



INSTRUCTIONAL PACKAGE

BIO 101
Biological Sciences I

Effective Term
Fall 2021

INSTRUCTIONAL PACKAGE

Part I: Course Information

Effective Term: 2021-2022

COURSE PREFIX: BIO 101

COURSE TITLE: Biological Sciences I

CONTACT HOURS: 3-3

CREDIT HOURS: 4

RATIONALE FOR THE COURSE:

BIO 101 is the first course in a sequence that introduces students to concepts in Biology and helps relate this information to real-world applications. This course is intended for students pursuing more advanced scientific courses and through guided classroom and laboratory experiences, students will be develop a deeper appreciation of the biological world.

COURSE DESCRIPTION:

This course is a study of the scientific method, basic biochemistry, cell structure and function, cell physiology, cell reproduction and development, Mendelian genetics, population genetics, natural selection, evolution and ecology. This course is transferable to public senior institutions as part of the South Carolina Commission on Higher Education Statewide Articulation Agreement.

PREREQUISITES/CO-REQUISITES:

((ACCUPLACER Reading Comp 075 and ACCUPLACER Sentence Skills 081) or (New ACCUPLACER Reading Comp 250 and New ACCUPLACER Sentence Skills 250) or (COMPANION Reading 075 and COMPANION Sentence Skills 081) or SAT Critical Reading 480 or (ACT Reading 19 or ACT English 19) or (Multiple Measures English 1) or (Writing Sample ENG101 1 or WS ENG101 with Lab 1 or Writing Sample ENG155 1) or (Credit level ENG 101 Minimum Grade of C or Credit level ENG 101 Minimum Grade of TC or Credit level ENG 155 Minimum Grade of C or Credit level ENG 155 Minimum Grade of TC))

REQUIRED MATERIALS:

Please visit the [BOOKSTORE](#) online site for most current textbook information. Use the direct link to find textbooks.

Enter the semester, course prefix, number and section when prompted and you will be linked to the correct textbook.

ADDITIONAL REQUIREMENTS:

A Connect access code from McGraw Hill is a required component of this course.

For Hybrid/Online Students Only: Each student will be required to view an orientation PowerPoint

presentation during the first week of class. This presentation can be found on the course homepage in D2L under News. After viewing the presentation, all online students must complete the orientation quiz, which can be found under the dropdown assignment menu. A student will not be considered officially enrolled in the course until the presentation has been viewed and the quiz completed with a 100% score. Any submitted work from the student including discussion posts, assignments, etc. will not be given a grade until the presentation has been viewed and the quiz has been submitted. Failure to view the presentation and take the quiz before midnight on the last day to add/drop classes will result in the student being automatically dropped from the course.

TECHNICAL REQUIREMENTS:

Access to Desire2Learn (D2L), HGTC's student portal for course materials.
MyHGTC and college email access.

STUDENT IDENTIFICATION VERIFICATION

Students enrolled in online courses will be required to participate in a minimum of one (1) proctored assignment and/or one (1) virtual event to support student identification verification. Please refer to your Instructor Information Sheet for information regarding this requirement.

CLASSROOM ETIQUETTE:

As a matter of courtesy to other students and your professor, please turn off cell phones and other communication/entertainment devices before class begins. If you are monitoring for an emergency, please notify your professor prior to class and switch cell phone ringers to vibrate.

NETIQUETTE: is the term commonly used to refer to conventions adopted by Internet users on the web, mailing lists, public forums, and in live chat focused on online communications etiquette. For more information regarding Netiquette expectations for distance learning courses, please visit [Online Netiquette](#).

ACADEMIC DISHONESTY:

All forms of academic dishonesty, as outlined in the Student Code in the HGTC catalog, will NOT be tolerated and will result in disciplinary action. Anyone caught cheating or committing plagiarism (Defined in the code as: "The appropriation of any other person's work and the unacknowledged incorporation of that work in one's own work offered for credit") will be given a grade of a zero for that assignment and reported to the Senior VP of Academic Affairs, in accordance with the student handbook. A second offense will result in the student being withdrawn from the course with a "WF" and charges being filed with the Chief Student Services Officer.

