

**CRPPH SPONSORED SURVEY  
OF UNIVERSITY LEVEL EDUCATION PROGRAMMES  
IN RADIATION PROTECTION**

**ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT**

**Paris**

**53376**

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## **ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT**

Pursuant to Article 1 of the Convention signed in Paris on 14th December 1960, and which came into force on 30th September 1961, the Organisation for Economic Co-operation and Development (OECD) shall promote policies designed:

- to achieve the highest sustainable economic growth and employment and a rising standard of living in Member countries, while maintaining financial stability, and thus to contribute to the development of the world economy;
- to contribute to sound economic expansion in Member as well as non-member countries in the process of economic development; and
- to contribute to the expansion of world trade on a multilateral, non-discriminatory basis in accordance with international obligations.

The original Member countries of the OECD are Austria, Belgium, Canada, Denmark, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The following countries became Members subsequently through accession at the dates indicated hereafter; Japan (28th April 1964), Finland (28th January 1969), Australia (7th June 1971), New Zealand (29th May 1973), Mexico (18th May 1994), the Czech Republic (21st December 1995), Hungary (7th May 1996), Poland (22nd November 1996) and the Republic of Korea (12th December 1996). The Commission of the European Communities takes part in the work of the OECD (Article 13 of the OECD Convention).

### ***NUCLEAR ENERGY AGENCY***

*The OECD Nuclear Energy Agency (NEA) was established on 1st February 1958 under the name of OEEC European Nuclear Energy Agency. It received its present designation on 20th April 1972, when Japan became its first non-European full Member. NEA membership today consist of all OECD Member countries, except New Zealand and Poland. The Commission of the European Communities takes part in the work of the Agency.*

*The primary objective of NEA is to promote co-operation among the governments of its participating countries in furthering the development of nuclear power as a safe, environmentally acceptable and economic energy source.*

*This is achieved by:*

- *encouraging harmonization of national regulatory policies and practices, with particular reference to the safety of nuclear installations, protection of man against ionising radiation and preservation of the environment, radioactive waste management, and nuclear third party liability and insurance;*
- *assessing the contribution of nuclear power to the overall energy supply by keeping under review the technical and economic aspects of nuclear power growth and forecasting demand and supply for the different phases of the nuclear fuel cycle;*
- *developing exchanges of scientific and technical information particularly through participation in common services;*
- *setting up international research and development programmes and joint undertakings.*

*In these and related tasks, NEA works in close collaboration with the International Atomic Energy Agency in Vienna, with which it has concluded a Co-operation Agreement, as well as with other international organisations in the nuclear field.*

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## INTRODUCTION

One of the challenges which has always faced the radiation protection community is that of the adequate education and training of its personnel. This was highlighted during the January 1993 CRPPH sponsored Workshop on Radiation Protection on the Threshold of the 21st Century. Conclusion 2.3 reads as follows:

*It was observed that the level of effort and resources devoted to radiation protection appears to be decreasing in many countries. This trend, which affects radiation protection laboratories and scientists, is seen with concern, because it could eventually have detrimental effects on the standards of protection and economic and social consequences, due to the progressive loss of needed expertise and facilities.*

One of the questions that this observation raises is that of education: how, in various countries, do radiation protection professionals receive their education in radiation protection, and how many trained personnel are produced? Some preliminary work in this area has shown that not all countries offer university degrees specifically in radiation protection, and that the exchange of students and faculty members between universities in different countries is rare. These facts will affect the number of professionals available in the future, and the scope of their perspectives.

To address this problem, and to foster broader exchange of ideas and research in radiation protection, the CRPPH agreed that it would be of value to perform a survey of its member countries to learn more about the status of the education of radiation protection professionals. The intent of this survey was to provide an information data base to be used by students (old and young) wishing to pursue an education in radiation protection, and by faculty members wishing to broaden their research perspective by spending sabbatical periods at other universities.

It is recognised that there exist many short courses, in all areas of radiation protection, which are intended as refresher courses for radiation protection professionals, or as introductory radiation protection courses for those disciplines for whom radiation protection is not a primary responsibility (engineers, job planners, equipment buyers, contract administrators, etc.). This survey was not intended to address these types of courses. This survey was intended to address the university-level programmes which produce trained radiation protection professionals.

The results of this survey are presented here, listed by country and by university. It is encouraging to note that there are currently 71 Universities listed having some sort of radiation protection degree programme. It is hoped that this document will be useful to both students and professors, and that as this document is updated, more detailed information will become available. Updates of this document will be produced approximately every three to four years.

Note that a copy of the survey form is attached as an Annex to this document. This questionnaire should be used to inform the NEA of any additions or changes suggested for subsequent modifications of this document.

It should be noted that the information concerning programmes at American universities has been compiled by the American Health Physics Society's Academic Education Committee (AEC), which has as one of its responsibilities to maintain and periodically publish a comprehensive list of health physics academic programs. For an American programme to be listed, it must have at least one full-time faculty member serving as program director. Programs in medical physics were included only if they had a degree component and/or faculty research interest in the area of medical health physics. The program descriptions are followed by a list of undergraduate and graduate fellowships/scholarships for which health physics students may be eligible. Award amounts and application deadlines are always subject to change; students are encouraged to contact the individuals listed for application specifics.

## **AUSTRALIA**

### **INDEX**

1. University of South Australia
2. Queensland University of Technology

**University of South Australia**  
School of Applied Physics  
University of South Australia  
The Levels  
Poorala, South Australia 5095

<b>Contact:</b>	Mr. David PAIX <b>Tel:</b> +(61) 8 343 3040
<b>Degrees granted:</b>	MSc in Medical and Health Physics PhD in Medical and Health Physics
<b>Faculty:</b>	Dr. Alun H. Beddoe, Associate Professor Mr. David Paix, Senior Lecturer Dr. John Patterson
<b>Visiting faculty financial assistance:</b>	No information provided
<b>Faculty Research Areas:</b>	<ul style="list-style-type: none"><li>• Radiation monitoring devices for uranium miners</li><li>• In-vivo neutron activation analysis</li><li>• Radiation therapy treatment planning</li></ul>
<b>Students:</b>	15 MSc and PhD students in the Programme (1993)

**Queensland University of Technology**

School of Physics  
GPO Box 2434  
Brisbane QLD 4001  
AUSTRALIA

**Contact person:** Dr. T. van Doorn, Senior Lecturer, School of Physics  
**Tel:** +617 864 2591 **Fax:** +617 864 1521 **e-mail:** t.vandoorn@out.edu.au

**Degrees Granted:** Master of Applied Science, Med. Pys. (~6 Diplomas granted per year)

**Faculty:** Full-time teaching/research (4 members)  
Part-time teaching/research (2 members)  
Full-time research (1 member)  
Part-time research (3 members)

note: above numbers include those working in the area of non-ionising

**Research Areas:**

- Radiological impact assessment of contaminated sites
- Environmental transport of radioactivity and studies related to erosion and sedimentation
- Radiological exposure due to radioactivity carrying aerosols in a mineral sands processing plant
- Use of nuclear track detectors for measurement of radon in buildings
- Development of new dosimeters for assessment of harmful UV
- Environmental UV dose modelling
- Spectroradiometry calibration of UV sources
- Effects of ozone depletion prediction
- Efficacy of shade structures
- Evaluation of gel dosimetry for clinical radiotherapy treatment planning

<b>Students:</b>	full-time	part-time
undergraduate		
masters	6	3
doctorate	2	
other		

**Student financial assistance:**

Scholarships: National & Corporate:  
Contact: Research Student Office  
QUT, +617 864 2932

Fellowships: National  
Contact: Office of Research  
QUT, +617 864 2932

Teaching: Yes  
Assistantships  
Contact: School of Physics  
QUT, +617 864 2325

**Visiting faculty  
financial  
assistance:**

**Adjunct professor**

The appointment of an adjunct professor is designed to enrich QUT's educational programme by involving distinguished and talented professionals and academics in teaching and research activities. A proforma for the nomination of adjunct professors is detailed in Appendix 11.

The number of adjunct professors appointed in any year will be determined within the context of the annual budget.

An adjunct professor is involved in activities such as:

- undergraduate and postgraduate teaching
- participation in seminars with advanced students and staff
- discussion with school staff on course, subject area, and unit structure, content and development
- participation in workshops, seminars, University lectures, continuing education programmes or conferences (through the Division of Research and Advancement) for the general public or specific outside group
- participation in school research programmes.

Adjunct professors are expected to have a marked influence on the activities of the faculty in which they serve. With this in mind, the period of residence and type of attendance are flexible. Full-time attendance for at least half a semester is suggested.

For the period of appointment, adjunct professors may be granted the following benefits and privileges:

- salary at professional level
- an appropriate return airfare for appointees
- an accommodation allowance of \$300 per week
- full use of the facilities of a school including office space and telephone
- full use of QUT facilities including libraries and computing facilities
- workers' compensation insurance protection.

**Appointment**

An adjunct professor will be appointed by Council on the recommendation of the Vice-Chancellor advice from the appropriate dean of faculty.

