

**BSC 2010 General Biology I:
The Molecular and Genetic Basis of Life (sec U01)
Tu/Th 9:00-10:15am – PG6-116**

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Office Hours:
M:1:30-3:00pm, Tu:10:30-11:30am & 2:00-3:00pm, W: 1:00-3:00pm, or by appt.
OE 236

Why should you care about General Biology I?

Life on Earth is in you, on you, around you. Everything that is alive (plants, whales, bacteria, you) shares a common 'language of life.' This language is the signals sent between cells and even the organelles and structures inside cells. From the slime on a green pool to your baby brother, all life is linked through the use of a shared alphabet, and here's where it gets interesting...

Have you ever wondered what you are made of? Would you like to understand the diversity of life? How does this diversity exist using only five letters (ATCG and U)? How is it that the DNA in each of your cells is so long that if extended, could go to the moon and back, and how does it all fit inside one cell? How do we go from ATTCCGAGG... to a clown fish or palm tree or Lebron James?

This is the study of life via genetic, molecular and cellular mechanisms. Welcome aboard!

How will this course help you succeed?

All life is cellular. Cells have to talk to each other and reproduce in order to survive. Sound familiar? Just like us? *Oh wait, this is us...* if cells are what we are made of, then understanding the basic mechanisms of how cells function provides the foundation for understanding the mechanisms underlying all life. Wow. This is a huge responsibility. Imagine what you can do when you begin to understand how life works.

For biology majors: if you learn GB1, you will have the foundation to understand and do well in all your other courses because life is cellular and must transfer information and energy. In this course, we will begin to explore the core concepts needed to understand the more complex interactions you will encounter in your other courses, whether your interests lie in conservation, coral reefs, plants, preventative health care or curing cancer to name a few.

For non-biology majors: if you learn GB1, you will have the foundation of understanding how living things work that will be transferred to your future work and life in a multitude of ways. These include, but are not limited to setting a foundation for further learning and understanding: mechanisms of the body, biotechnology, nutrition, human/animal development, science writing and bio-ethics to name a few.

We make decisions every day that impact our biology – what you eat (or don't eat), the clothes you buy (natural fibers or synthetic, affects agriculture and industry which affects our environment which affects our lives), how much you sleep, toxins you put in your body or avoid – these all impact our gene expression and therefore, how life proceeds. How about that?

Through this course of study, you will gain a deeper understanding of:

- the components of cells
- how cells reproduce to make exact copies of themselves (you wouldn't want liver cells on your forehead)
- how cells reproduce for genetic diversity (if we were all clones not only would it be boring, but one environmental disaster or disease could wipe out an entire species)
- how genetic information is transferred between generations
- how organisms grow
- how cells acquire and assimilate the energy they need to survive

Course Themes: Basic biological themes include: structure dictates function, information flow, cellular organization (simple to more complex) and energy utilization.

Learning Outcomes:

You will be able to:

- Detail the events necessary for cellular replication
- Describe the replication, transcription and translation of DNA
- Connect inheritance to meiosis
- Explain the variety of inheritance patterns
- Explain energy flow and metabolism in animals
- Identify the processes occurring as molecules are transported across membranes
- Predict the movement of substances across membranes
- Relate cell signaling to the growth of an organism

How will you learn all this?

Education, the process of creating knowledge, values and information, is going through a transformation from a 'sage on stage' towards student-centered learning. This is because research shows that knowledge is better created, retained and used by students when acquired through active, participatory learning rather than being a passive recipient (Fink 2003). **Understanding is not downloadable.** The key to learning (not memorization, but deep learning) is to engage with the material. You will learn in proportion to the amount of effort you put into it.

How does this play out?

We will be learning about genetic and molecular mechanisms and seeing how this is the basis for all levels of organization: (1) molecular/cellular; (2) tissues/organs/muscles; (3) organismal; and, (4) emergent properties. In other words, we will be looking at biology from beneath the microscope to large-scale observations (e.g., from DNA to a white whale).

Overview of the semester:

How do we explain life?