Part II: Student Learning Outcomes

COURSE LEARNING OUTCOMES and ASSESSMENTS*:

Lecture Student Learning Outcomes: Chapter 1: A View of Life

Distinguish among the levels of biological organization.
Identify the basic characteristics of life.
Explain the relationship between the process of natural selection and evolutionary change.
Distinguish among the three domains of life.
Identify the components of the scientific method.
Distinguish between a theory and a hypothesis.
Analyze a scientific experiment and identify the hypothesis, experiment, control groups, and conclusions.

Chapter 2: Basic Chemistry

Explain how protons, neutrons, and electrons relate to atomic structure.
Utilize the periodic table to evaluate relationships between atomic number and mass number.
Relate how variations in an atomic nucleus account for its physical properties.
Determine how electrons are configured around a nucleus.
Explain how elements are combined into molecules and compounds.
List the different types of bonds that occur between elements.
Relate the difference between a polar and a nonpolar covalent bond.
Relate how water associates with other molecules in solution.
Explain why the properties of water are important to life.
Analyze how water's solid, liquid, and vapor state allow life to exist on Earth.
Distinguish between an acid and a base.
Explain how buffers prevent large pH changes in solutions.

Chapter 3: The Chemistry of Organic Molecules

Explain how the properties of carbon enable it to produce diverse organic molecules.
Relate the relationship between a functional group and the chemical reactivity of an organic molecule.
Compare the role of dehydration synthesis and hydrolytic reactions in organic chemistry.
Summarize the role of carbohydrates in a cell.
Distinguish among the forms of carbohydrates.
Compare the energy and structural uses of starch, glycogen, and cellulose.
Summarize why lipids are essential to living organisms.
Distinguish between saturated and unsaturated fatty acids.
Contrast the structures of fats, phospholipids, and steroids.
Compare the functions of phospholipids and steroids in cells.
Summarize the functions of proteins in cells.
Explain how a polypeptide is constructed from amino acids.
Compare the four levels of protein structure.
Relate the factors that affect protein structure and function.
Distinguish between a nucleotide and nucleic acid.
Compare the structure and function of DNA and RNA nucleic acids.
Explain how ATP is able to store energy.

Chapter 4: Cell Structure and Function

Identify that cells are the basic unit of life.
List the basic principles of the cell theory.
Summarize how the surface-area-to-volume ratio limits the size of a cell.

Examine the evolutionary relatedness of prokaryotes, eukaryotes, and archaeans.
List the fundamental components of a bacterial cell.
Analyze how the endosymbiotic theory explains eukaryotic cell structure.
Summarize the functions of the organelles in a eukaryotic cell.
Compare and contrast the structure of animal and plant cells.
Relate the structure and function of the nucleus.
Explain the flow of information from DNA to a protein.
Summarize the role of ribosomes in protein synthesis.
Explain the importance of the endomembrane system in cellular function.
Analyze how the ER, Golgi apparatus, and lysosome membranes differ from one another.
Summarize how endomembrane vesicles are able to fuse with organelles.
Relate the role of peroxisomes and vacuoles in cell function.
Contrast peroxisomes and vacuoles with endomembrane organelles.
Distinguish between the functions of chloroplasts and mitochondria in a cell.
Summarize the internal structure of mitochondria and chloroplasts.
Compare the structure and function of actin filaments, intermediate filaments, and microtubules.
Summarize how motor molecules interact with cytoskeletal elements to produce movement.
Explain the diverse roles of microtubules within the cell.

Chapter 5: Membrane Structure and Function

Distinguish between the different structural components of membranes.
Summarize the nature of the fluid-mosaic model as it relates to membrane structure.
List the diverse role of proteins in membranes.
Explain why the plasma membrane exhibits selective permeability.
Compare diffusion and osmosis across a membrane.
Summarize the role of proteins in the movement of molecules across a membrane.
Differentiate among the effects of hypotonic, isotonic, and hypertonic solutions on animal and plant cells.
Explain how active transport moves substances across a membrane.
Compare the energy requirements of passive and active transport.
Contrast the bulk transport of large and small substances into a cell.
Explain the role of the extracellular matrix in animal cell behavior.
Compare the structure and function of adhesion, tight, and gap junctions in animals.
Relate the role of plasmodesmata in plants.