**Research facilities:**

- UV laboratory with spectrodaiometer, radiation monochromator, badge dosimetry readers and solar simulators
- low level gamma and alpha counting laboratory
- access to whole body counting facility
- radioisotope laboratory with TLD system

## **CANADA**

### **INDEX**

1. McMaster University

**McMaster University**  
Physics and Astronomy  
1280 Main Street West  
Hamilton, Ontario  
L8S 4M1 Canada

**Contact person:** D.R. Chettle, Professor, Co-ordinator Health and Radiation Physics  
**Tel:** +1 (905) 525 9140 (ext.: 27340)  
**Fax:** +1 (905) 546 1252  
**e-mail:** chettle@mcmaster.ca

**Degrees Granted:** Undergraduate (~10 per year) and Masters (~3 per year)

### Undergraduate Programmes

- a) *Honours Medical and Health Physics, admission is to level II, following successful completion of appropriate courses from level I Natural Sciences*

#### Level I

Physics 1A06 MECHANICS, ELECTRICITY AND MODERN PHYSICS Lectures and laboratory work on mechanics, electricity, atomic and nuclear physics. Primarily intended for students proceeding in the physical sciences.

#### Math 1A03 CALCULUS I

Differential calculus, the definite integral, techniques of integration, partial derivatives, applications, with some emphasis placed on theory.

#### Math 1AA3 CALCULUS II

The continuation of MATH 1A03. Topics will include applications of the integral, sequences and series, power series, differential equations.

#### Math 1B03 LINEAR ALGEBRA I

Vectors, matrices, determinants, vector spaces, complex numbers, with applications.

#### Biology 1A06 ADAPTATION IN THE BIOLOGICAL WORLD

A course in introductory Biology which stresses the adaptation of form and function at the levels of molecules, cells, organisms and populations.

#### Chemistry 1A06 INTRODUCTORY CHEMISTRY

First term: An introduction to inorganic chemistry; molecular structure and equilibrium.  
Second term: An introduction to organic chemistry and kinetics. The laboratory is designed to illustrate the lecture material and co-ordinates with it.

Computer Science 1MA3 INTRODUCTION TO COMPUTER PROGRAMMING

Organisation and characteristics of computers; introduction to packages; algorithmic development, stepwise refinement, modularisation, searching and sorting methods, problem solving; data types, arithmetic/logical expressions, looping, arrays, subprograms, input/output, style, and program testing.

Level II

Biochemistry 2E03 ELEMENTARY BIOCHEMISTRY

(or Biochem 3G03 and Biochem 3GG3 in level III)

A treatment of the basic areas of biochemistry, including physiological biochemistry. Designed for students who do not intend to pursue biochemistry.

Chemistry 2D03 INTRODUCTORY ORGANIC CHEMISTRY

(or Chem. 2006)

An introduction to the chemistry of monofunctional aliphatic and aromatic compounds.

Math 2E03 INTRODUCTION TO MODELLING

General features of modelling. Examples from chemistry, physics, biology and economics are treated by a variety of elementary methods. Computer packages are used when appropriate.

Math 2G03 INTERMEDIATE CALCULUS

Differential calculus of several variables, multiple integrals, line and surface integrals.

Math 2003 DIFFERENTIAL EQUATIONS

Ordinary differential equations with constant coefficients, series solutions, special methods; Laplace transforms, Fourier series; introduction to partial differential equations.

Physics 2B06 ELECTRICITY AND MAGNETISM

Electrostatics, D.C. and A.C. circuits, the magnetic field; Faraday's law of induction; Maxwell's equations.

Physics 2G03 MECHANICS OF A PARTICLE

Vectorial treatment of the mechanics of a particle in three dimensions. Special Relativity.

Physics 2H03 THERMAL PHYSICS

Introduction to heat and the kinetic theory of gases.

Biology 2B03 CELL BIOLOGY

Basic treatment of cell structure and function, including transport and chemical signals; adaptation of structure and function in specialised cells.

### Level III

- Math 3C03 MATHEMATICAL PHYSICS I  
Linear algebra and eigenvalue problems; partial differential equations, orthogonal functions, Fourier series, Legendre functions, spherical harmonics.
- Physics 3H04 INTERMEDIATE LABORATORY  
Experiments in atomic and neutron physics, optics and spectroscopy, mechanics.
- Physics 3N03 PHYSICAL OPTICS  
Interference; Fraunhofer and Fresnel diffraction; Maxwell's equations and the electromagnetic character of light; polarisation and double refraction; interference of polarised light; selected topics in modern optics.
- Physics 3003 MODERN PHYSICS  
Phenomenological basis for quantum physics, topics from atomic and photon physics; wave phenomena; Schrodinger equation for one dimensional systems.
- Physics 3Q03 INTRODUCTORY QUANTUM MECHANICS  
Operator algebra. The Schrodinger equation. The square well, harmonic oscillator, barriers, perturbations, transition matrix elements, and selected three dimensional problems.
- Physics 3R03 COMPUTATIONAL MEDICAL PHYSICS  
A problem-based introduction to the use of numerical methods in medical physics.
- Physics 3T03 RADIOACTIVITY AND RADIATION INTERACTIONS  
Radioactivity and radiation phenomenology; interaction of radiations with matter, dosimetry, tracer methods, radiation in medicine, biological effects, radiation levels and regulations, radiation protection.

### Level IV

- Biology 4U03 RADIATION BIOLOGY AND RADIATION BIOPHYSICS  
The effects of radiation on biological material at the molecular, cellular, tissue and whole organism level. Applications of radiation in medicine and toxicology.
- Engineering Physics 3X03 HUMAN PHYSIOLOGY  
Basic introduction and working knowledge of the human body. Includes study of the cellular level of organisation.

OR

- Engineering 4X03 CONCEPTS IN BIOMEDICAL ENGINEERING  
Engineering and physical science approach to human physiological systems; cardiovascular system, with specific organ circulations, respiratory systems, overall integration and control.

- Physics 4A03 SPECIAL TOPICS  
Independent study of the scientific literature, including the preparation of seminars and reports on assigned topics.
- Physics 4D06 DIGITAL LOGIC AND COMPUTER SYSTEMS  
The design and use of digital logic systems and their application to data acquisition and control techniques. The project-oriented laboratory involves both hardware and software.
- Physics 4E03 NUCLEAR PHYSICS  
Nuclear masses and stability; radioactivity and nuclear reactions; elementary nuclear models.
- Physics 4K03 SOLID STATE PHYSICS  
Crystal structure and binding; lattice vibrations; electron energy bands; metals and semiconductors; magnetism.
- Physics 4R03 RADIATION AND RADIOISOTOPE METHODOLOGY  
Lectures and laboratory work in the techniques and theory of the measurement of radiation. Topics include radioactivity and radioactive decay, solid state dosimetry, principles of radioactive detectors, counting statistics and data reduction, advanced multidetector systems.
- Physics 4T03 INTRODUCTION TO MEDICAL PHYSICS  
Basic concepts in radiology, nuclear medicine, radiotherapy, physiological measurements and laser applications.
- a total of 6-12 units of electives (3 units = 1 semester course) are taken during the programme

**b) Honours Medical and Health Physics Co-op**

*This programme has the same content as Honours Medical and Health Physics except*

- (i) students undertake two work placements of approximately one month each: one starts after 2½ years of the academic programme have been completed; the second starts after 3½ years of the academic programme
- (ii) Physics 4A03 is replaced by Physics 3101 plus Physics 4101
- (iii) The programme takes 5 years, rather than four years and the order in which some courses are taken is altered to accommodate the co-op work placements.

**c) Engineering Physics - Nuclear Engineering (this is a recognised area within Engineering Physics, rather than a formal programme). The following courses are particularly relevant.**

Eng Phys 3D03 PRINCIPLES OF NUCLEAR ENGINEERING

Introduction to fission and fusion energy systems. Energetics of nuclear reactions, interactions of radiation with matter, radioactivity, design and operating principles of fission and fusion reactors.

Eng Phys 4D03 NUCLEAR REACTOR ANALYSIS

Introduction to nuclear energy; nuclear physics and chain reactions; reactor statics and kinetics; multigroup analysis, core thermalhydraulics; reactor design.

Eng Phys 4L03 NUCLEAR REACTOR THERMALHYDRAULICS

Introduction to two phase flow and nuclear reactor thermalhydraulics systems. Condensation and boiling phenomena and heat transfer mechanisms. Two phase flow apparatus and diagnostics techniques. Modelling of two phase flow by homogeneous and separated flow models.

Eng Phys 4N03 PRINCIPLES OF FUSION ENERGY

Fusion phenomena and the plasma state; reaction analysis; Coulomb scattering; field effect trajectories; magnetic field configurations; particle transport; energy viability; burn cycles; inertial confinement; muon catalysed fusion.

Eng Phys 4U04 MODERN AND APPLIED PHYSICS LABORATORY

Selected advanced experiments in two areas of applied physics, chosen from among; lasers and electro-optics; solid state electronics; nuclear engineering.

## Graduate Programmes

*a) Health and Radiation Physics - M.Sc.*

In this programme students are required to complete six courses. They then sit a written comprehensive examination. This is followed by a project which is expected to last four months. In practice, students frequently take 12-16 months to complete the programme.

The required courses are:

Biology 6U03 RADIATION BIOLOGY AND RADIATION BIOPHYSICS

The effects of radiation on biological material at the molecular, cellular, tissue and whole organism level. Applications of radiation in medicine and toxicology.

Physics 6R03 RADIATION AND RADIOISOTOPE METHODOLOGY

Lectures and laboratory work in the techniques and theory of the measurement of radiation. Topics include radioactivity and radioactive decay, solid state dosimetry, principles of radioactive detectors, counting statistics and data reduction, advanced multidetector systems.

Physics 771 ISOTOPES IN-VIVO

Discussion of how various practical aspects of the production and in-vivo use of radioactive isotopes impact upon radiation doses of people who work with radioisotopes and people to whom radioactivity is administered either by design or by accident. Discussion of the regulatory processes involved in the production and in-vivo use of radiochemicals.

