CASPER COLLEGE COURSE SYLLABUS
RDTK 1925
Computed Tomography Physics and Instrumentation I

Semester/Year: Fall 2015

Lecture Hours: 3  Lab Hours: 0  Credit Hours: 3


Instructor’s Name: April Perez R.T. (R) (CT)
Instructor’s Contact:  Cell Phone: 970-275-2063  Email: aperez@caspercollege.edu

Office Hours: Email or text is the best way to get a hold of me.

Course Description: Content is designed to impart an understanding of the physical principles and instrumentation involved in computed tomography. Physics topics covered include the characteristics of x-radiation, CT beam attenuation, linear attenuation coefficients, tissue characteristics and Hounsfield numbers application. Data acquisition and manipulation techniques, image reconstruction algorithms such as filtered back-projection will be explained. Radiation protection and ethical issues associated with CT will be discussed.

Statement of Prerequisites: RDTK 1610, RDTK 1640

Goal: Students will learn the physics portion of CT and the Instrumentation through a variety of modules and lectures. Students will learn through a set of lectures as well as online courses.

Outcomes:
1. List the characteristics of x-radiation.
2. Explain the interaction of x-rays with matter.
3. Explain the configuration of the CT tube and its components.
4. Define the heat load capacity of the radiographic tube and explain what it means in both conventional and spiral CT scanning.
5. Be knowledgeable of the technical factors used in CT, ie; kVp, mA
6. Understand the warm up procedure
7. Gain a basic knowledge of the data acquisition systems
8. Understand image processing to include reconstruction and post processing.

Methodology: Lecture, exploration, research

Evaluation Criteria: Test, quiz, assignments

Grade Scale: Grade percentage scale:  A = 92-100
B = 83- 91
C = 75- 82
F = 0- 74

Evaluation Criteria: Test, quiz, assignments, attendance
Attendance: 3%
Assignments:
1. Basic X-ray Review 50 pts.

Chapter Quizzes: Chapters 3-8 at 50 points each= 300 pts.
Module Quizzes: 3 module quizzes 50 points each= 150 pts.
Final Exam= 200 points
Total course points= 825

Required Text, Readings, and Materials:

Class Policies: Last Date to Change to Audit Status or to Withdraw with a W Grade: TBD
Attendance is expected, unless of inclement weather or prior arrangements have been made thru me and with approval, all exams and quizzes have a specific due date, make-up policy must be within 3 days of exam deadline and I must be notified in writing to why it was not taken during the given time frame

Student Rights and Responsibilities: Please refer to the Casper College Student Conduct and Judicial Code for information concerning your rights and responsibilities as a Casper College Student.

Chain of Command: If you have any problems with this class, you should first contact the instructor to attempt to solve the problem. If you are not satisfied with the solution offered by the instructor, you should then take the matter through the appropriate chain of command starting with the Department Head/Program Director, the Dean, and lastly the Interim Vice President for Academic Affairs.

Academic Dishonesty - Cheating & Plagiarism: Casper College demands intellectual honesty. Proven plagiarism or any form of dishonesty associated with the academic process can result in the offender failing the course in which the offense was committed or expulsion from school. See the Casper College Student Code of Conduct.

Official Means of Communication: Casper College faculty and staff will employ the student’s assigned Casper College email account as a primary method of communication. Students are responsible to check their account regularly. This is also, where you will find course evaluation links during course evaluation periods.

ADA Accommodations Policy: It is the policy of Casper College to provide appropriate accommodations to any student with a documented disability. If you have a need for accommodation in this course, please make an appointment to see me at your earliest convenience. See me privately after class, or email. To request academic accommodations, students must first consult with the college’s Disability Services Counselor located in the Gateway Building, Room 344, 307-268-2557, bheuer@caspercollege.edu. The Disability Services Counselor is responsible for reviewing documentation provided by students requesting accommodation, determining the eligibility for accommodations, and helping students request and use appropriate accommodations.
Calendar or schedule indicating course content:
Syllabus is subject to change.

