Nursing and Health Professions
1400 Tanyard Road, Sewell, NJ 08080
856-468-5000

NMT 230: Nuclear Instrumentation and Statistics

Syllabus

Lecture Hours/Clinical Lab/Credits: 1/3/2

Catalog Description

Prerequisite: Grade of "C" or higher in NMT 205, NMT 210 and NMT 215

Pre or Co-requisite: Grade of "C" or higher in NMT 227 and NMT 233

This course includes the study of the components, operating principles and quality control procedures of nuclear and fusion imaging instrumentation, including Computed Tomography. The laboratory component provides the students with the opportunity to analyze imaging and quality control statistical data to determine the most appropriate course of action.

Textbook and Course Materials

It is the responsibility of the student to confirm with the bookstore and/or their instructor the textbook, handbook, and any other materials required for their specific course and section.

Click here to see current textbook prices at rcgc.bncollege.com.

Evaluation Assessment

Online Proctoring

All courses offered at RCSJ, whether they are web-enhanced, hybrid, or fully online, may include assessments that make use of Online Proctoring. To find out more about Online Proctoring, and to learn about the minimum technical requirements, visit rcsj.edu/elearning/online-proctoring

Grading Distribution

Grading to be determined by individual instructors.

Individual instructors may include the following assessment(s):

- Exams
- Quizzes
- Terms Identification
- Essays
- Presentations
- Group Discussions

- Attendance and Participation

Grading

The grading scale for each course and section will be determined by the instructor and distributed the first day of class.

Rowan College of South Jersey Core Competencies

(Based on the NJCCC General Education Foundation - August 15, 2007; Revised 2011; Adopted 2014)

This comprehensive list reflects the core competencies that are essential for all RCSJ graduates; however, each program varies regarding competencies required for a specific degree. Critical thinking is embedded in all courses, while teamwork and personal skills are embedded in many courses.

1. **Written and Oral Communication**: Students will communicate effectively in both speech and writing.
2. **Quantitative Knowledge and Skills:** Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems
3. **Scientific Knowledge and Reasoning:** Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.
4. **Technological Competency:** Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals
5. **Society and Human Behavior:** Students will use social science theories and concepts to analyze human behavior and social and political institutions and to act as responsible citizens.
6. **Humanistic Perspective:** Students will analyze works in the fields of art, history, music, or theater; literature; philosophy and/or religious studies; and/or will gain competence in the use of a foreign language
7. **Historical Perspective:** Students will understand historical events and movements in World, Western, non-Western or American societies and assess their subsequent significance.
8. **Global and Cultural Awareness:** Students will understand the importance of a global perspective and culturally diverse peoples.
9. **Ethical Reasoning and Action:** Students will understand ethical issues and situations.
10. **Information Literacy:** Students will address an information need by locating, evaluating, and effectively using information.

NMT 230 Core Competencies

This course focuses on one of RCSJ's Core Competencies:

- Quantitative Knowledge and Skills

Student Learning Outcomes: Nuclear Instrumentation and Statistics

Successful completion of NMT 230 will help students:	**RCSJ Core Competencies**	**Evaluation / Assessment** **(Additional means of evaluation may be included by individual instructors**
Outline criteria of procedures used to perform quality control procedures on Gamma Camera, SPECT and PET/CT instrumentation and analyze statistical data using appropriate formulize and prescribe appropriate response.	Quantitative Knowledge and Skills	Test and Quizzes Lab competency
Define operating components of gamma camera, planar and SPECT components, well counter, uptake probe and dose calibrator.		Test and Quizzes
Outline criteria of procedures used to perform quality control procedures on uptake probe and well counter and dose calibrator.		Test and Quizzes Lab Competency
Perform dose calibrator and GM detector quality control procedures and analyze data to prescribe the appropriate response.		Test and Quizzes Lab Competency

It is the responsibility of the student to review the RCSJ Information and Policies, as well as the Online Syllabus at: rcsj.edu/syllabi.