Physics 772 MEDICAL HEALTH PHYSICS

Health Physics aspects of ionising and non-ionising forms of radiation commonly used in medicine. Includes ultraviolet, visible, infrared, radiofrequency/microwave, ultrasound, diagnostic x-rays, radiation therapy.

Physics 775 ADVANCED RADIATION PHYSICS

Mathematical analysis of the radiation field; interaction coefficients, survey of interactions, radiation transport, electromagnetic and hadronic cascades, exposure, dose, kerma, dose equivalent, micro-dosimetry, interface dosimetry, cavity theory, shielding theory.

Physics 776 PRINCIPLES OF RADIATION PROTECTION

Dose limitation, stochastic and non-stochastic effects, collective dose equivalent, effective dose equivalent, internal exposures, committed dose equivalent, cost-benefit analysis, sources of radiation, environmental monitoring, waste management, instrumentation, facility designs, applied health physics.

***b) Physics and Astronomy (Medical Physics) M.Sc., Ph.D.***

In this programme, students are required to complete a minimum of four courses for the M.Sc., plus they undertake research which they present in the form of a thesis. Students usually take about 20-24 months to complete the programme.

Three courses are required:

Biology 6U03 RADIATION BIOLOGY AND RADIATION BIOPHYSICS

The effects of radiation on biological material at the molecular, cellular, tissue and whole organism level. Applications of radiation in medicine and toxicology.

Physics 6R03 RADIATION AND RADIOISOTOPE METHODOLOGY

Lectures and laboratory work in the techniques and theory of the measurement of radiation. Topics include radioactivity and radioactive decay, solid state dosimetry, principles of radioactive detectors, counting statistics and data reduction, advanced multidetector systems.

Physics 775 ADVANCED RADIATION PHYSICS

Mathematical analysis of the radiation field; interaction coefficients, survey of interactions, radiation transport, electromagnetic and hadronic cascades, exposure, dose, kerma, dose equivalent, micro-dosimetry, interface dosimetry, cavity theory, shielding theory.

For a fourth course, students frequently choose one of Physics 771, 772, 776, listed above or

Physics 774 MEMCAL IMAGING

The theory of medical imaging is covered by a detailed examination of the principles of image formation, image reconstruction from projections and image evaluation. This is complemented by experiments in Positron Tomography, Single Photon Emission Computed Tomography, X-ray Computerised Tomography and Magnetic Resonance Imaging.

At the Ph.D. level, students are required to complete a minimum of a further four courses beyond the M.Sc. level. They have to pass an oral comprehensive examination, usually about 21 months after

registering in this Ph.D. programme. Also, of course, they have to undertake research which is defended as a thesis. Completion times for Ph.D.'s are variable, but 3 to 4 years post M.Sc. is typical.

**c) *Engineering Physics M.Eng., Ph.D.***

The following courses relate to nuclear engineering

**Eng Phys 6D03 NUCLEAR REACTOR SYSTEMS ANALYSIS**

Release and utilisation of energy from nuclear process; steady state and dynamics of chain reactions; neutron distributions and nuclear fuel cycle analysis; systems analysis of alternative nuclear energy concepts (e.g. hybrids, spallation breeders etc.). The McMaster University Nuclear Reactor will be used as a demonstration facility, and a field trip to a nuclear power installation will be undertaken.

**Eng Phys 6L03 INTRODUCTION TO REACTOR THERMOHYDRAULICS**

Introduction to thermal hydraulics loops in power stations; two phase flow modelling; two-phase flow diagnostic techniques; and transient thermal fluid flows.

**Eng Phys 6N03 PRINCIPLES OF FUSION ENERGY**

Nuclear kinetics; reaction analysis; Coulomb scattering; field effect trajectories; magnetic field configurations; particle transport; energy viability; burn cycles; inertial confinement; muon catalysed fusion.

**Eng Phys 702 ADVANCED NUCLEAR ENERGY**

General matter-energy transformations and their dynamics; reaction viability and sustainability; breeding and multiplication, advanced fusion fuel cycles; fusion sustainment by magnetic, inertial, and catalytic processes; small and direct energy conversion nuclear batteries, nonlinear reaction dynamics; mathematical reactor parameterisation .

**Eng Phys 711 FUSION PHYSICS**

Fusion reactions and kinetics; introductory plasma physics; distribution effects; energetics and reaction chaining; magnetic field topologies; inertial confinement and nuclear hydrodynamics; fusion catalysis and aneutronic processes; non-linear nuclear reaction dynamics; fusion-fission symbiosis.

**Eng Phys 712 NUCLEAR REACTOR ANALYSIS I**

Neutron distributions; multigroup neutron diffusion; reactor statics and kinetics; depletion and breeding analysis.

**Eng Phys 713 NUCLEAR REACTOR ANALYSIS II**

Time dependent analysis of neutron multiplying media; point kinetics; space-time analysis; depletion, breeding and conversion; reactivity effects. Nuclear energy transport; characterisation of reactor thermalhydraulic processes; selected solution formulations and applications in simulation; system dynamics; component design analysis.

**Eng Phys 715 ADVANCED NUCLEAR REACTOR THERMALHYDRAULICS**

Advanced topics of current interest in the area of fission and fusion nuclear reactor primary heat transport system, system safety and the transitional operations.

## Eng Phys 716 CANDU HEAT TRANSPORT SYSTEM DESIGN

Thermalhydraulic design and analysis of the primary heat transport of CANDU nuclear reactors, emphasising the main characteristics. System equations are developed from fundamental heat and mass transfer conservation equations.

## Eng Phys 731 PARTICLE/ENERGY TRANSPORT AND DYNAMICS

Analysis of particle-photon transport and dynamics in various media; discrete/continuous transport effect; integrated classification of case specific transport formulations; reaction characterisations associated with neutral/charged particles; non-linear dynamical equations and methods of analysis.

**Faculty:** Full-time teaching/research faculty (4)  
Part-time teaching/research faculty (8)  
Full-time research faculty (2)  
Visiting faculty (1)

**Research Areas:**

- in vivo elemental analysis of toxic metals: Pb, Cd, Al, U
- body composition (water, protein, fat) using nuclear analytical probes
- development of radiation protection (educational) materials for electronic media
- high speed digital and analogue systems for nuclear pulse processing
- radio labelled monoclonal antibodies for diagnosis and therapy
- quantitation of functional imaging in positron emission tomography
- dosimetric models for photodynamic therapy
- quantitative fluorescence and absorption spectroscopy to characterize chemicals in vivo time resolved and frequency domain methods for optical imaging
- electron dosimetry at interfaces: computation and experiment
- study of DNA repair deficiencies using viral, cell culture and recombinant techniques
- neutron microdosimetry below 100 keV
- microdosimetry related to cellular and molecular level radiation damage
- characterisation of risk and treatment of metabolic bone disease
- imaging control systems for laser based thermal cancer therapy
- modelling reactor core physics and thermalhydraulics
- real time fault detection in reactor operation systems
- general fitness of emerging nuclear energy system in the long term

**Visiting faculty financial assistance:**

- hooker Distinguished Visiting Professor
- bilateral exchange programmes have been negotiated between Canada and a number of other nations
- individual faculty members at McMaster can sometimes provide partial support for visiting faculty from their research funds

<b>Students:</b>	full-time	part-time
undergraduate	18	-
masters	15	1
doctorate	10	3
other <sup>1</sup>		150

<b>Student financial assistance:</b>	Scholarships:	Nationally sponsored:	yes
		Regionally sponsored:	yes
	Fellowships:	Nationally sponsored:	yes

Scholarships and Fellowships are available to Canadian citizens and residents on a competitive basis from the: Natural Sciences & Engineering Research Council

Scholarships & Fellowships Division  
350 Albert Street  
Ottawa ON K1A 1H5 Canada

Scholarships are also available to residents of the province of Ontario from:  
Ontario Graduate Scholarship Program  
Student Affairs  
Ministry of Education and Training  
P.O. Box 4500  
4th Floor, 189 Red River Road  
Thunder Bay ON P7B 6G9 Canada

Student teaching assistantships: yes

Student research assistantships: yes

Student teaching assistantships and research assistantships are administered through McMaster University School of Graduate Studies in association with the Department of Physics and faculty research supervisors

- Professional Certification:**
- there is no “professional certification” in radiation protection in Canada
  - our Health & Radiation Physics programme is patterned after training criteria for certification in other jurisdictions within the OECD, particularly in the comprehensive examination

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<sup>1</sup> Non-specialist faculty, students and staff requiring training in radiation protection and radioisotope handling.

