

Bergen Community College  
Health Professions Division  
Radiation Therapy Technology Program

Course Syllabus  
RTT- 230 Advanced Procedures

**Course Description**

**RTT-230 Advanced Procedures** – This course explores advanced practices that the student will incorporate into their basic foundation of knowledge. Cross-sectional anatomy will be presented through didactic presentation. Students will be required to present and analyze case studies. Quality control parameters for therapeutic and simulation equipment will be presented through a synchronous didactic and laboratory presentation. There will be an introduction to computing, information processing, and computer concepts and various laboratory experiments.

1 lecture / 2 lab – 3 credits

Prerequisites: RTT 110, RTT 120, RTT 150

Co-requisites: RTT 210, RTT 220, RTT 221

Spring Semester

**Student Learning Objectives:**

As a result of meeting the requirements in this course, students will be able to:

1. Compare and contrast a diagnostic CT with a dedicated CT simulator
2. Describe the components and the operation of a dedicated CT simulator.
3. Demonstrate basic knowledge of CT, MRI, PET, Ultrasound and Nuclear medicine.
4. Identify and describe body planes and topographical landmarks.
5. Review the principles of imaging for imaging modalities using relevant terminology
6. Describe the use of various imaging modalities as they apply to radiation therapy.
7. Identify and describe anatomical structures
8. Identify anatomy on CT and MRI images.
9. Correlate topographic anatomy to pertinent anatomic structures.
10. Demonstrate oral and written communication through presentations of patient case studies.
11. Evaluate and discuss patient case studies. Include: diagnostic evaluation, diagnosis, patient history, treatment options, treatment, possible side effects, and outcome.
12. Define quality measures and accreditation standards for quality management in a radiation therapy department.
13. Demonstrate knowledge and understanding of treatment documentation.
14. Discuss the scope of quality management in a patient care area.
15. Discuss quality management practices relevant to radiation therapy accessory devices, communication devices and computerization.
16. Explain the importance of quality assurance for multi-leaf collimation.
17. Explain the required quality management checks specific to localization/simulation units.

18.	Discuss quality management for the safe handling of brachytherapy sources.
19.	Identify acceptable quality limits in the areas of medical dosimetry and treatment planning.
20.	Explain quality management as it applies to radiation therapy device fabrication.
21.	Describe the technical factors affecting radiographic quality, computerized imaging, portal imaging, and DRR's.
22.	Demonstrate professional growth and development through an advanced procedure presentation.

**Means of Assessment:**

The Student Learning Objectives (SLO) in this course are intended to be aligned with advanced procedures accreditation requirements, including quality assurance, medical imaging and topographic anatomy, of The Joint Committee on Education in Radiologic Technology and the New Jersey Department of Environmental Protection. These Student Learning Objectives are also correlated with the content specifications for the national registration examination in Radiation Therapy administered by The American Registry of Radiologic Technologists. Additional student learning objectives may be specified in particular units. The major assessment types (means of assessment) utilized in this course are quizzes and case studies, laboratory modules, objective tests, oral presentations and class participation.

**Course Content:**

Content is designed to provide the student with advanced concepts in medical imaging, sectional anatomy and quality assurance including laboratory practice to maximize performance in the classroom as well as in the clinic.

**Course Website:**

**RTT 230 – Advanced Procedures** is a “web-enhanced” class. The class has its own website and each member of the class has an account for the website. The BCC online course management system is known as “Moodle”. This website will provide the student with review and assessment materials..

**Course Texts and/or Other Study Materials:**

All text books are available through the Bergen Community College Bookstore.

1. Course Handouts: American College of Radiography. Quality Assurance in Radiation Therapy – A Manual for Technologists, 1982. Revised 2013

2. Madden, Michael. *Introduction to Sectional Anatomy* . Lippincott Williams & Wilkins, 2008. - ISBN13: 978-0-7817-6342-4
3. Washington, Charles M., and Leaver, Dennis. *Principles and Practice of Radiation Therapy*. Ed. 4. 2015. Mosby Publishers.

*Suggested Readings:*

1. Atlas, Scott & Kaplan. *Pocket Atlas of Cranial Magnetic Resonance Imaging*, Lippincott Williams & Wilkins, 2001.
2. Czervioke, Leo. *Pocket Atlas of Normal Spine MRI*, Lippincott Williams & Wilkins, 2001.
3. Smith, Michelle & Smith, Timothy. *Pocket Atlas of Normal CT of Head and Brain*, Lippincott Williams & Wilkins, 2001.
4. Webb, W Richard & Gotway, Michael. *Pocket Atlas of Body CT Anatomy*, Lippincott Williams & Wilkins, 2002.

*Reference handouts:*

5. Khan, Faiz, M., *The Physics of Radiation Therapy*. Philadelphia, PA: Wolters Kluwer/Lippincott Williams & Wilkins. 4<sup>th</sup> ed. 2010. ISBN 978-0-7817-8856-4.