Unit (3 weeks)	Information &/or Energy Flow	Structure/Function (selected examples)
1: Cell Foundations	Cell to cell (growth)	Cell structures Chromosomes DNA Enzymes Microtubules
2: Genetic Replication	Central Dogma (DNA → RNA → Pro ...at least for the most part)	DNA tRNA Ribosomes Proteosomes
3: Sexual Replication	Parent → offspring (over generations)	Chromosomes DNA Enzymes Microtubules
4: Growth, Varying Cell Potentials & Energy Flow	Cell to cell Energy for growth & maintenance Energy storage and transfer (via ATP)	Enzymes Mitochondria Cell growth (regulated & unregulated)
5: Tying it all together: Nutrition, Energy & Cell Health	Within and between cells	Membrane Receptors Cytoskeleton Organelles

Weeks will typically have the following format:

Tuesday	Thursday
Intro – 1 st day <u>Other days:</u> 2 quiz-quiz Content discussion, Clicker questions, possible in-class activities -or- Exams	Content discussion with <ul style="list-style-type: none"> • Clicker questions • in-class activities 2-5min Reflection on what was learned, muddiest point -and/or- Culminating activity

Textbook: Campbell Biology in Focus, Urry, Cain, Wasserman, 2nd edition,

ISBN (book): 9780134433769, ISBN (book & Mastering program): 9780134433769. See Syllabus part 2 in Blackboard for buying options.

iClickers: For buying options, pls see the link on the left-hand side in our Blackboard shell or Syllabus part 2, also posted in Blackboard.

Grade Scheme:

A: 90-100; B: 80-89; C: 70-79; D: 60-69; F: <59

How you earn your grade:

If you enroll in PLTL	Without PLTL
Exams – 60% (each exam = 12%) Quizzes – 10% iClicker – 10% PLTL – 10% Class Activities & Homework – 10%	Exams – 64% (each exam = 12.8%) Quizzes – 12% iClicker – 12% Class Activities & Homework – 12%

Exams (100pts each): All exams will focus on the unit they pertain to, but will also contain several concept-integrating questions to ensure that important themes are being learned and carried throughout the semester. Exams will be multiple choice and will be thoughtful, clear and challenging, not tricky. If you come to class, participate in the activities, study on your own and with your new friends, you will ace this course and leave being able to think like a biologist!

Exams will be a **2 stage-test format (i.e., a 2-test-test)**; the 1st exam is taken individually (70% of the grade) and the 2nd exam (30% of the grade) is done in groups. The individual exam will be taken from 8:15am-9:10am and the group exam will be taken from 9:15am-10:15am. We will open the doors at 8:10am and begin promptly at 8:15am. If you arrive late, you will take your exam at 9:15am-10:15am in another room and it will count as 100% of your grade. You will receive a separate scantron for each exam. During the group exam, we encourage you to discuss the questions with your tablemates *but answer each question independently* (do not let anyone push you into submitting an answer that doesn't feel right to you – this is your exam). Have confidence in your own thinking and also give your friends the space to think and answer for themselves.

There is a total of 5 exams, 1 every 3 weeks with the last exam being during finals week. The first 4 exam dates are: Jan. 30th (Tues.); Feb. 20th (Tues.); Mar. 20th (Tues.); and Apr. 12th (**Thursday**). Our final, Exam 5, is still to be scheduled.

There are no makeup exams. Given the large size of this class, it is impossible to create makeup exams and ensure the same level of difficulty as the original exam. If an exam falls on a religious holiday, please let me know within the first two weeks of the semester. If needed, I will change the date of the exam so that everyone can take it together.

II. Quizzes (10pts each): Quizzes will be given in the same format as the exams (**2 stage-quizzes**). Quizzes will be every Tuesday at 9:00am sharp starting Tues., Jan. 16th. You will take the quiz twice, once on your own (70% of the grade), and once in groups (30% of your grade). During your group portion of the quiz, you are allowed to discuss your answers (no notes allowed). Quizzes will have 1-2 questions from the previous material, 3-4 questions on the coming week's material.

III. iClickers: Starting the second week of the semester, every Thursday will begin with 3 clicker questions and every class will end with a final question (Tuesdays will either begin with quizzes or be exam days). Clicker questions will also be interspersed throughout the class to serve as a marker, for both you and me, to see if you understand the material. This enables us to clarify misconceptions on the spot.