Chapter 6: Metabolism: Energy and Enzymes

Compare potential and kinetic energy.
Summarize the first and second laws of thermodynamics.
Examine how the organization and structure of living organisms are related to heat and entropy.
Explain how the ATP cycle involves both endergonic and exergonic reactions.
Relate how energy is stored in a molecule of ATP.
Examine how cells use ATP to drive energetically unfavorable reactions.
Explain the purpose of a metabolic pathway and how enzymes help to regulate it.
Summarize how enzymes influence the activation energy rates of a chemical reaction.
Distinguish between conditions and factors that affect an enzyme's rate of reaction.
Explain how the reactions for photosynthesis and cellular respiration represent oxidation-reduction

reactions.

Summarize the relationship between the metabolic reactions of photosynthesis and cellular respiration.

Chapter 7: Photosynthesis

Explain how autotrophs are able to produce their own food.

List the components of a chloroplast.

Compare the roles of oxygen and carbon dioxide in autotrophs and heterotrophs.

Explain the overall process of photosynthesis.

Compare energy input and output of the light reaction.

Compare carbon input and output of the Calvin cycle reaction.

Relate the relationship between wavelength and energy in the electromagnetic spectrum.

Explain the role of photosynthetic pigments in harnessing solar energy.

Examine how ATP and NADPH are produced from redox reactions and membrane gradients.

Describe the three steps of the Calvin cycle, and when ATP and/or NADPH are needed.

Evaluate the significance of RuBP carboxylase enzyme to photosynthesis.

Explain how glyceraldehyde-3-phosphate (G3P) is used to produce other necessary plant molecules.

Compare the internal location of photosynthesis in C3 and C4 plants.

Contrast C3/C4 modes of photosynthesis with CAM photosynthesis.

Explain how different ways of achieving photosynthesis allow plants to adapt to particular environments.

Chapter 8: Cellular Respiration

Summarize the overall reaction for glucose breakdown and show that it is a redox reaction.

Examine the role of NADH and FADH₂ redox reactions in cellular respiration.

Summarize the phases of cellular respiration.

Relate the role of glycolysis in cellular respiration.

List the inputs and outputs of glycolysis.

Explain how energy-investment and energy-harvesting steps of glycolysis result in 2 net ATP.

Summarize the two fermentation pathways.

Discuss the conditions under which organisms may switch between cellular respiration and fermentation.

Compare the benefits and drawbacks of fermentation.

Explain the fate of each carbon during the complete aerobic metabolism of glucose.

Contrast substrate-level phosphorylation and chemiosmosis as methods of ATP synthesis.

Summarize how electron energy from redox reactions is used to create a proton gradient.

Compare the pathways of carbohydrate, fat, and protein catabolism.

Explain how the structure of mitochondria and chloroplasts enables a flow of energy through living organisms.

Chapter 9: The Cell Cycle and Cellular Reproduction

List the stages of interphase, and describe the major events that occur during each stage in preparation for cell division.

List the checkpoints that regulate the progression of cells through the cell cycle.

Explain the mechanisms within the G₁ cell cycle checkpoint that evaluate growth signals, determine nutrient availability, and assess DNA integrity.

Explain how DNA becomes sufficiently compacted to fit inside a nucleus.

Distinguish between euchromatin and heterochromatin.

Explain how the cell prepares the chromosomes and centrosomes prior to nuclear division.
Summarize the major events that occur during mitosis and cytokinesis.
Discuss why human stem cells continuously conduct mitosis.
Summarize the basic characteristics of cancer cells.
Explain the difference between a benign and malignant tumor.
Distinguish between the roles of the tumor suppressor genes and proto-oncogenes in the regulation of the cell cycle.
Distinguish between the structures of a prokaryotic and eukaryotic chromosome.
List the events that occur during binary fission.