## **CZECH REPUBLIC**

### **INDEX**

1. Czech Technical University

**Czech Technical University**  
Faculty of Nuclear Science and Physical Dosimetry  
Czech Technical University  
115 19 Prague 1  
Brehova 7  
CZECH REPUBLIC

<b>Contact:</b>	Dr. J. Sabol <b>Tel:</b> +42 (2) 231 51 12
<b>Degrees Granted:</b>	Engineering Degree (BS & MSc Equivalent) in Nuclear Engineering, specialisation in Dosimetry and Application of Ionizing Radiation  PhD in Dosimetry and Application of Ionizing Radiation
<b>Faculty:</b>	Dr. Chchak, Department Chairman Dr. J. Sabol, Associate Professor Dr. Hamak, Associate Professor 3 Senior Assistant Professors
<b>Faculty Research Areas:</b>	<ul style="list-style-type: none"><li>• Mixed neutron-gamma dosimetry</li><li>• Evaluation of environmental radioactivity and radiation fields</li><li>• Reasurements of doses in radiology and radiotherapy</li><li>• Radiation damage and high dose measurement</li><li>• Radiation transport using Monte-Carlo methods</li><li>• Solid state and chemical dosimetry</li><li>• Nuclear instrumentation</li><li>• X-ray fluorescence analysis</li><li>• Evaluation and monitoring of radon in the environment and in dwellings</li><li>• Mocrodosimetry and Nanodosimetry</li></ul>
<b>Visiting faculty financial assistance:</b>	no information provided
<b>Students:</b>	500 students in the Faculty of Nuclear Sciences and Physical Engineering (FNSPE), no specification as to number in Dosimetry Speciality
<b>Student financial assistance programme:</b>	no information provided
<b>Research facilities:</b>	no information provided

## **FRANCE**

### **INDEX**

1. Institut National des Sciences et Techniques Nucléaires (INSTN)
2. Université Joseph Fourier

**Université Joseph Fourier**  
National Institute for Nuclear Sciences and Technology  
Centre de Recherches du Service de Santé des Armées  
Institute for Nuclear Safety and Protection  
CHU - Unité de Concertation  
BP 217  
F-38043 Grenoble CEDEX 09  
FRANCE

**Contact person:** Dr. Kolodie  
**Tel:** 33 (16) 7628 4071 **Fax:** 33 (16) 7654 1782

**OR**

**Contact person:** M. Charles  
**Tel:** 33 (16) 7628 4071 **Fax:** 33 (16) 7888 5101

**Degrees Granted:** Masters in Radiation Protection (~ 15 per year)

**Curricula:** Engineer,  
4 years University graduates in physics, chemistry, & biology  
2 years University graduates  
5 years professional experience in radiological protection

**Faculty:** The course involves approximately fifty full-time or part-time teachers originating from various fields of expertise

**Research Areas:**

- Dosimetry for various types of ionizing radiation
- Biological effects: deterministic and Stochastic
- Non-ionizing radiations: physical aspects and biological effects
- Operational radiological protection: occupational aspects, public exposure, medical exposure, ALARA approach
- Safety and radiological protection
- Management of accident situations

**Financial Assistance:** May be sought from the International Atomic Energy Agency (IAEA) or the European Union (EU)

<b>Students:</b>	full-time	part-time
undergraduate	-	-
masters	10	-
doctorate		-
other	5	-

**Student financial assistance programmes:**

Fellowships      nationally sponsored and corporately sponsored

**Research facilities:**

- Laboratories of CEA and IPSN, EdF and COGEMA
- Various French hospitals

**Professional Certification:**

Formal “Professional Certification” is not compulsory in France

However professionals are closely associated to:

- the definition of the educational content
- the evaluation of the students level

**National Institute for Nuclear Sciences and Technology**  
Radioprotection Department  
CEA-SACLAY  
F-91191 Gif-sur-Yvette Cedex  
FRANCE

**Contact person:** NOLIBÉ, Head of Radioprotection Education Department  
**Tel:** 33 (1) 6908 8909 **Fax:** +33 (1) 6908 5753  
**e-mail:** tomasik@instndir.cea.fr

**Degrees Granted:** Undergraduate degree (25/30 Diplomas granted per year)

**Curricula:** Undergraduate degree  
for holders of technician diploma (physics, chemistry, radiological protection)  
for holders of first university degree  
professionals of technical areas (Radiological protection, chemistry, physics)  
and standardised entry examination with a minimal acceptance result of 10/20

**Faculty:** Full-time teaching/research faculty (5 members)  
Full-time research faculty (21 members)

- Research Areas:**
- Dosimetry for various types of ionizing radiation
  - Biological effects: deterministic and stochastic
  - Non-ionizing radiations: physical aspects and biological effects
  - Operational radiological protection: occupational aspects, public exposure, medical exposure, ALARA approach
  - Safety and radiological protection
  - Management of accident situations

**Financial Assistance:** May be sought from the IAEA

<b>Students:</b>	full-time	part-time
undergraduate	30	-
masters	-	-
doctorate	-	-
other	-	-

**Student financial assistance programmes:** Fellowships nationally sponsored and corporately sponsored

**Research facilities:**

- Research reactors
- Reprocessing fuel
- Waste and effluent processing
- Neutron sources
- Hot cells

For the practical training:  
all laboratories of CEA, EdF, IPSN, COGEMA.

**Professional Certification:**

Formal “Professional Certification” is not compulsory in France

However professionals are closely associated to:

- the definition of the educational content
- the evaluation of the students level

## **GERMANY**

### **INDEX**

1. Dresden University of Technology

**Dresden University of Technology**  
Physics Department  
Institute of Radiation Protection Physics  
Mommсенstrasse 13  
D-01069 Dresden  
GERMANY

**Contact person:** Prof Dr. Dörschel, Birgit  
**Tel:** +49 351 463 2566 **Fax:** +49 351 463 7040

**Degrees Granted:** Master (MSc) (5-6 Diplomas granted per year)  
Doctor (PhD) (2-3 Diplomas granted per year)

**Curricula:** Master degree  
Prerequisite: basic courses in general physics (2 years)  
with examinations  
basic knowledge in nuclear physics  
Courses: Radiation Protection Physics I 60 hours  
(Fundamentals)  
Interaction of radiation with matter 60 hours  
Radiation Protection Physics II 60 hours  
(Measuring Technique)  
Experimental Exercises 120 hours  
Calculational Exercises 60 hours  
Special lectures (Students' choice) 30 hours

Diploma examination in Radiation Protection Physics  
Diploma thesis: 1 year

Doctor degree  
3 years scientific work in the Institute of Radiation Protection Physics  
Doctor thesis  
Doctor examination (rigorousum)

**Faculty:** Full-time teaching faculty (4)  
Part-time teaching faculty (2)  
Full-time research faculty (4)  
Part-time research faculty (6)  
Visiting faculty: (2)  
Other faculty (3)

**Research Areas:**

- Description of radiation sources and radiation fields
- Study of radionuclides in the environment and within the human body (e.g. radon and decay products)
- Study of interaction of radiation with matter, especially physical effects in detector materials, shieldings, biological tissue (e.g. thermoluminescence, formation of etched tracks etc.)
- Estimation of the radiation exposure to individuals and environment
- Physical fundamentals for the reduction of the exposure

**Visiting faculty financial assistance:** Arrangements via the DAAD (Deutscher Akademischer Austauschdienst = German Academic Exchange Service)  
Address: DAAD, Kennedyallee 50, D-5300 Bonn

**Financial Assistance:** May be arranged via the DAAD (Deutscher Akademischer Austauschdienst = German Academic Exchange Service)  
Address: DAAD, Kennedyallee 50, D-5300 Bonn

<b>Students:</b>	full-time	part-time
undergraduate	-	-
masters	17	-
doctorate	6	-
other	-	-

**Student financial assistance programmes:** Scholarships: nationally sponsored all arrangements vis DAAD (see above)  
Fellowships: nationally sponsored

- Research facilities:**
- tandem accelerator (protons, deuterons, heavy ions)
  - cyclotron (neutrons, heavy ions)
  - various radionuclide sources
  - laboratories for evaluation of solid state detectors (e.g. image analysing systems for SSNTD's, TL readers etc.)
  - laboratories for gamma spectrometry

**Professional Certification:** The lectures and exercises in radiation protection physics are acknowledged, therefore the procedure to obtain the "professional certification" is shortened considerably for those who graduated in radiation protection physics at our university

## **GREECE**

### **INDEX**

1. Athens University
2. Democriton University of Thrace
3. University of Patras

**Athens University**  
Department of Medical Physics  
School of Medicine  
Athens University  
115 27 Athens  
GREECE

**Contact:** Professor C. Proukakis, M.D., Ph.D.  
**Tel:** +(301) 77 93 273

**Faculty:** C. Proukakis, Professor  
K. Ntalles, Assistant Professor  
D. Sotiriou, Assistant Professor  
E. Georgiou, Assistant Professor  
J. Malamitsi, Assistant Professor  
A. Serefoglou, Assistant Professor  
A. Louizi, Lecturer  
S. Kottou, Lecturer

**Degrees:** MSc in Medical Physics

**Research Areas:**

- Theoretical Neural Models
- Non-linear Analysis in chaos
- Biomagnetic measurements using SQUID technology for determining normal and abnormal functions in CNS structures

**Democriton University of Thrace**  
Department of Medicine  
Laboratory of Medical Physics  
681 00 Alexandroupolis  
GREECE

**Contact:** Professor Photios A. Anninos  
**Tel:** (0551) 25 292

**Faculty:** Professor Photios A. Anninos

**Degrees:** MSc in Medical Physics  
PhD in Medical Physics

**Students:** There are currently 10 MSc and PhD students in the program.

The department was founded in 1988.

**Faculty Research Areas:**

- Theoretical Neural Models
- Non-linear Analysis in chaos
- Biomagnetic measurements using SQUID technology for determining normal and abnormal functions in CNS structures

**University of Patras**  
Faculty of Health and Sciences/Medicine  
Department of Medical Physics  
GR-26000 Rio - Patras

**Contact person:** Vassilis Proimos, Professor  
**Tel:** +30 061 997 620 **or** 997 781 **or** 997 758

**Degrees Granted: - 1** Post-graduate education programme in Medical physics  
Department of Medicine and Physics  
supported by the Department of Computer Engineering, the Institute of  
Computer Technology and the University Hospital

This programme is open to 10 students holding a BS in Physics  
with adequate knowledge of English, mathematics and electronics  
Entrance examinations are required

The duration of the programme is four semesters leading to an MSc degree in  
Medical Physics and optionally to a Ph.D. degree (minimum two more  
semesters are required for the PhD thesis work).