Each clicker question can be worth 2 pts: 1 for answering, 1 for getting it correct.

We begin using iClickers on Thurs., Jan. 11th, so that you can connect to our class and practice using the device. Official points begin accruing on Thurs., Jan. 18th.

IV. PLTL (Peer Led Team Learning; 10% of total grade if you take it): A weekly meeting with up to 11 of your classmates typically led by a biology major with junior or senior standing who did very well in this course. Using currently learned information, you will answer a list of questions, problems or case studies. This group setting has been created as another way to help you engage with the material but in a more intimate setting. Studies have shown that this learning environment really works.

V. Class Activities & Homework: You do not come to this class as a blank slate, but instead, with knowledge of the natural world that you have been acquiring since the moment you came into this world. That said, this class will be presenting material that may be new to you or at a deeper level and certainly faster than how material is presented in non-university settings.

In order to help you learn, master and integrate concepts, we will be engaging in class activities (practically) every day and weekly homework assignments (**MasteringBiology Dynamic Study modules**, possibly others) to prepare, practice and hone your skills. Class activities and homework assignments may range

from drawing concept maps to Venn diagrams, case studies, reflections, and more. Class activity points will be earned by your active participation in the activity in addition to how well you complete the activity.

VERY important! We do not give busy work (we don't like to do it either). All homework assignments are meant to provide a good foundation of the material to be discussed and/or serve to incorporate the central concepts and facts learned thus far into your understanding of biology. We have thought about each assignment carefully and feel that it adds to your body of knowledge. Please do your homework thoughtfully and attentively.

Note: there will be a *MasteringBiology Dynamic Study module* due Tuesday, Jan. 16th. This is a practice module to allow you to sign in and make sure the technology works before it starts counting as part of your grade. No excuses for future modules, please make use of this opportunity.

How will you succeed in this course?

Read the assigned pages before coming to class. This way, you have seen the words and concepts once, then we discuss in class, then review your notes, re-read your book. This simple, time-tested technique works. You can also add studying with your classmates. Also, please come see me in office hours; you can also reach out to our terrific LAs. We are all here to help you learn.

Shared Values:

Be respectful - There are 181 of us in this room. Everyone deserves to be able to hear and to participate in our discussions. Please do not have side conversations - if you have something important to say, we would like everyone to benefit from your wisdom or question. If it is not important and pertinent to the class, save it for when you are out of class.

Cell phone and computer use - there is none. If you are focusing on something happening outside of our room, you can't be fully focused on what is happening inside. **We only have 2.5 hrs per week and a lot to cover.** I will do my best, but unless you meet me halfway, you will not learn to your potential and likely not do well in this class. Take this opportunity and use it to your fullest ability. Be present with us during class time. (If you have an emergency situation talk with one of us before class.) Please turn off cell phones and restrict using your computer.

Academic Honesty - is of the utmost importance. This is an indicator of how you will behave as a professional, whether as a physician, dentist, scientist, preschool teacher, etc. We all value people who are honest and trustworthy. Be one.

"Florida International University is a community dedicated to generating and imparting knowledge through excellent teaching and research, the rigorous and

respectful exchange of ideas, and community service. All students should respect the right of others to have an equitable opportunity to learn and to honestly demonstrate the quality of their learning. Therefore, all students are expected to adhere to a standard of academic conduct, which demonstrates respect for themselves, their fellow students, and the educational mission of the University. All students are deemed by the University to understand that if they are found responsible for academic misconduct, they will be subject to the Academic Misconduct procedures and sanctions, as outlined in the Student Handbook."

Additionally, if at some point you feel that your friend or neighbor needs help, help them by studying with them, not by letting them cheat off of your work. Whether you are the one looking or the one who allows the other use your work, you are cheating.

For specifics, see the Academic Misconduct procedures & sanctions as outlined in the *Student Handbook*. (<http://academic.fiu.edu/polman/sec2web.htm> - [two-forty-four](#))

How can to contact me?

I am happy to help you either in my office or via email. If you'd like to send me an email, please adhere to the following guidelines:

1. Always have a subject line that includes GB1.
2. It should have a proper greeting.
3. Please sign your name.

****As we work together and I see the needs of the class,
the syllabus is subject to change****