Chapter 10: Meiosis and Sexual Reproduction

Contrast haploid and diploid chromosome numbers.
Explain what is meant by homologous chromosomes.
Summarize the process by which meiosis reduces the chromosome number.
Examine the importance of genetic variation to evolutionary change.
Explain how crossing-over contributes to genetic variation.
Summarize how independent assortment contributes to genetic variation.
Explain the phases of meiosis and the major events that occur during each phase.
Relate how meiosis reduces the chromosome number from diploid to haploid.
Contrast changes in chromosome number, genetic variability, and number of daughter cells between meiosis and mitosis.
Distinguish the events that occur during prophase I of meiosis that do not occur during prophase of mitosis.
Compare chromosome alignment during meiosis I to mitosis.
Contrast the life cycle of plants with the life cycle of animals.
Summarize spermatogenesis and oogenesis in humans.
Distinguish between euploidy and aneuploidy.
Explain how nondisjunction can cause monosomy and trisomy aneuploidy.
Examine human diseases caused by changes in the number of sex chromosomes.
Relate how changes in chromosome structure can lead to human diseases.

Chapter 11: Mendelian Patterns of Inheritance

Identify how Mendel's scientific approach enabled his genetic experiments to be successful.
Contrast blending and the particulate concept of inheritance.
Explain Mendel's law of segregation and law of independent assortment.
Compare and contrast dominant alleles with recessive alleles and their relation to genotype and phenotype.
Utilize a Punnett square and the law of probability to predict the chances of producing gametes and offspring.
Distinguish between an autosomal dominant and an autosomal recessive pattern of inheritance.
Identify the pattern of inheritance for selected single-gene human disorders.
Explain the inheritance pattern of traits where more than two alleles for the trait exist.
Contrast incomplete dominance and incomplete penetrance.
Summarize the effects of pleiotropy on phenotypic traits.
Explain the concept of polygenic and multifactorial traits.
Describe how X-linked inheritance differs from autosomal inheritance.

Chapter 12: Molecular Biology of the Gene

List the properties a substance must possess in order to serve as the genetic material.
Examine how historical researchers demonstrated that DNA was the genetic material.
Explain the chemical structure of DNA as defined by the Watson and Crick model.
Explain why the replication of DNA is semiconservative.
List the enzymes and proteins involved in DNA replication.
Contrast DNA replication in eukaryotes and prokaryotes.
Explain the function of transcription and translation.
Explain how the mRNA nucleotides determine the sequence of amino acids in a polypeptide.
Distinguish among the events of transcription that occur during formation of an mRNA molecule.
Summarize how eukaryotic mRNA molecules are processed and exported to the cytoplasm.
Explain the roles of mRNA, tRNA, and rRNA in translating the genetic code.
Examine the stages of translation and the events that occur during each stage.

Chapter 13: Regulation of Gene expression

Summarize the structure of an operon and state the role of each component of the operon.
Explain how the trp and lac operons of prokaryotes are regulated.
Distinguish between a repressible operon and an inducible operon.
List the levels of control of gene expression in eukaryotes.
Summarize how chromatin structure may be involved in regulation of gene expression in eukaryotes.
Identify the mechanisms of transcriptional, posttranscriptional, and translational control of gene expression.
Distinguish between spontaneous and induced mutations.
Identify how mutations influence protein structure.
Summarize how mutations may cause cancer.

Chapter 14: Biotechnology and Genomics

List the steps involved in making a recombinant DNA molecule.
Explain the purpose of the polymerase chain reaction (PCR).
Identify how PCR may be used to analyze DNA.
Identify the benefits of genetically modified bacteria, plants, and animals to human society.
List the steps involved in the production of a transgenic animal.
Distinguish between in vivo and ex vivo gene therapy in humans.
List examples of how in vivo and ex vivo gene therapy has been used to treat human disease.
Distinguish between the sciences of genomics, proteomics, and bioinformatics.
Identify the function of repetitive elements, transposons, and unique noncoding DNA sequences in the human genome.
Explain how DNA microarrays are used in the study of genomics.