The programme is financially supported by governmental funds.

**Degrees Granted: - 2** Joint post-graduate programme in Medical Physics - Radiophysics

This programme leads to an MSc degree in Medical Radiation Physics and  
optionally to a Ph.D. with additional work of at least two more semesters  
degree.

The following institutions participate in this programme:

University of Athens (Department of Medical Physics)

University of Ionnina (Department of Medical Physics)

University of Thraki (Department of Medical Physics)

Greek Atomic Energy Commission (Institute of Radiation Physics)

Nuclear Research Centre "Democritos"

University of Thessaloniki (will join the programme in the near future)

The programme is financially supported by governmental funds.

The programme is scheduled to run every three years and is open to 10-20  
students.

Candidates must hold a BS in Physics and are admitted after successfully  
passing entrance examinations in Physics, Mathematics and English.

The duration of the programme is five semesters,

two semesters of theoretical lectures and laboratory work

two semesters in service training in Hospitals and

one semester for thesis work.

Lecturers come from all participating programme institutions

Address: Medical Physics Department  
School of Medicine  
Mikras Asias 75  
Goudi 115 27 GR

Contact person for further information:

Prof. Charalambos Proukakis, Tel: +30 01 779 3273

Graduates from both programmes or from equivalent studies abroad can get the professional licence of “Medical Radiation Physics” issued by the Ministry of Health taking successfully the relevant examination

## **ICELAND**

Iceland does not offer University degrees specifically in radiation protection. Most of the radiation protection professionals in Iceland have a degree in physics or related fields that includes some courses on radiation protection and on the job training.

## **ISRAEL**

### **INDEX**

1. Ben-Gurion University of the Negev

**Ben-Gurion University of the Negev**  
Nuclear Engineering Department  
P.O. Box 653  
Beer-Sheva, 84105  
ISRAEL

**Contact:** Professor A. Kushilevski  
Department Head

**Faculty:** Professor A. Kushilevski, Department Head  
  
Other faculty not specified

**Degrees:** Nuclear Engineering degrees (Some Courses in Radioprotection)  
Level(s) (BS MS, PhD) not specified

**Students:** No information provided

**Financing** No information provided

**Faculty  
Research  
Areas:** No information provided

## **ITALY**

### **INDEX**

1. Università degli Studi di Firenze
2. Università degli Studi di Genova
3. Università di Bologna
4. Università di Milano

**Universita' degli Studi di Firenze**  
 Dip. fisiopatologia Clinica  
 Scuola di Specializzazione in Fisica Sanitaria  
 Dipartimento di Fisiopatologia Clinica  
 Viale Morgagni, 85  
 I - 50134 Firenze  
 ITALIA

**Contact person:** Salvatore Romano, Prof. Medical Physics  
**Tel:** +39 (55) 437 6332 **Fax:** +39 (55) 437 7290  
**e-mail:** salrom@cesit1.unifi.it

**Degrees Granted:** MSc degree (average of 5 per year)

**Faculty:** Full-time teaching/research faculty (10)

- Research Areas:**
- design of a calorimeter for dosimetry in radiotherapy
  - heavy particles dose distribution: an experimental and Monte Carlo study on inhomogeneous systems
  - FTIR spectroscopy of biological samples (normal and malignant cells and tissues)
  - Photodynamic therapy of surface tumours
  - laser induced pain threshold study
  - normal and leukaemic lymphocytes discrimination by endogenous fluorescence
  - photoplethysmography

<b>Students:</b>	full-time	part-time
undergraduate	-	-
masters	15	-
doctorate	-	-
other	-	-

**Student financial assistance programmes:** Scholarships: nationally sponsored

**Research facilities:** Lab and equipment facilities available to the students are present in many independent administration structures. They are mainly:  
 Dept of Clinical Physiopathology (University of Florence)  
 Dept of Physics (University of Florence)  
 Health Physics Service (Hospital)  
 Medical departments (both university and hospital)  
 Institutes of applied optics and optoelectronics (INO, CNR)  
 Some industries (ex. EsaOte Biomedica)

Equipment:

Basic Physics (e.g. radiation detectors, transducers, radiation and ultrasound sources)

Nuclear equipment (e.g. 3 MeV linac)

Diagnostic equipment (e.g. gamma-camera, X-ray tubes, TAC NMR, ultrasound)

Therapeutic equipment (e.g. Co60, Linacs, brachitherapy, radionuclides, lasers)

Radiation monitoring equipment (e.g. TLD, photographic, ionisation chambers, ...)

**Professional  
Certification:**

The lectures and exercises in radiation protection physics are acknowledged, therefore the procedure to obtain the “professional certification” is shortened considerably for those who graduated in radiation protection physics at our university

**Universita' degli Studi di Genova**

Departmento di Fisica  
via Dodecaneso 33  
16146 Genova

**Contact person:** S. Vitale, Professor  
**Tel:** +39 10 353 62229 **Fax:** +39 10 313 358  
**e-mail:** vitale@genova.infn.it

**Degrees Granted:** average of 4 degrees granted per year in radiation protection

**Faculty:** full-time teaching/research faculty: 5  
full-time research faculty: 1

**Research Areas:**

- low activity measurement
- air, food, water analysis
- environmental contamination
- air pollution studies with PIXE analysis
- Montecarlo cal for shielding and dosimetry

<b>Students:</b>	full-time	part-time
undergraduate	-	-
masters	20	-
doctorate	-	-
other	-	-

**Student financial assistance programmes:** None

**Research facilities:** inside department:  
low level spectrometers (HpGe + NaI, Si detectors)  
neutron dosimetry - Rodon meas station

outside department:  
20 MeV electron accelerator  
TAC  
NMR  
whole body counter  
camera SPECT

**Professional Certification:** no

**Universita' di Bologna**  
 Physics and Medical Faculty  
 Dipartimento di Fisica  
 Viale Berti Pichat 6/2  
 40127 Bologna

**Contact person:** G. Maltoni, Professor of Health Physics  
**Tel:** +39 51 630 5127 **Fax:** +39 51 247 244  
**e-mail:** maltoni@bo.infn.it

**Degrees Granted:** Undergraduate degree  
 Master degree (20-25, Biosistem Physics for the Physics degree)  
 Other: (15)

**Faculty:** full-time teaching/research faculty: 6  
 part-time teaching/research faculty: 1

see also art. 110 commas 4/5/6 (supplemento ordinario G.V.) or the DL 17  
 March 1995 no. 230

- Research Areas:**
- new defectors for millimetric neutron dosimetry
  - personal spectrometer for aerosol dosimetry
  - non ionising radiation an defects at cell level
  - radon concentration and air exchange
  - personnel contamination in nuclear medicine
  - absorbed dose in radio diagnosis and radiotherapy to workers and patients
  - E.M fields and impact on population

<b>Students:</b>	full-time	part-time
undergraduate	80	-
masters	60	-
doctorate	4	-
post-doctorate	1	-
other	-	-

- Student financial assistance programmes:**
- Scholarships: nationally sponsored 3 per year post graduate
  - Fellowships: none
  - Premi di Studio (study prize) by ENEA

- Research facilities:**
- University laboratories - research equipment
  - Hospital facilities: health physics services radiology, radiotherapy and nuclear medicine facilities
  - Environmental and personal monitoring research laboratories at ENEA and C.N.R.

**Professional  
Certification:**

The scuola di specializzazione in fisica sanitaria is intended to provide the preparation needed to pass the national test for “qualified expert for radiation physical protection” up to the third level. The scuola is also qualified equivalent to two years of training at special radiation laboratories required for the third level of expertise.

At present the school lasts 2 academic years, in the near future it will be modified to 4 years the school leads to the title of “specialist” for future organisations in other faculties.

(See art. 110 of the DL230, 17/3/95)

**Universita' di Milano**  
 Dipartimento di Fisica  
 Via Celoria, 16  
 20133 Milano

**Contact person:** Ettore Fiorimi, Full Professor  
**Tel:** +39 2 239 2300 **Fax:** +39 2 70609512  
**e-mail:** fiorimi@milano.jhfn.it

**Degrees Granted:** Scuola di Specializzazione: 14

**Curricula:** Laurea in Fisica or Ingegneria and qualifying examination

**Faculty:** full-time teaching/research: 1  
 part-time teaching/research: 2  
 part-time research: 4  
 visiting: 1

**Research Areas:**

- Radiation Protection at Accelerators
- Radiation Protection with Radioactive Sources
- Radiation Protection in Radiotherapy
- Radiation Protection in Laser Surgery
- Radiation Protection in Radiodiagnostics

<b>Students:</b>	full-time	part-time
undergraduate	-	-
masters	7	-
doctorate	-	-
other	-	-

**Student financial assistance programmes:** Scholarships nationally sponsored

**Research facilities:** Radon measuring apparatuses  
 X-ray spectrometers (HAJ and GE)  
 Neutron activation analysis  
 General dosimetry systems

**Professional Certification:** The Scuola di Specializzazione give the title of "Specialista in Fisica Sanitaria"  
 Attendance at the schools is considered by law equivalent to the two years of "Tirocinio" requested for the higher level degree (III) of "Exerto Qualificato"

## **JAPAN**

### **INDEX**

1. Kyoto University
2. The University of Tokyo
3. Kyushu University

**Kyoto University**  
Research Reactor Institute  
Noda, Kumatoricho  
Sen-nan-gun  
Osaka Prefecture  
590-04, JAPAN

**Contact person:** Dr. Tadashi TSUJIMOTO, Associate Professor  
**Tel:** +81 724 52 0901, ext: 2631 **Fax:** +81 724 53 0360

