ROC - RADIATION ONCOLOGY

ROC 5010 Introduction to Radiological Physics Cr. 4
**Prerequisite:** PHY 2180, with a minimum grade of C-; PHY 3300, with a minimum grade of C.

ROC 5990 Directed Study in Medical Sciences Cr. 1-4
Introduction to modern methodology of cancer research. Students of the Division of Cancer Biology of the Department of Radiation Oncology conduct research projects under direction of research scientists. Areas of research include: molecular biology, enzyme purification, tumor biology, cellular biochemistry. Offered for graduate credit only. Offered Every Term.  
**Equivalent:** PHY 6710

ROC 6710 Physics in Medicine Cr. 3
Applications of physics in medicine including radioactivity; interaction of radiation in matter; x-ray, CT, MRI, ultrasound, and PET imaging; nuclear medicine; radiation oncology; nerve electrophysiology, electrocardiogram, pacemakers, and defibrillators. Offered for graduate credit only. Offered Winter.  
**Equivalent:** PHY 6710

ROC 7000 Imaging Physics I Cr. 4
Basic theory of medical imaging. Introduction to magnetic resonance imaging and spectroscopy, ultrasound; diagnostic radiology: radiography, fluoroscopy, CT, digital radiography, and mammography. Offered Fall.  
**Prerequisite:** ROC 5010, (may be taken concurrently), ROC 7010 Imaging Physics II: Nuclear Medicine Cr. 2

ROC 7010 Imaging Physics II: Nuclear Medicine Cr. 2
Physics of nuclear medicine, with emphasis on imaging. Offered Winter.  
**Prerequisite:** ROC 5010,

ROC 7020 Physics of Radiation Therapy Cr. 3
Lecture and demonstration in physics of radiation therapy. Offered Winter.  
**Prerequisite:** ROC 5010,

ROC 7040 Radiation Dosimetry Cr. 2
Lecture and demonstration on principles of radiation dosimetry. Dosimetry of photons, electrons, neutrons and dose from radioactive materials. Offered Winter.  
**Prerequisite:** ROC 5010,

ROC 7050 Diagnostic Imaging Laboratory Cr. 2
Practical laboratory exercises in ionometric and solid-state dosimetry techniques, quality assurance, and radiation safety for selected diagnostic imaging techniques. Offered Winter.  
**Prerequisite:** ROC 7000,

ROC 7060 Applied Radiobiology in Radiological Science Cr. 2
Fractionation, oxygen enhancement ratio, characterization of neutron beams and heavy particles for radiation therapy, radiosensitivity within cell division. Offered Fall.  
**Prerequisite:** PHY 2180, with a minimum grade of C-

ROC 7070 Radiation Safety Cr. 2
Lectures on radiation safety procedures and practices; governmental regulations on radiation safety. Offered Spring/Summer.  
**Prerequisite:** ROC 5010, with a minimum grade of C

ROC 7080 Radiotherapy Physics Laboratory Cr. 2
Practical laboratory exercises in ionometric and solid-state dosimetry techniques, quality assurance procedures for selected radiation therapy and diagnostic radiological equipment. Offered Spring/Summer.  
**Prerequisite:** ROC 7020, with a minimum grade of C; ROC 7040, with a minimum grade of C

ROC 7090 Biomedical Nuclear Magnetic Resonance Cr. 2
Principles of nuclear magnetism, absorption spectroscopy and NMR relaxation applied to NMR spectroscopy and imaging in biology and medicine. Instrumental design, operation and maintenance; cryogen management. Offered Fall.  
**Prerequisite:** PHY 2180, with a minimum grade of C-; PHY 3300, with a minimum grade of C

ROC 7110 Treatment Planning Cr. 2
Practical aspects of radiotherapy treatment planning. Lectures and exercises in patient data acquisition and computerized treatment planning for a variety of sites with both teletherapy and brachytherapy. Offered Fall.  
**Prerequisite:** ROC 7020, with a minimum grade of C

ROC 7120 Radionuclide Therapy Cr. 2
Development of radionuclide technology and its practical peaceful use from its discovery to the latest developments. Offered Fall.  
**Prerequisite:** ROC 5010, with a minimum grade of C; ROC 7020, with a minimum grade of C; ROC 7040, with a minimum grade of C