Lab Student Learning Outcomes:

Learning outcomes for the lab portion of this course are the Objectives given for each lab in the manual and can be found at the start of each lab. They include hands-on items such as identification of lab equipment, models, and specimens on slides, and the use of microscopes and lab equipment.

****Students – please refer to the Instructor’s Course Information sheet for specific***

information on assessments and due dates.

Part III: Grading and Assessment

EVALUATION OF REQUIRED COURSE MEASURES/ARTIFACTS*

Students' performance will be assessed and the weight associated with the various measures/artifacts are listed below.

EVALUATION*

Lecture	75%
Lab	25%
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	100%

****Students, for the specific number and type of evaluations, please refer to the Instructor's Course Information Sheet.***

GRADING SYSTEM:

Please note the College adheres to a 10 point grading scale A = 100 – 90, B = 89- 80, C = 79 – 70, D = 69 – 60, F = 59 and below.

Grades earned in courses impact academic progression and financial aid status. Before withdrawing from a course, be sure to talk with your instructor and financial aid counselor about the implications of that course of action. Ds, Fs, Ws, WFs and Is also negatively impact academic progression and financial aid status.

The Add/Drop Period is the first 5 days of the semester for **full term** classes. Add/Drop periods are shorter for accelerated format courses. Please refer to the [academic calendar](#) for deadlines for add/drop. You must attend at least one meeting of all of your classes during that period. If you do not, you will be dropped from the course(s) and your Financial Aid will be reduced accordingly.

Part IV: Attendance

Horry-Georgetown Technical College maintains a general attendance policy requiring students to be present for a minimum of 80 percent (80%) of their classes in order to receive credit for any course. Due to the varied nature of courses taught at the college, some faculty may require up to 90 percent (90%) attendance. Pursuant to 34 Code of Federal Regulations 228.22 - Return to Title IV Funds, once a student has missed over 20% of the course or has missed two (2) consecutive weeks, the faculty is obligated to withdraw the student and a student may not be permitted to reenroll. **Instructors define absentee limits for their class at the beginning of each term; please refer to the Instructor Course Information Sheet.**

For online and hybrid courses, check your Instructor's Course Information Sheet for any required on-site meeting times. Please note, instructors may require tests to be taken at approved testing sites, if you use a testing center other than those provided by HGTC, the center may charge a fee for its services.

Lecture Attendance:

For a 15 week course (fall and spring), the allowed number of absences for a MW or TR class is as follows: 4 absences are allowed for lecture, regardless of reason. For a lecture class that meets once a week, the allowed number of absences is two (2). When a student surpasses the allowed number of absences, the student will be dropped automatically from the course with a W or a WF. Remember, an absence is an absence, no matter if it is excused or not!

Lab Attendance:

Students are allowed one (1) lab absence for a lab that meets weekly. When a student surpasses the allowed number of absences, the student will be dropped automatically from the course with a W or a WF.

Online/Hybrid Attendance:

Students enrolled in distance learning courses (hybrid and online) are required to maintain contact with the instructor on a regular basis to be counted as "in attendance" for the course. All distance learning students must participate weekly in an Attendance activity in order to demonstrate course participation. Students showing no activity in the course for two weeks (these weeks do not need to be consecutive) will be withdrawn due to lack of attendance.

Lab Attendance for Hybrid Courses:

Students in hybrid classes in which labs only meet 5 or 6 times during the semester, must attend all lab sessions for its entirety. Failure to attend one lab will result in immediate withdrawal. Students in hybrid classes where labs meet every week, you are allowed one lab absence. When a student surpasses the allowed number of absences, the student will be dropped automatically from the course with a W or a WF.

Part V: Student Resources



THE STUDENT SUCCESS AND TUTORING CENTER (SSTC):

The SSTC offers to all students the following **free** resources:

1. **Academic tutors** for most subject areas, **Writing Center support**, and **college success skills**.
2. Online **tutoring** and academic support resources.
3. Professional and interpersonal communication **coaching** in the EPIC Labs.