### **Course Requirements and Learning Assessment:**

A student's final grade for the course is based primarily on his or her performance on the required work for the course (research paper, examinations and class participation).

#### **Quizzes/Homework Assignments (10% of final grade)**

Students are expected to be prepared for a quiz following each lecture topic. Quiz item format may vary. Missed quizzes may not be made up. Late homework assignments will receive a 5 point reduction per late day.

#### **Case Study/Oral Presentation (20% of final grade)**

Students are required to present a case study for the Sectional Anatomy portion of the class. Additionally, students are required to present a new or unfamiliar modality or a critique of a scholarly article from a professional journal on a new or unfamiliar modality. It is to be presented in PowerPoint format. Printed presentations will remain a part of the student's permanent file.

#### **Examinations (65% of final grade)**

Four tests will be administered in class: A quality assurance mid-term and final exam and a cross sectional anatomy mid-term and final exam. Each test will be worth 15% of your final grade. The tests cover the major topics of the course. The test schedule will follow the classroom presentation and the content of the test will be based on the required textbook readings, classroom presentations and handouts. PowerPoint presentations and supplemental handouts are distributed in class and are available through Moodle. All tests are required. In

the event that a test is missed, the student will be given a comparable test. A make-up test is at the discretion of the instructor of the course.

Additionally, a mandatory final quality assurance practicum tests will be administered in the laboratory. The test will be worth 5% of your final grade. A make-up test is at the discretion of the instructor. A missed practicum test will result in a reduction of one grade from the student's final grade.

**Overall Class/ Laboratory Participation (5% of final grade)**

In order to participate in particular lectures and discussions, all related reading and assignments must be completed prior to that class session. Please be advised that you must be present to participate, yet that alone does not constitute active participation.

The following behaviors will be utilized to assess class participation:

Positive Behaviors:

1. Attend class regularly and on time and not leave early.
2. Be well-prepared for class by doing assigned reading.
3. Participate appropriately with relevant comments, questions or answers to questions presented in class.
4. Show respect and value for the content of the course.
5. Take all online tests.

Negative Behaviors:

1. Being absent from or being late for class.
2. Leaving class early.
3. Walking out of and coming back into class.
4. Sleeping in class.
5. Devalue the content of the course.
6. Behaving inappropriately in class (e.g., acting silly, conducting private conversations in the back of the room, distracting behaviors such as eating, drinking or chewing gum in class; defacing classroom furniture; etc.)
7. Being impolite, rude, or discourteous to me or to your classmates.
8. Not being adequately prepared for class.
9. Speak without thinking – demonstrate a lack of reasoning and critical thinking skills.
10. Submit research paper late.
11. Be absent for testing.

**Laboratory Modules**

Laboratory attendance is mandatory. Laboratory modules are to be completed by the instructor at each laboratory session. The QM laboratory serves as a prerequisite to clinical demonstrations and competencies. The laboratory experience will cover sectional anatomy and quality assurance testing in the radiation therapy department. In the event of an absence, the student is required to submit a three to four-page typed paper on the topic covered. Laboratory modules are due on the day of your final examination. Late submission will result in a 5-point reduction per day of lateness.

### **Grading Policy:**

The grading policy and course grade appeal policy of the program are stated in the Radiation Therapy Student Handbook. The program grading policy utilizes the standards of the American Registry of Radiologic Technologist national registry exam.

Letter Grade	Numerical Range	Conversion
A	90% to 100%	Excellent
B+	85% to 89.9%	Very Good
B	80% to 84.9%	Good
C+	75% to 79.9%	Marginal / Acceptable
C	70% to 74.9%	Poor / Failing
I	Incomplete	
E	Unofficial withdrawal	
W	Official Withdrawal	
D / F	Does not apply to RTT courses	

There are no extra credit opportunities in this course.

### **Attendance Policy:**

**BCC Attendance Policy:** All students are expected to attend punctually every scheduled meeting of each course in which they are registered. Attendance and lateness policies and sanctions are to be determined by the instructor for each section of each course. These are to be established in writing on the individual course outline. Attendance will be kept by the instructor for administrative and counseling purposes.

**Radiation Therapy Program Attendance Policy:** Classroom attendance policy for the Radiation Therapy Program is stated in the Radiation Therapy Student Handbook. The student is responsible for adherence to this policy.

**Attendance Policy in this Course:** Students are expected to attend class regularly and punctually and for the full class period. Attendance will be taken at each class session. In the event of a late arrival, the student is expected to enter quietly without disturbing the class. In the event of an absence, it is the responsibility of the student to acquire the missed material. The attendance policy of this course will adhere to the attendance policy of the Radiation Therapy Program as stated in the Radiation Therapy Student Handbook.