ROC 7130 Nuclear Medicine Physics Laboratory Cr. 2
Laboratory experiments calibration, Q.A., etc., on isotope generators, isotope calibrators, counting systems, spectrometers, cameras, spect and PET systems, Counting statistics, spectrum analysis. Offered Spring/Summer.  
**Prerequisite:** ROC 7010, with a minimum grade of C

ROC 7140 Nuclear Medicine Physics Laboratory Cr. 2
Independent study course covering radiological (CT/MRI) anatomy and basic anatomy and medical terminology pertinent to radiation oncology. Offered Every Term.  
**Prerequisite:** ROC 5010, with a minimum grade of C-

ROC 7150 Radiation Oncology Anatomy Cr. 2
Advanced imaging principles for students pursuing careers in medical physics or any other profession related to diagnostic imaging. Offered Winter.  
**Prerequisite:** ROC 5010, with a minimum grade of C-; ROC 7000, with a minimum grade of C

ROC 7160 Advanced Topics in Medical Physics Cr. 2
Provide an overview of the professional aspects of clinical radiation oncology physics. Involvement in practical aspects of clinical radiation oncology physics including analysis of quality assurance and practice quality improvement initiatives, review of regulatory and external certification requirements, etc. Offered Every Term.

ROC 7170 Professional Aspects of Medical Physics Cr. 2
Independent study in the uses of new technologies in clinical radiology. Offered Every Term.  
**Repeatable for 5 Credits**
ROC 7999 Essay Direction Cr. 3
Preparation of an in-depth paper on a subject in radiological physics. Offered Every Term.
Restriction(s): Enrollment is limited to students with a major, minor, or concentration in Medical Physics or Radiological Physics, enrollment is limited to Graduate level students.

ROC 8990 Special Problems in Radiation Biophysics Cr. 1-7
Independent study in advanced topics to be selected by the student in consultation with instructor. Offered Every Term.
Restriction(s): Enrollment is limited to students with a major in Medical Physics or Radiological Physics, enrollment is limited to Graduate level students.
Repeatable for 7 Credits

ROC 9990 Pre-Doctoral Candidacy Research Cr. 1-8
Research in preparation for doctoral dissertation. Offered Every Term.
Repeatable for 12 Credits

ROC 9991 Doctoral Candidate Status I: Dissertation Research and Direction Cr. 7.5
Offered Every Term.

ROC 9992 Doctoral Candidate Status II: Dissertation Research and Direction Cr. 7.5
Offered Every Term.
Prerequisite: ROC 9991,

ROC 9993 Doctoral Candidate Status III: Dissertation Research and Direction Cr. 7.5
Offered Every Term.
Prerequisite: ROC 9992,

ROC 9994 Doctoral Candidate Status IV: Dissertation Research and Direction Cr. 7.5
Offered Every Term.
Prerequisite: ROC 9993,

ROC 9995 Candidate Maintenance Status: Doctoral Dissertation Research and Direction Cr. 0
Offered Every Term.
Prerequisite: ROC 9994,

ROC 9996 Radiation Oncology Physics Clinical Rotation I Cr. 7.5
Prereq: DMP candidate in department and written consent of the program director. Required in Fall term of Year 3 of Professional Doctorate program. Offered for S and U grades only. Offered Every Term.

ROC 9997 Radiation Oncology Physics Clinical Rotation II Cr. 7.5
Prereq: Satisfactory completion of ROC 9996 and written consent of the program director. Required in Winter term of Year 3 of Professional Doctorate program. Offered for S and U grades only. Offered Every Term.

ROC 9998 Radiation Oncology Physics Clinical Rotation III Cr. 7.5
Prereq: Satisfactory completion of ROC 9997 and written consent of the program director. Required in Fall term of Year 4 of Professional Doctorate program. Offered for S and U grades only. Offered Every Term.

ROC 9999 Radiation Oncology Physics Clinical Rotation IV Cr. 7.5
Prereq: Satisfactory completion of ROC 9998 and written consent of the program director. Required in Winter term of Year 4 of Professional Doctorate program. Offered for S and U grades only. Offered Every Term.