Visit the [Student Success & Tutoring Center](#) website for more information. To schedule tutoring, contact the SSTC at sstc@hgtc.edu or self-schedule in the Penji iOS/Android app or at www.penjiapp.com. Email sstc@hgtc.edu or call SSTC Conway, 349-7872; SSTC Grand Strand, 477-2113; and SSTC Georgetown, 520-1455, or go to the [Online Resource Center](#) to access on-demand resources.



STUDENT INFORMATION CENTER: TECH Central

TECH Central offers to all students the following free resources:

1. **Getting around HGTC:** General information and guidance for enrollment, financial aid, registration, and payment plan support!
2. Use the [Online Resource Center \(ORC\)](#) including Office 365 support, password resets, and username information.
3. **In-person workshops, online tutorials and more services** are available in Desire2Learn, Student Portal, Degree Works, and Office 365.
4. **Chat with our staff on TECH Talk**, our live chat service. TECH Talk can be accessed on the student portal and on TECH Central's website, or by texting questions to (843) 375-8552.

Visit the [Tech Central](#) website for more information. Live Chat and Center locations are posted on the website. Or please call (843) 349 – TECH (8324), Option #2.

STUDENT TESTING:

Testing in an **online/hybrid** course may be accomplished in a variety of ways:

- Test administered within D2L
- Test administered in writing on paper
- Test administered through Publisher Platforms

Furthermore, tests may have time limits and/or require a proctor.

Proctoring can be accomplished either face-to-face at an approved site or online through RPNOW, our online proctoring service. To find out more about proctoring services, please visit the [Online Testing](#) section of the HGTC's Testing Center webpage.

The **Instructor Information Sheet** will have more details on test requirements for your course.

DISABILITY SERVICES:

HGTC is committed to providing an accessible environment for students with disabilities. Inquiries may be directed to HGTC's [Accessibility and Disability Service webpage](#). The Accessibility and Disability staff will review documentation of the student's disability and, in a confidential setting with the student, develop an educational accommodation plan.

Note: It is the student's responsibility to self-identify as needing accommodations and to provide acceptable documentation. After a student has self-identified and submitted documentation of a disability, accommodations may be determined, accepted, and provided.

STATEMENT OF EQUAL OPPORTUNITY/NON-DISCRIMINATION STATEMENT:

Horry-Georgetown Technical College prohibits discrimination and harassment, including sexual

harassment and abuse, on the basis of race, color, sex, national or ethnic origin, age, religion, disability, marital or family status, veteran status, political ideas, sexual orientation, gender identity, or pregnancy, childbirth, or related medical conditions, including, but not limited to, lactation in educational programs and/or activities.

TITLE IX REQUIREMENTS:

All students (as well as other persons) at Horry-Georgetown Technical College are protected by Title IX—regardless of their sex, sexual orientation, gender identity, part- or full-time status, disability, race, or national origin—in all aspects of educational programs and activities. Any student, or other member of the college community, who believes that he/she is or has been a victim of sexual harassment or sexual violence may file a report with the college’s Chief Student Services Officer, campus law enforcement, or with the college’s Title IX Coordinator, or designee.

*Faculty and Staff are required to report incidents to the Title IX Coordinators when involving students. The only HGTC employees exempt from mandatory reporting are licensed mental health professionals (only as part of their job description such as counseling services).

INQUIRIES REGARDING THE NON-DISCRIMINATION/TITLE IX POLICIES:

Student and prospective student inquiries concerning Section 504, Title II, and Title IX and their application to the College or any student decision may be directed to the Vice President for Student Affairs.

Dr. Melissa Batten, VP Student Affairs

Title IX Coordinator

Building 1100, Room 107A, Conway Campus

PO Box 261966, Conway, SC 29528-6066

843-349-5228

Melissa.Batten@hgtc.edu

Employee and applicant inquiries concerning Section 504, Title II, and Title IX and their application to the College may be directed to the Vice President for Human Resources.

Jacquelyne Snyder, VP Human Resources

EEO and Title IX Coordinator

Building 200, Room 212A, Conway Campus

PO Box 261966, Conway, SC 29528-6066

843-349-5212

Jacquelyne.Snyder@hgtc.edu