Absences, lateness and early departures will diminish your overall performance in the course and, subsequently, will increase your risk of diminished performance on the ARRT national registry exam and the administration of responsible patient care. Additionally, the BCC Radiation Therapy Program provides employment assistance upon graduation from the program and ARRT registration; your classroom attendance behavior may be used by your instructor as an indicator to your employment attendance behavior.



2.	<p><b>Lecture:</b> QM: Treatment documentation practices and QM in the patient care areas.</p> <p><b>Lab:</b> Quiz of introductory sectional concepts and anatomy of the cranium. Demonstrate general conditions of the treatment and simulator room and basic components of the patient treatment chart. This includes mathematical computations, reporting errors, and the phases of treatment delivery.</p>
3.	<p><b>Lecture:</b> QM: Accessory Devices, Communication Devices and Computerization</p> <p><b>Lab:</b> Quiz on Cranium/Anatomy of the Structures and location of the Brain. Demonstrate an understanding of QM for accessory devices, immobilization devices, beam modification devices, communication devices and computerized information systems.</p>
4.	<p><b>Lecture:</b> QM: Treatment Units – Control panel, indicator lights, and mechanical and electrical safety devices</p> <p><b>Lab:</b> Quiz/ View Sectional images and identify Anatomy on the Computer and Plates. Demonstrate an understanding of QM for mechanical safety devices, termination of radiation exposure and monitoring devices.</p>
5.	<p><b>Lecture:</b> QM: Treatment Units – Light field, radiation field and collimator indicator agreement.</p> <p><b>Lab:</b> Quiz/ Anatomy of the Structures and location of Structures of the Neck. Demonstrate an understanding of QM for SSD/SAD readout devices, sources of light and radiation field alignment, alignment and accuracy of collimator field size.</p>
6.	<p><b>Lecture:</b> QM: Treatment Units – Machine outputs and dose rate constancy.</p> <p><b>Lab:</b> Quiz/ View Sectional images and identify Anatomy on the Computer. Demonstrate an understanding of QM for determining dose rate constancy and factors that affect dose rate.</p>
7.	<p><b>Lecture:</b> QM: treatment Units – Beam penetration quality and field symmetry and flatness.</p> <p><b>Lab:</b> Anatomy of the Structures and location in the Chest. Demonstrate an understanding of QM for determining constancy in beam penetrating power and field symmetry and flatness.</p>
8.	<p><b>Lecture:</b> Mid-term Examination</p> <p><b>Lab:</b> Quiz/ View Sectional images and identify Anatomy on the computer. Mid-semester Conference</p>
9.	<p><b>Lecture:</b> QM: Units – Mechanical and optical patient alignment devices and PSA linear scales</p> <p><b>Lab:</b> Anatomy of Neck. Demonstrate an understanding of QM verification and malfunction of patient alignment devices and PSA linear scales.</p>
10.	<p><b>Lecture:</b> QM: Treatment Units – Collimator rotation and gantry rotation readout devices.</p> <p><b>Lab:</b> Quiz/ View and identify images on computer and film (head and neck). Demonstrate an understanding of QM for the collimator rotation indicator, collimator angle, beam edge and gantry angle.</p>
11.	<p><b>Lecture:</b> QM: Treatment Units – Isocenter verification under collimator and gantry rotation and couch motion.</p> <p><b>Lab:</b> Anatomy of Spine/ Lymphatic System. Demonstrate an understanding of QM for stability of the isocenter under collimator and gantry rotation and the vertical axis of the treatment couch.</p>

12.	<p><b>Lecture:</b> QM: Treatment Units - Portal Imaging, MLC quality assurance.</p> <p><b>Lab:</b> Quiz/ View and identify images film on CT. QM for computerized filming will be demonstrated with MLC's, DRR's and electronic portal imaging.</p>
13.	<p><b>Lecture:</b> QM and radiation safety. QM Test Combination Efficiency</p> <p><b>Lab:</b> CT Data Acquisition/ Image Reconstruction/Quality Control. Demonstrate critical thinking and logical sequencing for concurrent and consecutive QM testing.</p>
14.	<p><b>Lecture:</b> QM and radiation safety. Brachytherapy source inventory. Mechanisms to ensure accurate inventory control.</p> <p><b>Lab:</b> Presentations* / review for sectional exam. The role QM for the treatment planning system will be correlated to the simulator and treatment machine. Accuracy checks will be demonstrated. The student will be given an HDR Brachytherapy demonstration.</p>
15.	<p><b>Lecture:</b> Final Examination</p> <p><b>Lab:</b> Make-up labs session (if needed)</p>

\* **Sectional Anatomy: Required Paper and Presentation** -Describe and compare two image modalities that are used to aid in radiation therapy treatment and include a case study of the exams.