**Degrees Granted:** Master degree  
Doctorate

**Faculty:** Programme in the Graduate Course in the Faculty of Agriculture

**The University of Tokyo**  
 Department of Radiological Health  
 Faculty of Medicine  
 7-3-1 Hongo, Bankyo-ku  
 113 Tokyo  
 JAPAN

**Contact person:** Dr. Tomsko Kusama, PhD  
**Tel:** +81 3 3812 2111, ext: 3502     **Fax:** +81 3 5684 5274  
**e-mail:** kusama@nile.gen.u-tokyo.ac.jp

**Degrees Granted:** Undergraduate    YES    (~2-4 per year)  
 Master                                    YES    (~1 per year)  
 Other                                        YES    (~1 per year)

**Faculty:** Full-time teaching/research faculty: ~4 members  
 Part-time teaching/research faculty: ~2 members  
 Full-time research faculty:                ~1 member

**Research Areas:**

- Dose estimation of medical exposure
  - the upper GI-tract X-ray examination as a mass screening
  - cardio vascular cinematograph
  - chest x-ray examination as a mass screening
- Dose estimation of radiation worker
  - radiologists and radiation technician engaged in angiography and in
    - interventional radiology
- Biological effects of embryo/foetuses from viewpoints of radiation protection
- Biological dosimetry in the case of over exposure in the skin
- Biokinetics of radionuclide in nuclear medicine
- Risk estimation of radiation-induced cancer

none

**Financial Assistance:**

<b>Students:</b>	full-time	part-time
undergraduate	6	0
masters	3	0
doctorate	4	4
other	-	0

**Student financial assistance programmes:** Student teaching assistantships  
 Student research assistantships

**Research facilities:** Dose estimation system of workers and patients RANDO phantom,  
 Tissueequivalent phantom  
 Whole body counter  
 Radiation exposure machine

**Professional Certification:** none

**Kyushu University**  
Department of Nuclear Engineering  
Fukuoka  
812, JAPAN

**Contact person:** Professor Masaru MATOBA  
**Tel:** +81 092 641 1101, ext: 5811 **Fax:** +81 092 641 7908

**Degrees Granted:**

Undergraduate	YES	(~40 per year)
Master	YES	(~12 per year)
Doctor	YES	(~6 per year)

**Curricula:** (The digit corresponds to the credit point for each curriculum)

1. Undergraduate Course, total 136 credits for graduation
  - Basis of Nuclear Physics 2
  - Nuclear Physics 2
  - Radio chemistry 2
  - Radiation Detection 2
  - Nuclear Electronics 2
  - Nuclear Electronics Engineering 2
  - Nuclear Chemical Engineering 2
  - Radiation Safety and Nuclear Instrumentation 2
  - Nuclear Engineering Experiments 4
  - Nuclear Engineering Seminars 2
  - Related curricula
2. Master Course, total 30 credits for graduation
  - Advanced Nuclear Instrumentation I, II 6
  - Advanced Radiation Detection and Protection Engineering
  - Related curricula
  - Muster Thesis
3. Doctor Course, Total 10 credits for graduation
  - Advanced Nuclear Engineering 4
  - Related curricula
  - Doctor Thesis

**Faculty:**

Full-time teaching/research faculty:	~12 members
Part-time teaching/research faculty:	~2 members
Full-time research faculty:	~2 members
Part-time research faculty:	~2 members
Visiting faculty:	~2 members

- Research Areas:**
- $^{14}\text{C}$  radioactivity in nature  
Dr. T. Okai and Dr. A. Nohtomi, (2 graduated students)
  - Neutron dosimeters for environmental monitoring  
Dr. M. Matoba and Dr. T. Sakae, (1 foreign researcher and 1 graduated student)
  - Cosmic-ray based neutron dosimetry  
Dr. T. Sakae and Dr. M. Matoba, (1 foreign researcher and 1 graduated student)
  - $^3\text{H}$  radioactivity in atmosphere  
Dr. T. Okai, and 3 co-operative researchers

**Financial Assistance:** Mainly the supports of the ministry of education and culture, Japan

<b>Students:</b>	full-time	part-time
undergraduate	6	34
masters	2	10
doctorate	0.5	5.5
other	1	-

**Student financial assistance programmes:**

- Scholarships
  - nationally sponsored
  - corporately sponsored
- Fellowships
  - nationally sponsored
  - corporately sponsored
- Student teaching assistantships

- Research facilities:**
1. Radioactive Isotope Laboratory, 1,100 m<sup>2</sup>
  2. Laboratory of quantum irradiation and analysis,  $^{60}\text{Co}$  irradiation, 100 m<sup>2</sup>
  3. Laboratory of high resolution radiation detection, 600 m<sup>2</sup>
  4. many  $\alpha$ ,  $\beta$ ,  $\gamma$  counters and dosimeters
  5. neutron counters and dosimeters
  6. liquid scintillation counter (4 sets)
  7. non-critical assembly system for neutron experiments
  8. high resolution position counter system

Unfortunately, now, the financial support for the research facility from the ministry of education and culture, Japan, decreases and decreases in this field. If this situation will not change, we may not continue this type of teaching training and research in future.

**Professional Certification:** There are not possibilities to obtain the professional certification in radiation protection in this department. But many students succeed to pass national examination of professional certification in radiation protection, after obtaining many credits of curricula for radiation protection.

## **KOREA**

### **INDEX**

1. Seoul National University
2. Kyung Hee University
3. Cheju National University
4. Hanyang University
5. ChoSun University
6. Korea Advanced Institute of Science and Technology

**Seoul National University**  
 Department of Nuclear Engineering  
 56-1 Shinaim-dong  
 Kwanak-ku  
 Seoul 151-742,  
 KOREA

**Contact person:** Professor Kang, Chang Sun  
**Tel:** +82 2 880 7203 **Fax:** +82 2 889 2688  
**e-mail:** cskang@plaza.snu

**Degrees Granted:** Masters in Radiation Protection (1~2 per year)  
 Other (~1 per year)

**Faculty:** Faculty Members in Radiation Protection:  
 1 full-time and 1 part-time Teaching/Research  
 1 part-time research  
 8 other faculties

**Research Areas:**

- radioisotope transport out of the radwaste disposal site
- PSA applications in radwaste disposal
- tritium transport in a PHWR plant
- sitting study of independent spent-fuel storage
- internal exposure due to H-3 intake
- derivation of designs criteria for radwaste disposal facilities
- design guidance to meet the criteria of ALARA for the next generation reactor
- 

**Financial Assistance:** Not offered yet

<b>Students:</b>	full-time	part-time
undergraduate	-	-
masters	5	-
doctorate	2	-
post-doctorate level	1	-
other	-	-

**Student financial assistance programmes:**

- Scholarships corporately sponsored
- Fellowships corporately sponsored

**Research facilities:** Van de Graaf type linear accelerator  
 Various radiation detection and measurement equipment including Ge (Li), scintillators, etc..

**Professional Certification:**

1. National Registered Professional Engineer for Radiation Protection  
 State requirements:  
 1 years' experience in radiation protection after bachelor's degree
2. License for Radiation Protection Supervisor
3. General license for Radiation Protection
4. Special license for Radiation Protection for medical workers

**Kyung Hee University**  
 Department of Nuclear Engineering  
 1 Seocheon-Ri, Kihung-Eub  
 Yongin-Kun Kyunggi-Do  
 449-701 KOREA

**Contact person:** Professor Won-Keun Lee  
**Tel:** 82 2 280 2560    **Fax:** 82 2 282 1541

**Degrees Granted:** Msc Radiation Protection (approx 2 per year)

**Faculty:** 2 full-time teaching/research faculty members in radiation protection  
 2 members in the visiting faculty

**Research Areas:**

- “Theoretical calculation of dose conversion factor for photons of the extremity dosimeters”,  
 Professor: Won-Keun Lee  
 Student: Kwang-Pyo Kim
- “Development of precise beta dosimeter response to Accident”  
 Professor: Won-Keun Lee  
 Student: Chun-Hyung Cho

**Financial Assistance:** Payment provided for classes to the Visiting Faculty

<b>Students:</b>	full-time	part-time
undergraduate	-	-
masters	2	-
doctorate	-	-
other	-	-

**Student financial assistance programmes:** Student Teaching Assistantships  
 Student Research Assistantships

**Research facilities:**

Laboratory: 2 rooms  
Research reactors: AGN-201 (Aero-jet General Nuclear, model 201)  
Amplifiers general purpose: 2 EA  
Area radiation monitor: 1EA  
Multichannel analyser: 1EA  
Chart recorder: 1EA  
Complete spectrometry: 1EA  
Function generator: 1EA  
Nuclear testing kit: 2EA  
Oscilloscope: 5EA  
Logarithmic pico-ammeter: 1EA  
Nimbin and power supply: 2EA  
Portable survey meter: 10EA  
Wheston bridge: 3EA  
Scaler (counter and timer): 3EA  
Pocket dosimeter: 10EA  
Pico ampere source: 1EA  
Vamp area monitor: 1EA  
High voltage supply: 3EA  
G/M system (intermediate): 2EA

**Professional Certification:**

1. Radio Isotope General Management License  
Junior and Senior can take an exam for this license
2. Supervisor License for Radioisotope Management  
Someone who has more than one years' professional experience can take an exam for this license

**Cheju National University**

Department of Nuclear and Energy Engineering  
1 Ara-dong, Cheju-si,  
Cheju-do  
690-756 KOREA

