HORRY GEORGETOWN TECHNICAL COLLEGE

# INSTRUCTIONAL PACKAGE

PHY 118
Medical Imaging Science

Effective Term
Fall 2025/Spring 2026/Summer 2026

# INSTRUCTIONAL PACKAGE

## Part I: Course Information

Effective Term: Fall 2025/Spring 2026/Summer 2026

COURSE PREFIX: PHY 118 COURSE TITLE: Medical Imaging Science

CONTACT HOURS: 3 CREDIT HOURS: 3

### RATIONALE FOR THE COURSE:

Completion of PHY 118 prepares students for the diagnostic medical sonography and X-ray technology degree programs and for other related allied health fields.

### COURSE DESCRIPTION:

This course is the study of the fundamental physics associated with the field of medical imaging sciences. The areas of study include concepts of radiation production as it relates to x rays and nuclear medicine studies and acoustical properties related to sonographic exams.

### PREREQUISITES/CO-REQUISITES:

( (Credit level MAT 102 Minimum Grade of C or Credit level MAT 120 Minimum Grade of C or Credit level MAT 110 Minimum Grade of C or Credit level MAT 102 Minimum Grade of TC or Credit level MAT 120 Minimum Grade of TC or Credit level MAT 110 Minimum Grade of TC or Credit level MAT 101 Minimum Grade of C or Credit level MAT 101 Minimum Grade of TC or New SAT Mathematics 500 or ACT Math 19) or ( Multiple Measures Math 1) )

### REQUIRED MATERIALS:

Please visit the BOOKSTORE online site for most current textbook information.

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

### ADDITIONAL REQUIREMENTS:

A scientific calculator will be needed for in-class use and for tests.
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.

## TECHNICAL REQUIREMENTS:

Access to Desire2Learn (D2L), HGTC's learning management system (LMS) used for course materials.
Access to myHGTC portal for student self-services.
College email access – this is the college's primary official form of communication.

## STUDENT IDENTIFICATION VERIFICATION:

Students enrolled in online courses will be required to complete identity 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 (Defined in the code as: "a. Copying from another student's test or answer sheet. b. Using materials or equipment during a test not authorized by the person giving the test. c. Collaborating with any other person during a test without permission. d. Knowingly obtaining, using, buying, selling, transporting, or soliciting in whole or in part the contents of a test prior to its administration. e. Bribing or coercing any other person to obtain tests or information about tests. f. Substituting for another student or permitting any other person to substitute for oneself. g. Cooperating or aiding in any of the above.") or committing plagiarism (Defined in the code as: "(1) the appropriation of any other person's work and the unacknowledged incorporation of that work in one's own work or (2) submitting content for academic purposes that are created by artificial intelligence, technology platforms, or writing services and representing that such content is the person's own work product.") 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. If a zero is awarded due to academic misconduct and the lowest exam grade is dropped, that zero will NOT be eligible to be the dropped grade, it will count within the final average. A second offense will result in the student being withdrawn from the course with a W and charges being filed with the Chief Student Services Officer. Alternatively, at the professor's discretion, a student can be assigned a failing grade for the course.

# Part II: Student Learning Outcomes

## COURSE LEARNING OUTCOMES and ASSESSMENTS*:

### The Nature of Science

Acknowledge contributions to science by various cultures.
Recount how mathematics contributes to success in science.
List the steps in one scientific method and cite other methods that advance science.
Describe how honest inquiry affects the formulation of facts, laws, and theories.
Distinguish between natural and supernatural phenomena.
Discuss some similarities and differences among science, art, and religion.
Relate technology to the furthering of science, and vice versa.
Compare the fields of physics, chemistry, Earth science, and astronomy.
Relate learning science to an increased appreciation of nature.