Topical Outline

Topic	**Labs**
• Module 1 Scintillation Detectors/Anger Types/ Variations and Components Collimators ○ Flat Field ○ Multihole ➢ Parallel Hole – Low, Medium, High ➢ Diverging/Converging ○ Pinhole ○ SPECT Collimators ○ Detectors – Liquid and Crystal ○ PM Tubes – Photocathode/dynodes ○ High Voltage ○ Preamplifier, Amplifier, Gain ○ Resistor/Capacitor ○ Pulse Height Analyzer ➢ Gamma Spectrometry ➢ Two Types ➢ Windows (Math)	▪ Lab 1 ○ Analyze a Gamma Spectrum to Identify Radionuclide. ○ Calculate Window Width to be Applied around Photopeak in a Given Gamma Spectrum

Topic	Labs
➢ FWHM Energy Resolution ➢ Gain o Image Display Modes/Data Storage o Analog and Digital o PAC's and DiCom o Well Counter/Uptake Probee	
• Module 2 Basics of Statistical Analysis: Considerations of Counting and Imaging o Time o Efficiency o Geometry o Attenuation o Statistical Nature, Background o Count Rate Determination o Review HVL and Inverse Square Law	▪ Lab 2: HVL o Measure Counts at Various Distances Using GM Detector to Determine Effects of Distance on Count Rate
• Module 3 Quality Control Scintillation Detectors o Uniformity – Intrinsic and Extrinsic o Spatial Resolution (Bars) o Linearity o Sensitivity o Statistical Analysis of Results o Wipe Tests and Area Surveys o Dose Calibrator QC	▪ Lab 3 o Well Counter/ Uptake Probe o Chi Square o Wipe Testing Procedures
• Module 4 Miscellaneous o Computer o Medical Informatics	▪ Lab 4 o Dose Calibrator Operation and QC to Include: Constancy, Accuracy Testing and Linearity
▪ Module 5 Components of SPECT Instrumentation o Terminology o Detector Types o Orbit o Step and Shoot o SPECT Reconstruction/ Filters	▪ Lab 5 o Analyze data from Dose Calibrator QC and Prescribe Appropriate Response
▪ Module 6 SPECT QC and Statistical Analysis o Uniformity Correction o Center of Rotation o Pixel Sizing/ Calibration o Overall System Resolution – Phantom o Attenuation correction o Linearity	▪ Lab 6 o Obtain and analyze COR and Pixal Size Date to Determine Appropriate Response

Topic	Labs
▪ Module 7 PET Instrumentation Components and QC	▪ Lab 7 ○ Obtain and Analyze PET/CT Quality Control Data to Determine Appropriate Response
▪ Module 8 Components of CT Imaging and Quality Control Fusion Imaging	▪ Lab 9 ○ Image Processing

Resources

Academic Support Center: The Academic Support Center (ACS), located in Room 603 above the College Store, offers FREE tutoring, student success workshops, structured study groups, and academic coaching for RCSJ students seeking assistance in most subjects. The phone number is 856-681-6250. For more information about all the services provided, please visit the Academic Support Center's webpage: rcsj.edu/asc.

Affirmative Action Statement

The Board of Trustees is committed to providing a work and academic environment that maintains and promotes affirmative action and equal opportunity for all employees and students without discrimination on the basis of certain enumerated and protected categories. These categories are race, creed (religion), color, national origin, nationality, ancestry, age, sex (including pregnancy and sexual harassment), marital status, domestic partnership or civil union status, affectional or sexual orientation, gender identity or expression, atypical hereditary cellular or blood trait, genetic information, liability for military service, or mental or physical disability, including AIDS and HIV related illnesses.