- Contact person:** Associate Professor Jae-Woo Park  
**Tel:** 82 2 64 54 3645 **Fax:** 82 2 64 52 9276  
**e-mail:** jwpark@cheju.cheju.ac.kr
- Degrees Granted:** Undergraduate degree in Radiation Protection (~10 per year)
- Curricula:** Undergraduate degree  
Introduction to Nuclear Engineering I, II  
Radiation Detection  
Radiation Detection Laboratory  
Radioisotopes application  
Nuclear Chemical Engineering  
prerequisites  
General entry examination
- Faculty** Full-time Teaching/Research Faculty (2 faculty members)
- Research Areas:**
- There has been virtually no research activity except education in the Department over the past three years.
- Financial Assistance:** There is no financial assistance provided by the University or Department. However some financial support may be arranged through application to the Korean government agencies such as Korean Science & Engineering Foundations
- Students:**
- |               | full-time | part-time |
|---------------|-----------|-----------|
| undergraduate | 10        | -         |
| masters       | -         | -         |
| doctorate     | -         | -         |
| other         | -         | -         |
- Student financial assistance programmes:** none
- Research facilities:** Radioisotopes application centre (IAEA-funded facility)  
Liquid scintillation counting system  
Multi channel gamma-ray spectropy system  
X-ray generator  
Hang-foot monitor  
G-M counters  
Survey Meters (GM type, Scintillation type)
- Professional Certification:** Certificate for Radioisotopes handling (ordinary license)  
Certificate for Radioisotopes handling (supervisor license)  
The above 2 certificates are often required by the national authority for certain jobs such as NDT's and other radioisotopes handling companies

**Hanyang University**  
Nuclear Engineering Department  
17 Hangdang, Seongdong  
Seoul, Republic of KOREA

**Contact person:** Associate Professor Lee Jai-Ki  
**Tel:** 82 2 290 0466 **Fax:** 82 2 290 0533

**Degrees** Master in Radiation Protection (~4 per year)  
**Granted:** PhD in Radiation Protection (~0.5 per year)

**Curricula:** There are neither the official requirement in curriculum nor prerequisites for entry into the programme. Documents will be evaluated by the admission committee for foreign applicants.

Graduation requirements are as follows:

requirements	MS	Ph.D.
preliminary exam	oral presentation	oral presentation
qualifying exam	yes*	yes*
Thesis	required	required
papers	n/a	2 as prime authors

\* problems about the fundamental courses in nuclear engineering

**Faculty:** Full-time teaching/research faculty (2)  
Part-time teaching/research faculty (2)

- Research Areas:**
- - Radiation protection philosophy and principles
  - Implementation of the ICRP recommendations to national regulatory programme and to protection practices
  - Quantitative optimisation of protection
  - Shielding design and analysis of spent fuel shipping casks
  - Risk assessment and perception
  - Radiation field characterisation using Monte Carlo calculations
  - Atmospheric dispersion and exposure pathway analysis
  - Determination of response function for external exposure
  - Application of fuzzy logic to radiation protection
  - Simulation of detector responses using Monte Carlo techniques
  - Development of dose algorithm for personnel dosimeters
  - Development of internal dose algorithm
  - Assessment of effectiveness of environmental monitoring programmes around nuclear facilities
  - Measurements of natural radiation

<b>Financial Assistance:</b>	University programme is not well-established. A grant programme is available through the Korea Science and Engineering Foundation (KOSEF);															
	- duration: short term (a few weeks) or long term (6 ~ 12 months)															
	- support: air fares and living expenses															
	Additional supports may be available through participation in research projects.															
<b>Students:</b>	<table border="1" style="margin-left: 40px;"> <thead> <tr> <th></th> <th style="text-align: center;">full-time</th> <th style="text-align: center;">part-time</th> </tr> </thead> <tbody> <tr> <td>undergraduate</td> <td style="text-align: center;">N/A</td> <td style="text-align: center;">-</td> </tr> <tr> <td>masters</td> <td style="text-align: center;">8</td> <td style="text-align: center;">1</td> </tr> <tr> <td>doctorate</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> </tr> <tr> <td>other</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> </tr> </tbody> </table>		full-time	part-time	undergraduate	N/A	-	masters	8	1	doctorate	2	3	other	-	-
	full-time	part-time														
undergraduate	N/A	-														
masters	8	1														
doctorate	2	3														
other	-	-														
<b>Student financial assistance programmes:</b>	Scholarships corporately sponsored Fellowships corporately sponsored Student teaching assistantships Student research assistantships															
<b>Research facilities:</b>	counting laboratory equipped with typical radiation counting systems Am-Be neutron sources. Advanced facilities (whole body counter, research reactor, irradiation facilities) are available at the national laboratories															
<b>Professional Certification:</b>	All radiation works should be supervised by an authorised Radiation Safety Officer (RSO) elected for the organisation/operation. A certificate given by the government is required to be elected as RSO. Two types of certificates - type I and type II (higher level) - are issued to the applicants when he/she passes the written examination (in Korean) and finished the designated training course (also given in Korean). Graduate students having at least one year of experience in radiation work can apply for the examination.															

**ChoSun University**  
 Nuclear Engineering Department  
 375 Seasuck-dong, Dong-Gu, Kwongju  
 501-759 KOREA

**Contact person:** Associate Professor Soon Kwan Chung  
**Tel:** 82 62 230 9166 **Fax:** 82 62 232 9218  
**e-mail:** n/a

**Degrees Granted:** Undergraduate degree in Radiation Protection (~50 per year)  
 Masters (~3 per year)

**Faculty:** 1 Full-time teaching/research faculty

**Research Areas:**

- Measurement of personal exposure dose by film badge dosimeter
- Development of Digital/Analog multi-purpose radiation protection detection monitor
- Control and instrumentation of radiation monitoring system
- Development of environmental radioactivity analysis technology

**Financial Assistance:** n/a

<b>Students:</b>	full-time	part-time
undergraduate	50	-
masters	2	1
doctorate	-	-
other	-	-

**Student financial assistance programmes:** Scholarships corporately sponsored  
 Student teaching assistantships  
 Student research assistantships

**Research facilities:** Radiation Detection and Measurement Laboratory  
 Nuclear and Radio-Chemistry Laboratory  
 Radiation and Radioisotope Laboratory and Equipment  
 Multi-channel Analyser  
 HPGE Detector and Lead shield  
 Low Background and Counting System

**Professional Certification:** n/a

**Korea Advanced Institute of Science and Technology**

Department of Nuclear Engineering  
373-1, Kusong-dong, Yusong-gu  
Taejon 305-701 KOREA

**Contact person:** Assistant Professor Gyuseong Cho  
**Tel:** +82 (42) 869 3821 **Fax:** +82 (42) 869 3810  
**e-mail:** gscho@cais.kaist.ac.kr

**Degrees Granted:** NE 202 Applied Nuclear Physics for Nuclear Engineering  
**/ Curricula:** NE 341 Nuclear Chemistry  
NE 343 Health Physics  
NE 431 Radiation Measurement and Instrumentation  
NE 445 Radiation Protection and Shielding  
NE 541 Radioactive Waste Management  
NE 561 Advanced Radiation Detection  
NE613 Neutron and Radiation Transport Theory  
NE 641 Isotope Separation

**Faculty:** 4 members in the Full-time teaching/research Faculty

**Research Areas:**

- Theoretical studies on radiation transport
- Theoretical studies on radioisotope transport in the air and under the ground
- Studies on waste treatment in general
- Environmental radiation monitoring system design
- Design of solid state radiation detectors for X-ray gamma and charged particles

**Financial Assistance:** No regular support  
Support for visiting scholars depending on professor's research - fund situations

<b>Students:</b>	full-time	part-time
	undergraduate	
masters	no information	
doctorate	provided	
other		

**Student financial assistance programmes:** Scholarships nationally sponsored  
Fellowships corporately sponsored  
Student Research Assistantships  
**Research facilities:** Radiation detection systems (Gelli, MLA etc.)  
Radiochemical handling facilities

**Professional Certification:** none

## **LUXEMBOURG**

Luxembourg offers no full University programme in any scientific domain and there is no possibility to achieve an academic degree in the field of radiation protection.