### Patterns of Motion and Equilibrium

Establish Aristotle's influence on classifying motion.
Establish Galileo's influence in understanding motion.
Describe and distinguish between mass and weight.
Distinguish between Force and net Force and give examples.
Describe the rule $\Sigma F=0$ and give examples.
Define support force and explain its relationship to weight.
Describe friction and its direction when an object slides.
Distinguish between different kinds of speed and velocity.
Define acceleration and distinguish it from velocity and speed.

### Newton's Laws of Motion

State Newton's first law of motion and relate it to inertia.
Relate acceleration, $\Delta v/\Delta t$, to its cause, $F/m$.
Describe how forces always occur in pairs.
Define Newton's third law of motion by giving examples.
Summarize and contrast Newton's three laws of motion.

### Momentum and Energy

Describe the relationship between impulse and momentum.
Describe the role of force and time when momentum changes.
Relate the conditions under which momentum is and is not conserved.
Describe how the work done on an object relates to its change in energy.
Specify the relationship between work and kinetic energy.
Relate conservation of energy to physics and science in general.
Relate the concept of energy conservation to machines.

Describe efficiency in terms of energy input and output.
Identify and describe the two ultimate sources of energy on Earth.

## Fluid Mechanics

Distinguish among weight, mass, and density.
Distinguish between force and pressure.
Relate the buoyant force to pressure differences in a fluid.
Relate the weights of a submerged body and displaced water to the buoyant force. Relate volume and pressure changes for a confined gas.
Relate the weight of the air above us to atmospheric pressure.
Characterize pressure changes at various points in a confined fluid.
Describe the application of Archimedes' principle to gases.
Relate changes in the speed of fluid flow to changes in pressure.

## Thermal Energy and Thermodynamics

Distinguish between thermal energy and temperature.
Describe the meaning of the lowest possible temperature in nature.
Distinguish between heat and temperature.
Distinguish among the units calories, Calories, and joules
Describe the three laws of thermodynamics.
Describe the direction of flow of ordered energy to disordered energy in nature.
Relate the specific heat capacity of substances to thermal inertia.
Describe the role of thermal expansion in common structures.
Relate the open structure of ice to water's maximum density at 4°C.

## Heat Transfer and Change of Phase

Describe the nature of conduction in solids.
Describe the nature of convection in fluids.

Describe the nature of radiant energy.
Relate Newton's law of cooling to everyday thermal occurrences.
Describe the similarities between a florist greenhouse and Earth's climate.
Describe the relationship between energy and phase changes.
Explain the cooling nature of the boiling process.
Distinguish between the processes of melting and freezing.
Identify the phase changes that require and that expel energy.

## Static and Current Electricity

Describe the conditions by which an object acquires a net charge.
Relate the inverse-square law to electrical forces.
Electric Field: Relate electric field strength with patterns of electrical lines of force.
Distinguish between electric potential energy and electric potential.
Recognize how a potential difference is necessary for electric current.
Relate the speed of electrons in a circuit to dc and ac.
Relate the length and width of wires to electrical resistance.
Relate current, voltage, and resistance in electric circuits.
Distinguish between series and parallel circuits.
Relate current and voltage to power with their units of measurement.

## Magnetism and Electromagnetic Induction

Establish the rule for the attraction and repulsion of magnetic poles.
Relate magnetic field strength to magnetic field patterns.
Describe magnetic field strength in terms of domain alignment.
Relate magnetic field strength to electric wire configurations.
Show how relative directions, fields, and motion affect force.
Describe how Faraday's law is central to the industrial age.
Describe how electromagnetic induction produces the ac of generators.
Describe how generators transfer rather than produce energy.
Describe how voltage and current can be boosted or lowered.
Describe how the nature of light is related to electromagnetic induction.

## Waves and Sound

Distinguish among amplitude, wavelength, frequency, and period.
Describe how energy is carried in waves.
Distinguish between transverse and longitudinal waves.
Identify compressions and rarefactions in a sound wave.
Distinguish between the reflection and the refraction of waves.
Distinguish between forced vibration and resonance.
Describe how interference is a property of all wave behavior.
Relate the compression and extension of waves due to motion to the Doppler effect.
Describe the production of bow waves and shock waves.
Distinguish noise from musical sounds.

