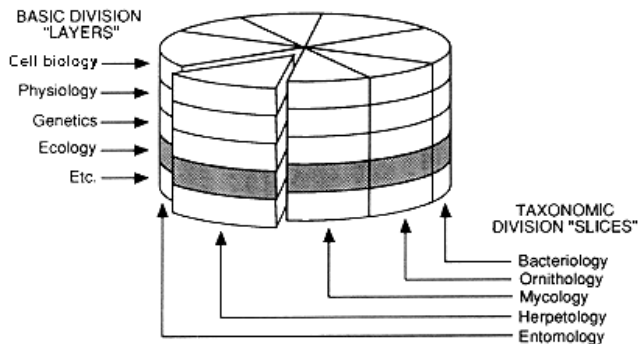
## Biological hierarchy

## Levels of organization

- ▶ Molecules
- ▶ Organelles
- ▶ Cells
- ▶ Tissues
- ▶ Organs
- ▶ Organisms
- ▶ Populations
- ▶ Ecosystems OR Taxonomic groups

*Cells are “atoms of life”, the least level where organisms are still alive.*

## Place of cell biology



Layered cake of biology (Odum, 1971): cell biology is a "layer science"

# What are cells

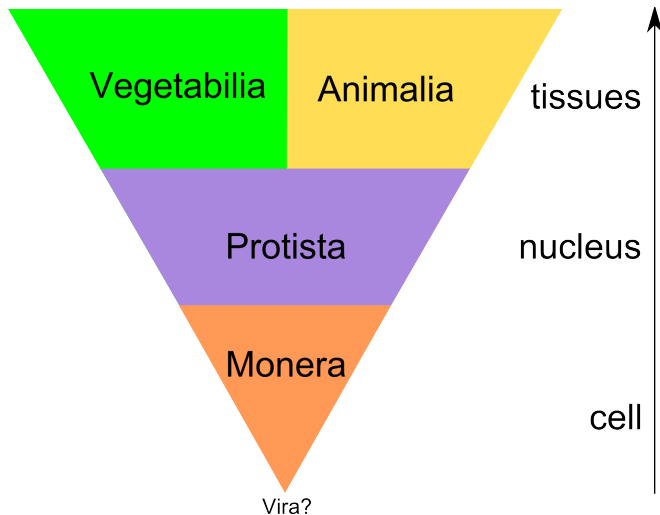
## Cell theory

## Cell theory

Cells were first discovered in 1665 by Robert Hook. Cell theory was formulated in XIX century:

- ▶ All plants and animals are composed of cells (1838, Matthias Schleiden and Theodor Schwann)
- ▶ Cells reproduce themselves (1858, Rudolf Virchow)
- ▶ All cells arise by reproduction from previous cells (1858, Rudolf Virchow)

## Cells, tissues and kingdoms





## Diversity of living things

- ▶ Prokaryotes (Monera)
  - ▶ Bacteria and Archaea
- ▶ Eukaryotes
  - ▶ Protists (do not have tissues)
  - ▶ Animals
  - ▶ Plants (Vegetabilia)

## Final question (2 points)

What is that?

## Final question (2 points)

What is that?



## Summary

- ▶ All organisms are composed of cells
- ▶ Cells reproduce themselves
- ▶ All cells arise by reproduction from previous cells

# Appendix

## For Further Reading

## For Further Reading



A. Shipunov.

*Advanced Cell Biology* [Electronic resource].

2011—onwards.

Mode of access: `http:`

`//ashipunov.info/shipunov/school/biol_250`



B. Alberts et al.

*Essential Cell Biology*. 3rd edition.

Garland Science, 2009.

*Chapter 1: Unity and diversity of cells.*