COURSE INFORMATION

Course Prefix/Number: RAD 103
Course Title: Introduction to Computed Tomography
Lecture Hours/Week: 2.0
Lab Hours/Week: 0.0
Credit Hours/Semester: 2.0

VA Statement/Distance Learning Attendance
Textbook Information
Student Code and Grievance Policy
Attendance Statement (3-30-4000.1)

COURSE DESCRIPTION

This course is a study of the technological developments behind computed tomography, an overview of scanner components, terminology, data acquisition, digital imaging, image reconstruction, display and manipulations. Current applications will be explored, including patient screening, contrast utilization and administration, contrast reactions and treatment, pediatrics, conscious sedation and monitoring and radiation protection.

COURSE COMPETENCIES

Module 1: Introduction to the Profession of Computed Tomography
- Outline major events in computed tomography history.
- List the generations of CT scanners.
- Describe the differences in image acquisition in the generations of scanners.
- List the main components of the CT imaging system.
- Define the components of the CT gantry.
- Explain the x-ray source.
- Define High-Voltage generation.
- Describe the function of the detector array.
- List the basic steps of data acquisition.
- Describe an overview of image reconstruction, image display and manipulation.

Module 2: Basic Radiation Safety
- Identify the appropriate application of radiation protection shielding including traditional (lead) and non-traditional (bismuth) shields.
- Describe methods used for patient dose reduction during CT exams.
- Associate radiation safety principles related to pediatric patients and the special exam precaution that should be implementing to minimize pediatric patient dose.
- Recognize the risks of administering ionizing radiation to all patients and how it related to adults.
• List dose modulation techniques that can be implemented to minimize patient dose during CT exams. (SmART mA, auto mA, CARe dose and SURe exposure)
• Define iterative reconstruction and explain how it can aid in CT dose reduction.

Module 3: Intravenous Procedures and Contrast Agents
• Identity ionic versus non-ionic contrast agents.
• Define drug solubility, viscosity, and osmolality, and toxicity as it relates to radiographic contrast media.
• Discuss the pharmacology of barium compounds and iodine compounds.
• Discuss the application of air, water and other substances as a contrast media agent.
• Outline the patient contraindications for receiving contrast media.
• Identify when an exam order and patient symptoms indicate the use of contrast media.
• Discuss the additional risks, precautions, patient education and post-procedural instructions for patients that are pregnant or lactating or on dialysis.
• Describe the correct administration and usage of various contrast agents.
• Calculate appropriate patient doses of contrast agents.
• Determine the routes of contrast administration including IV, Oral, Rectal and intrathecal.
• Express the procedures for utilizing catheters (peripheral line, central line, pICC line) and other (stoma, intra-articular) alternative methods for contrast administration.
• List and describe the principles of venipuncture and site selection.
• Differentiate aseptic versus sterile technique and when they are required.
• List the required information for documenting the use of contrast media. (site, amount, gauge, concentration, rate and number of attempts)
• Discuss the varying injection techniques and when they are appropriate. (manual, power injector options, single or dual head, single phase, multi-phase (flow rate))
• Delineate appropriate post-procedure care following an exam with contrast media.
• Describe the treatment of contrast extravasation and documentation required.
• Identify proper recognition, assessment, treatment and documentation to contrast reactions.

Module 4: Patient Preparation, assessment and monitoring for CT Exams
• Outline the process of taking a clinical history in CT.
• Explain the scheduling considerations for CT exams.
• Discuss the patient screening and consent processes for CT exams.
• Associate the appropriate patient education required for different CT exams.
• List the methods of immobilization.
• Interpret lab values screened before CT exams for renal function, blood coagulation, D-dimer, IFT, others.
• Identify lab results that will increase a patient’s risk if CT exams are completed.
• Identify patient medications that could be contraindications for a CT exam or require different instructions for post exam care.
• List the levels of consciousness.
• Restate normal patient vital signs.
• Translate and explain a patient’s heart rhythm and cardiac cycle.
• Identify the clinical application of oximetry and varying oxygen delivery systems.
• Describe the clinical applications and precautions when caring for a patient with a chest tube.
• Describe the clinical applications and precautions when caring for a patient with an indwelling catheters.
- Identify possible clinical needs for pre-procedure medications (steroid, anti-anxiety).
- Interoperate appropriate post-procedure instructions for various CT exams.

**METHODS OF INSTRUCTION**

Principles will be introduced by the instructor through the use of the learning management system via power points, outlines, computer-based lessons and modules, class discussion board, drop-box assignments and videos.

**PERFORMANCE OBJECTIVES/MINIMAL STANDARDS**

Performance objectives for each topic (unit) are included in this syllabus. A minimum grade of 80% is required to pass the course (See Grading Procedures).

**COURSE REQUIREMENTS**

All students are responsible for attaining competencies though the completion of the following course requirements:
- Participating in all class assignments (ex. Discussion board, drop-box)
- Completing online learning modules
- Reading all assigned materials as listed in the course calendar
- Completing all quizzes and tests as scheduled in the course calendar.

**Academic Integrity**

The policies stated in the York Technical College Handbook will be enforced. Any student violating these policies will be subject to academic discipline.

**GRADING PROCEDURES**

Tests are to be taken on or before the assigned dates as listed on the course calendar. Each test is only taken once and will be timed. Tests will not be open to the student until other unit assignments are complete. Semester objectives will include attendance and drop box assignments. Unit tests and the final exam will make up the remainder of the course grade. Students achieving a 93% average or above will be exempt from the final exam, but still need to complete it for registry practice.

As with all RAD courses, the grading scale is as follows:

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<thead>
<tr>
<th>Grade</th>
<th>Range</th>
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<tbody>
<tr>
<td>A</td>
<td>93 - 100</td>
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<td>B</td>
<td>86 - 92</td>
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<td>C</td>
<td>80 - 85</td>
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<td>D</td>
<td>70 - 79</td>
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<td>F</td>
<td>Below 70</td>
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**ENTRY LEVEL SKILLS**

A student entering this course must be enrolled in the Certificate in Computed Tomography Program.
PREREQUISITES

Enrollment in the Advanced Certificate in Computed Tomography program

CO-REQUISITES

AHS 206, RAD 120, RAD 135, RAD 140, RAD 145

DISABILITIES STATEMENT

Any student who feels s/he may need an accommodation based on the impact of a disability should contact the Special Resources Office (SRO) at 803-327-8007 in the 300 area of Student Services. The SRO coordinates reasonable accommodations for students with documented disabilities.