## Light

Describe the nature and range of electromagnetic waves.
Relate the transparency of materials to wave frequencies.

Describe the law of reflection.
Describe how refraction is caused by changes in wave speed.
Describe how color depends on the frequency of light.
Relate different speeds of light in a medium to dispersion.
Describe how polarization is related to wave orientation.

## Atoms and the Periodic Table

Describe the origin of atoms and the empty nature of their internal structure.
Recognize the elements of the periodic table as the fundamental building blocks of matter.
Describe the structure of the atomic nucleus and how the atomic mass of an element is calculated.

Interpret how elements are organized in the periodic table.
Distinguish between models that describe physical attributes and models that describe the behavior of a system.
Describe how an atom reveals its identity by the light it emits.
Recount how the quantum nature of energy led to Bohr's planetary model of the atom.
Summarize how electrons, when confined to an atom, behave like self-reinforcing wavelike entities.
Show how electrons behave as though they are arranged in a series of shells surrounding the atomic nucleus.

## The Atomic Nucleus and Radioactivity

Identify three forms of radioactivity and their effects on living tissue.
Describe how the strong nuclear force acts to hold nucleons together in the atomic nucleus.
Recognize how radioactive elements can be identified by the rate at which they decay and how this decay results in the formation of new elements.
Review how the age of ancient artifacts can be determined by measuring the amounts of remaining radioactivity they contain.
Describe the process by which large atomic nuclei can split in half, leading to the production of energy.
Show how the mass of a nucleon depends on the identity of the nucleus within which it is contained.
Describe the process by which small nuclei can join together, leading to the production of energy, such as occurs in the Sun.

***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% |
| Homework | 25% |
| Total | 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,

and if you use a testing center other than those provided by HGTC, the center may charge a fee for its services.

**Science Department Attendance Policies**
For a 15-week course (fall and spring) or a 10-week course (summer), the allowed number of absences for a MW or TR class is as follows: 4 absences are allowed for lecture and 2 are allowed for lab, regardless of reason. For a lecture class that meets once a week, the allowed number of absences is 2.

For a 7-week fast-paced course (fall and spring) or a 5-week fast-paced course (summer), the allowed number of absences is as follows: 1 absence is allowed for lecture and 1 for lab, regardless of reason.

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!

**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 meet weekly, are allowed two (2) lab absences. Students in hybrid labs that only meet 5 or 6 times during the semester, must attend all lab sessions for its entirety. When a student surpasses the allowed number of absences, the student will be dropped automatically from the course with a W or a WF.

**Tardiness:**
Students are expected to arrive on time and remain for the entire class session. Repetitive tardiness that results in a significant loss of instructional time may be counted as an absence at the instructor's discretion. Students are encouraged to communicate with their instructor in advance if they anticipate being late or need to leave early due to extenuating circumstances.

# 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 Academic Coaching for 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 or coaching, 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 SSTC 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. In-person and remote assistance are available for Desire2Learn, Student Portal, Degree Works, and Office 365.

3. 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 # 1.

**HGTC LIBRARY:**

Each campus location has a library where HGTC students, faculty, and staff may check out materials with their HGTC ID. All three HGTC campus libraries have librarians and staff who can aid with research, computers to support academic research and related school-work, and individual/group study rooms. Printing is available as well at each location. Visit the Library website for more information or call (843) 349-5268.

**STUDENT TESTING:**

Testing in an **online/hybrid** course and in **make-up exam** situations may be accomplished in a variety of ways:

- Test administered within D2L.
- Test administered in writing on paper.
- Test administered through Publisher Platforms (which may have a fee associated with the usage)

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

Testing candidates must make their appointments 24 hours in advance.

Students must bring a physical ID in order to take a test.

Proctoring can be accomplished either face-to-face at an approved site or online through 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. Students seeking accommodations are encouraged to visit HGTC's Accessibility and Disability Service webpage for detailed information.