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<thead>
<tr>
<th>Date</th>
<th>Content</th>
<th>Required Reading</th>
<th>Assignment</th>
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<tbody>
<tr>
<td>Aug.24 – Sept. 31 Assignment Due: Sept. 6</td>
<td>Basic X-ray Review: X-ray Characteristics, X-ray tube construction, Production of x-rays Radiation Interaction with Matter, Acquisition (Geometry), Physical Principles (Attenuation)</td>
<td>1. Computed Tomography; Physical Principles, Clinical Applications, and Quality Control, Chapter 1 2. Computed Tomography For Technologists, Chapter 1</td>
<td>Take the quiz covering this material. <strong>50 points</strong></td>
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<td>Labor Day Sept 7 Sept. 1 – Sept. 8 Assignment Due: Sept. 13</td>
<td>Digital Image Processing</td>
<td>Required Reading: 1. Computed Tomography; Physical Principles, Clinical Applications, and Quality Control, Ch. 3 Reference Suggestion: 2. Computed Tomography For Technologists, Chapter 2</td>
<td>1. Read Ch. 3 CT Physical Principles, Seeram. 2. Take quiz covering this material. <strong>50 points</strong></td>
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<td>Sept. 9 – Sept. 18 Assignment Due Sept. 27</td>
<td>CT Module: Equipment and Instrumentation</td>
<td>Equipment and Instrumentation Overview: Suggested that the student take detailed notes to be used while taking quiz covering this section.</td>
<td>1. Watch module: Equipment and Instrumentation. 2. Take quiz covering this material. <strong>50 points</strong></td>
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<td>Sept. 19 – Sept. 30 Assignment Due: Oct. 7</td>
<td>Physical Principles of Computed Tomography</td>
<td>Required Reading: 1. Computed Tomography; Physical Principles, Clinical Applications, and Quality Control, Ch. 4 Reference Suggestion: 2. Computed Tomography For Technologists, Chapter 4</td>
<td>1. Read Ch. 4 CT Physical Principles, Seeram. 2. Take quiz covering this material. <strong>50 Points</strong></td>
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<td>Oct. 1 – Oct. 11 Assignment Due: Oct. 18th</td>
<td>Data Acquisition Concepts</td>
<td>Required Reading: 1. Computed Tomography; Physical Principles, Clinical Applications, and Quality Control, Ch. 5 2. Computed Tomography For Technologists, Ch. 2</td>
<td>1. Read Ch. 5 CT Physical Principles, Seeram &amp; Ch. 2 CT for Technologists, Romans. 2. Answer questions 1-11 Chapter 2 in Text 3. Take quiz covering material from both text. <strong>50 points</strong></td>
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<td>Date Range</td>
<td>CT Module:</td>
<td>Required Reading</td>
<td>Points</td>
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<td>Fall Break – Oct. 19-20</td>
<td>Data Acquisition</td>
<td><strong>Data Acquisition Module-Overview:</strong> Suggested that the student take detailed notes to be used while taking quiz covering this section.</td>
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2. Take quiz covering this material. **50 points** |        |
| Oct. 24 – Nov. 6    | Image Reconstruction      | **Required Reading:**  
1. Computed Tomography; Physical Principles, Clinical Applications, and Quality Control, Ch. 6  
2. Computed Tomography For Technologists, Ch. 3 |        |
| Assignment Due: Nov. 13th |                 | 1. Read Ch. 6 CT Physical Principles, Seeram & Ch. 3 CT for Technologists, Romans.  
2. Answer questions 1-7 Chapter 3 in Text CT for Technologists, Romans. **35 points**  
3. Take quiz covering material from both text.**50 points** |        |
| Nov. 7 - 14         | CT Module: Image Processing and Reconstruction | **Image Processing and Reconstruction**  
**Overview:** Suggested that the student take detailed notes to be used while taking quiz covering this section. |        |
| Assignment Due: Nov. 21 |                  | 1. Watch module: Image Processing and Reconstruction  
2. Take quiz covering this material. **50 points** |        |
| Thanksgiving Break |                               | 1. Read Ch. 7 CT Physical Principles, Seeram  
2. Take quiz covering material from this chapter.**50 points** |        |
| Nov. 15 - 22        | Basic Instrumentation      | **Required Reading:**  
1. Computed Tomography; Physical Principles, Clinical Applications, and Quality Control, Ch. 7  
**Reference Suggestion:**  
2. Computed Tomography For Technologists, Chapter 5 |        |
| Assignment Due: Nov. 29 |                          | 1. Read Ch. 8 CT Physical Principles, Seeram & Ch. 8 CT for Technologists, Romans.  
2. Answer questions 1-7 Chapter 8 in Text CT for Technologists, Romans. **35 points**  
3. Take quiz covering material from both text.**50 points** |        |
| Nov. 23- Dec. 4th   | Image Post Processing and Visualization Tools | **Required Reading:**  
1. Computed Tomography; Physical Principles, Clinical Applications, and Quality Control, Ch. 8  
2. Computed Tomography For Technologists, Ch. 8 |        |
| Assignment Due: Dec. 13th |                           | 1. Read Ch. 8 CT Physical Principles, Seeram & Ch. 8 CT for Technologists, Romans.  
2. Answer questions 1-7 Chapter 8 in Text CT for Technologists, Romans. **35 points**  
3. Take quiz covering material from both text.**50 points** |        |
<p>| Nov.                 | Study for the final       |                                                                                 |        |</p>
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<th>Final Exam</th>
<th>Comprehensive: Review all course material</th>
<th>Final Exam 200 points</th>
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<td>Dec. 5 – 18th Exam must be taken by Dec. 18th</td>
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