For questions concerning discrimination, contact Almarie J. Jones, Special Assistant to the President, Diversity and Equity/Title IX and Compliance, 856-415-2154 or ajones@rcsj.edu or (Cumberland) Nathaniel Alridge, Jr., JD, Director, Diversity and Equity/Title IX and Judicial Affairs, 856-691-8600, ext. 1414 or nalridge@rcsj.edu. For disability issues or any barriers in the learning or physical environment related to a document condition/disability please contact: Gloucester campus – Carol Weinhardt, Director, Department of Special Services, ADAAA/504 Officer at 856-415-2247 or cweinhar@rcsj.edu; or Cumberland Campus – Meredith Vicente, Senior Director, Department of Special Services/Project Assist at 856-200-4688 or mvicent1@rcsj.edu.

Department of Special Services

The Department of Special Services is committed to providing support services and ensuring equal access to eligible students with documented conditions/disabilities as outlined by the Americans with Disabilities Act (ADA) and the Americans with Disabilities Act with Amendments Act (ADAAA).

(Gloucester Campus Location and Contact)

Location: Instructional Center, room 425A.

Primary Contact: Director, Carol Weinhardt, (email) cweinhar@rcsj.edu; or (phone) 856-415-2247.

(Cumberland Campus Location and Contact)

Location: Center for Academic & Student Success (CASS)

Primary Contact: Senior Director, Meredith Vicente, (email) mvicent1@rcsj.edu; or (phone) 856-200-4688.

Reporting Allegations of Sexual Assault and Resource Referrals (08/2021)
Gloucester Campus

There are multiple safe places for students to report allegations of sexual assault, both on and off campus. Reports of sexual assault can be made to any of the following offices listed in the chart below.

All students are encouraged to report alleged crimes on campus. Crimes that pose a threat to the campus community must be reported to 9-1-1, Security, the Sheriff's Office or the Deptford Township Police Department. All employees, including Security staff, must report incidents of discrimination, harassment or sexual misconduct to the Title IX Officer.

Service	Resource	Phone Number/Location/Website
Non-Confidential Reporting Local Law Enforcement	Gloucester County Sheriff's Office Deptford Township Police Dept. Gloucester Co. Prosecutor's Office Sexual Assault Response Team	856-681-2200 856-845-2220 856-384-5500 856-384-5555
Non-Confidential Reporting 9-1-1 and **Campus Security**	**9-1-1** Gloucester County Emergency Management Dispatch Campus Security Blue Light Emergency Phones or ext. 4444 from any campus desk phone	**9-1-1 or push RED button on** Campus **Blue Light** Emergency Phones 856-681-6287
Non-Confidential On-Campus Reporting Support Services	Almarie J. Jones Special Assistant to the President Diversity and Equity/Title IX and Compliance John F. Ryder Director, Student and Veteran Affairs	856-415-2154 College Center, Room 116 *ajones@rcsj.edu* 856-468-5000, ext. 6456 College Center, room 202 *jryder@rcsj.edu*
Confidential On-Campus Counseling and Support Services	Lois Y. Lawson-Briddell, Ph.D. MSW, LSW, Director Counseling & Wellness Services Center William Leonard, Ph.D. Intervention Teams Consultant Crystal Noboa, LSW, MSW Director, The Center for People in Transition (PIT) Diane Mussoline, EdS, LMFT Executive Director of Behavioral Services	856-464-5236 *llawsonb@rcsj.edu* College Center, Room 206 856-415-2119 *wleonard@rcsj.edu* College Center, STEM Office C-168 856-415-2264 *cnoboa@rcsj.edu* Career & Technical Education Center, Room 809, 1492 Tanyard Road 856-494-5665 *dmussoli@rcsj.edu* Rowan University Center, Room 200A
Confidential Off-Campus Full-Service Support	Center for Family Services/ Services Empowering Rights of Victims (SERV)	1-866-295-7378 Camden and Gloucester counties www.centerffs.org/serv
Hospitals with Sexual Assault Nurse Examiners	Inspira Medical Center Jefferson Washington Township Hospital	700 Mullica Hill Road, Mullica Hill, NJ 08062 856-508-1000 435 Hurffville-Crosskeys Rd., Turnersville, NJ 856-582-2500