It is the student's responsibility to self-identify as needing accommodations and to provide appropriate documentation. Once documentation is submitted, the student will participate in an interactive process with Accessibility and Disability Services staff to determine reasonable accommodations. Students may begin the accommodations process at any time; however, accommodations are **not retroactive** and will only be applied from the point at which they are approved. Students must contact the office **each semester** to renew their accommodations.

For assistance, please contact the Accessibility and Disability Services team at disabilityservices@hgtc.edu or 843-796-8818 (call or text).

**COUNSELING SERVICES:**
HGTC Counseling Services strives to optimize student success through managing personal and academic concerns that may interfere with achieving educational goals. Staff are available to every student for assistance and guidance on personal matters, academic concerns and other areas of concern. HGTC offers free in-person and telehealth counseling services to students. For more information about counseling services, please reach out to counseling@hgtc.edu or visit the website the Counseling Services webpage.

**STATEMENT OF EQUAL OPPORTUNITY/NON-DISCRIMINATION STATEMENT:**
Our sincere commitment to both effective business management and equitable treatment of our employees requires that we present this Policy Statement as an embodiment of that commitment to the fullest.

Discrimination is conduct that includes unjust or prejudicial treatment based upon an individual's

sex, race/color, religion, national origin, age, disability, service in the uniformed services (as defined in state and federal law), veteran status, political ideas, marital or family status, pregnancy, childbirth, or related medical conditions, including, but not limited to, lactation, genetic information, genetic identity, gender expression, or sexual orientation that excludes an individual from participation in, denies the individual the benefits of, treats the individual differently, or otherwise adversely affects a term or condition of a person's working or learning environment. This includes failing to provide reasonable accommodation, consistent with state and federal law, to persons with disabilities.

## INQUIRIES REGARDING THE NON-DISCRIMINATION/TITLE IX POLICIES:

**Student and prospective student** inquiries concerning Section 504, Title II, Title VII, 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, Section 504, and Title II 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**
*Affirmative Action/Equal Opportunity Officer and Title IX Coordinator*
Building 200, Room 205B, Conway Campus
PO Box 261966, Conway, SC 29528-6066
843-349-5212
Jacquelyne.Snyder@hgtc.edu

## TITLE IX REQUIREMENTS:

Title IX of the Education Amendments of 1972 protects students, employees, applicants for admission and employment, and other persons from all forms of sex discrimination.

HGTC prohibits the offenses of domestic violence, dating violence, sexual assault, and stalking and will provide students, faculty, and staff with necessary information regarding prevention, policies, procedures, and resources.

Any student, or other member of the college community, who believes that they have been a victim of sexual harassment, domestic violence, dating violence, sexual assault, or stalking may file a report with the college's Title IX Coordinator or campus law enforcement*.

*Faculty and Staff are required to report these incidents to the Title IX Coordinator 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).

**Student and prospective student** inquiries concerning Title IX and its application to the College or any student decision may be directed to the Vice President for Student Affairs.

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843-349-5212
Jacquelyne.Snyder@hgtc.edu

## PREGNANCY ACCOMMODATIONS

Under Title IX, colleges must not exclude a pregnant student from participating in any part of an educational program. Horry-Georgetown Technical College is committed to ensuring that pregnant students receive reasonable accommodations to ensure access to our educational programs.

Students should advise the Title IX Coordinator of a potential need for accommodations as soon as they know they are pregnant. It is extremely important that communication between student, instructors, and the Title IX Coordinator begin as soon as possible. Each situation is unique and will be addressed individually.

Title IX accommodations DO NOT apply to Financial Aid. Financial Aid regulations do not give the College any discretion in terms of Financial Aid eligibility.

Certain educational programs may have strict certification requirements or requirements mandated by outside regulatory agencies. Therefore, in some programs, the application of Title IX accommodations may be limited.

To request pregnancy accommodations, please complete the *Pregnancy Intake Form* that can

be found here.