DIGITAL IMAGE ACQUISITION AND DISPLAY
Course Syllabus

Course Number: RADT-0194   OHLAP Credit: No
OCAS Code: None
Course Length: 48 Hours
Career Cluster: Health Science
Career Pathway: Diagnostic Services
Career Major(s): Radiologic Technologist

Pre-requisite(s):

Course Description: Content imparts an understanding of the components, principles, and operation of digital imaging systems found in diagnostic radiology. Factors that impact image acquisition, display, archiving, and retrieval are discussed. Principles of digital system quality assurance and maintenance are presented.

Textbooks:


Essentials of Digital Imaging Modules, ASRT, 2013

Online Resources:
Blackboard

Course Objectives:

1. Define terminology associated with digital imaging systems.
2. Describe the various types of digital receptors.
3. Describe the response of digital detectors to exposure variations.
4. Compare the advantages and limits of each receptor type.
5. Evaluate the spatial resolution of a digital imaging system.
6. Define sampling frequency.
7. Describe the Nyquist-Shannon theorem as it relates to sampling frequency.
8. Describe the impact of sampling frequency on spatial resolution.
9. Describe the impact of detector element size on spatial resolution.
10. Describe detective quantum efficiency (DQE) for digital radiography detectors.
11. Describe modulation transfer function (MTF) as it relates to digital radiography detectors.
12. Describe the histogram and the process of histogram analysis as it relates to automatic rescaling.
13. Describe the calculation of the exposure indicator (AAPM Task Group 116).
14. Define region of interest (ROI).
15. Relate the location and size of the ROI to the appearance of the image and exposure indicator.
16. Relate how the values of interest (VOI) impact image appearance.
17. Describe the process of image stitching.
18. Relate the receptor exposure indicator values to technical factors, system calibration, part/beam/plate alignment and patient exposure.
19. Describe the response of PSP systems to background and scatter radiation.
20. Use appropriate means of scatter control.
22. Identify common limitations and technical problems encountered when using PSP systems.
23. Employ appropriate beam/part/receptor alignment to avoid histogram analysis errors.
24. Associate impact of image processing parameters to the image appearance.
25. Apply the fundamental principles of radiographic exposure to digital detectors.
26. Evaluate the effect of a given exposure change on histogram shape, data width and image appearance.
27. Formulate a procedure or process to minimize histogram analysis and rescaling errors.
28. Describe continuous quality improvement (CQI).
29. Differentiate between quality assurance(QA) and quality control (QC).
30. List the benefits of a quality control management to the patient and to the department.
31. Examine the potential impact of digital radiographic systems on patient exposure and methods of practicing the As Low As Reasonably Achievable (ALARA) concept with digital systems.
32. Discuss the appropriate use of electronic masking.
33. Describe Picture Archival and Communications System (PACS) and its function.
34. Identify the components of a PACS.
35. Define Digital Imaging and Communications in medicine (DICOM).
36. Identify critical components of the DICOM header.
37. Describe HIPAA concerns with electronic information.
38. Identify common problems associated with retrieving/viewing images within a PACS.
39. Compare monitor types. (e.g. acquisition, display)
40. Describe the components of the various types of display monitors.
41. Discuss the impact of viewing angle, luminance, ambient lighting, and pixel size on image display.
42. Describe monitor aspect ratio and its impact on image display.

All objectives are taken from the ASRT (American Society of Radiologic Technologists) curriculum © 2017

Teaching Methods:
The class will primarily be taught by the lecture and demonstration method and supported by various media materials to address various learning styles. There will be question and answer sessions over material covered in lecture and media presentations. Supervised lab time is provided for students to complete required projects.
### Grading Procedures:

1. Students are graded on theory and lab practice and performance.
2. Each course must be passed with eighty (80%) percent or better.
3. Grading scale: A=90-100%, B=80-89%
4. Career Major grades established during coursework are a major criteria in successfully obtaining certification.

### Description of Classroom, Laboratories, and Equipment:

Tulsa Technology Center campuses are owned and operated by Tulsa Technology Center School District No. 18. All programs provide students the opportunity to work with professionally certified instructors in modern, well-equipped facilities.

### Available Certifications/College Credit

The student may be eligible to take state, national or industry exam after completion of the program. Tulsa Tech students may be able to earn college credit based on their knowledge gained at Tech. The process of earning credit through Prior Learning Assessment (PLA) will be determined after completion with Tech and based on certification, credential or knowledge of the subject. See program counselor for additional information.

### College Credit Eligibility:

All Tulsa Tech students (high school and adult) may have the opportunity to receive college credit upon completion of their program. Our College Relations office will work with students regarding the benefits of Prior Learning Assessments (PLA) toward an Associate of Applied Science (AAS) degree or a technical college certificate at area colleges. For more details call the College Relations office at 918.828.5000.