## **NETHERLANDS**

No University Level Degree Programme

## **POLAND**

### **INDEX**

1. Warsaw University of Technology

**Warsaw University of Technology**  
Faculty of Electronics  
Warsaw University of Technology  
ul. Nowowiejska 15/19  
00-665 Warszawa  
POLAND

**Contact:** Professor Zdzislaw Pawlowski D.Sc.  
Department Head  
+(48) 22 25 13 63

**Faculty:** Professor Zdzislaw Pawlowski D.Sc.  
Department Head

**Degrees:** Nuclear and Medical Electronics degrees  
level(s) (BS, MS PhD) not specified

**Students:** No information provided

**Financing:** No information provided

**Faculty  
Research  
Areas:** No information provided

## **SPAIN**

### **INDEX**

1. CIEMAT (Institute of Energy Studies)
2. University of Santander

**CIEMAT**  
(Institute of Energy Studies)  
Av. Complutense, 22  
28040 Madrid

**Contact person:** Ma Luisa Marco  
**Tel:** +34 91 346 6292   **Fax:** +34 91 346 6005  
**e-mail:** marco@ciemat.es

**Degrees Granted:** Undergraduate degree   average 2 per year  
Master degree                           average 22 per year  
Other

**Curricula:** Technician  
University degree

**Faculty:** full-time teaching/research faculty   6  
part-time teaching/research faculty   30  
visiting faculty                           5

- Research Areas:**
- Master of Nuclear Energy
  - Post-graduate educational course in Radiation Protection
  - Characterisation of medium and low activity wastes by radiochemist, spectrometric and physique-chemist methods
  - Radiation Protection Course for NPP's
  - Radioactive Waste Management
  - Radiation protection to operate X-rays facilities for medical diagnosis
  - Experimental haematology
  - Measurements of the radionuclides by gamma spectrometry
  - Radiation protection to manage X-rays facilities for medical diagnosis
  - Measurements of the radioactivity in environment samples
  - Operators of the radioactivity facilities course
  - Supervisors of the radioactivity facilities course
  - Techniques in TLD dosimetry

<b>Students:</b>	full-time	part-time
undergraduate	400	-
masters	20	-
doctorate	200	-
other	-	-
<b>Student financial assistance programmes:</b>	Scholarships   corporately sponsored professional society sponsored	
	Fellowships   corporately sponsored	

**Research  
facilities:**

Radiochemist laboratories  
Semiconductor detectors  
Scintillation detectors (Alpha and Gamma)  
Radiation monitors  
X-rays equipment  
Flow gas counters  
Multichannel equipment  
Radioactive sources  
Personal computers

**Professional  
Certification:**

Qualified experts of radiation protection  
Post-graduate educational course in radiation protection  
Supervisors of radioactive installations  
Operators of radioactive installations

**Universidad de Cantabria**  
 Catedra fisica medica  
 Depto. Ciencias Medicas y Quirurgicas  
 Facultad Medicina  
 c/o Herrera Oria s/u  
 39011 Santander

**Contact person:** Jesus Soto Torres, Catedratico Fisica Medica  
**Tel:** +34 942 20 19 74 **Fax:** +34 942 201 903  
**e-mail:** sotoj@med.unican.es

**Degrees Granted:** Cursos Operadores Y supervisores de Instalaciones Radiactivas  
 Eventualmente de Radiodiagnostico

**Faculty:** Full-time teaching/research faculty 5

**Research Areas:**

- Estudio de radiacion y radiactividad ambientales efectos de bajas dosis de radiacion

<b>Students:</b>	full-time	part-time
undergraduate		
masters	no information	
doctorate	provided	
other		

**Student financial assistance programmes:**

**Research facilities:** Laboratorio de preparacion de muestras  
 Monitores de radiacion cadena espectrometria gamma con Ge Hp  
 Contador de Flujo de Gas  
 Contadores de Centelleo alfa  
 Cadena espectrometria gamma con ina (tl)  
 Contadores de radon

**Professional Certification:** Licenciatura en Medicina (nuevo plan estudios):  
 1st curso : Fisica Medica  
 2nd Curso : Instrumentacion en Diagnostico  
 4th Curso : Radioproteccion

## **SWEDEN**

### **INDEX**

1. Linköping University
2. Stockholm University
3. Lund University

**Linköping University**  
 Department of Radiation Physics  
 Faculty of Health Sciences  
 Linköping University  
 S-58185 Linköping

**Contact person:** Eva Lund, Assistant Professor  
**Tel:** +46 13 223 460 **Fax:** +46 13 224 749  
**e-mail:** eva.lund@raf.liu.se

**Degrees Granted:**

**Faculty:** Full-time teaching/research faculty (1)  
 Part-time teaching/research faculty (1)

- Research Areas:**
- Design and type testing of a dosimeter for measurement of the ambient dose equivalent
  - Development of retrospective dosimetry based on ESR analysis of ??
  - Optimisation of the relation between diagnostic information and radiation risks in X-ray examinations (computer modelling)
  - Experimental studies of the angular dependence of the personal dose equivalent completed with Monte Carlo calculations
  - Surveys of p?? absorbed doses and optimisation of x-ray techniques both for adults and children

**Financial**

**Assistance:**

**Research facilities:**

TLD - readers  
 ESR spectrometer (at the department of Physics and Measurements)  
 X-ray equipment  
 Cs-irradiation sources  
 Ge-detector and software

**Students:**

	full-time	part-time
undergraduate	-	-
masters	1	-
doctorate	-	1
post-doctorate	1	-
other	-	-

**Student financial assistance**

No information provided

**programmes:**

**Research facilities:**

TLD - readers  
 TSR spectrometer (at the dept. of Physics and Measurements)  
 X-ray equipment  
 Cs-irradiation sources  
 Ge-defector and software

**Professional Certification:**

**Stockholm University**  
 Medical Radiation Physics  
 Department of Medical Radiation Physics  
 Box 260  
 S-171 76 Stockholm

**Contact person:** Bo Nilsson  
**Tel:** +46 8 729 2497   **Fax:** +46 8 34 35 25  
**e-mail** bo.nilsson@radfys.ks.se

**Degrees Granted:** Master in Radiation Protection (average 4 per year)

**Faculty:** Radiation Physics including Radiation Potation  
 Full-time teaching/research faculty (1)  
 Part-time teaching/research faculty (1)  
 Full-time research faculty (3)  
 Part-time research faculty (5)

- Research Areas:**
- Research is performed in radiation physics, mainly towards the application in radiation treatment. However, in every use of radiation there is always a radiation protection consideration
  - Treatment optimisation using physical and biological objective functions
  - Ionisation chamber dosimetry, specially perturbation problems in photon and electron beams
  - Patient and personal doses in x-ray radiology
  - Development of a new circular gamma-camera for SPECT-investigations
  - Stopping power calculations for use in dosimetry using Monte Carlo methods
  - Neutron contamination problems in radiation treatment with high energy photons

**Financial Assistance:** Graduated researchers may obtain financial support through different research funds. There is however no special programme for funding visiting faculty members.

<b>Students:*</b>	full-time	part-time
undergraduate	6	-
masters	6	-
doctorate	15	-
other	-	-

\* in radiation physics in general including radiation protection

**Student Financial  
Assistance  
Programmes:**

Student Teaching Assistantships  
Student Research Assistantships

**Research  
facilities:**

- Radiation treatment sources: Linear electron accelerators,  $^{60}\text{Co}$ -sources
- Ge-detectors with multichannel analysers for low level activity counting
- Proportional chamber for microdosimetric measurements
- Gamma-cameras for in vivo activity measurements

**Professional  
Certification:**

**Lund University**  
 Radiation Physics Department, Lund  
 Radiation Physics Department  
 Lund University Hospital  
 S-221 85 Lund

**Contact person:** Christer Samuelsson, Assoc. Prof.  
**Tel:** +46 46 173 121 **Fax:** +46 46 127 249  
**e-mail:** christer.samuelsson@radfys.lu.se

**Degrees Granted:** Undergraduate degree (6per year)  
 Master (6 per year)  
 Ph.D. (1 per year)

**Faculty:** Full-time teaching/research faculty (2)  
 Part-time teaching/research faculty (5)  
 Part-time research faculty (1)  
 Visiting faculty (1)

- Research Areas:**
- Retrospective radon monitoring using superficially implanted  $^{210}\text{Po}$
  - Specific filtration of  $^{137}\text{Cs}$  from urine as large scale “whole-body counter”
  - Development of pulse-ionisation chambers for alpha spectrometry of large-area samples
  - Development of fission track detection methods for low-level  $^{239}\text{Pu}$  analysis
  - Mobil gamma spectrometry for mapping of fallout and finding lost point sources
  - In situ gamma spectrometry using HPGe detectors
  - Bioassay analysis of low-level  $^{239}\text{Pu}$  and  $^{137}\text{Cs}$  activities in Chernobyl clean-up workers
  - Radiopharmaceutical dosimetry research
  - The use of the Monte Carlo technique to optimise and evaluate nuclear medicine imaging systems
  - Optimising parameters for radionuclide therapy
  - Radiobiological research on Auger electron emitters
  - Radiopharmacology and tracer kinetic research
  - Radiation protection research for medical employees

**Financial Assistance:** Every four years there is a 6-month sabbatical option for professors

**Students:** No special funding for visiting scientists is available at Lund University

	full-time	part-time
undergraduate	8	-
masters	8	-
doctorate	8	4
post-doctorate	1	-
other	-	-

**Student financial assistance programmes:**

Scholarships: Nationally Sponsored  
Fellowships: Nationally and Regionally Sponsored

**Research facilities:**

- One counting lab for temporary installations
- One counting lab with a liquid scintillation counter, a sample changer NaI(Tl)-detector, and a HPGe-detector
- One permanent low-level lab with 20 alpha and two beta spectrometers
- One permanent low-level gamma spectrometry lab with 4 germanium detectors.
- One whole-body NaI(Tl)-spectrometer
- One lab for radon and radon daughter measurements
- One stainless steel walk-in room for radon/aerosol exposure experiments
- One low-level radiochemistry lab
- One gamma calibration facility
- Several medical accelerators are used outside patient-hours for education purposes
- Several medical X-ray facilities are used outside patient-hours for education purposes
- HOT-lab for intermediate radioactivity work
- Laboratories for aseptic work at the Medical Radiopharmaceutical Center
- Radiation biology laboratory (Department of Oncology)

**Professional Certification:**

none

## **SWITZERLAND**

### **INDEX**

1. Universität Bern
2. University of Zurich
3. University Basel, Institut für Kernphysik
4. University Basel, Departement Medizinische Radiologie

**Universität Bern**  
 Abt. für Medizinische Strahlenphysik  
 Inselspital  
 CH-3010 Bern  
 SWITZERLAND

**Contact person:** Dr. R. Mini, phil. nat.  
**Tel:** +41 31 632 24 29 **Fax:** +41 31 632 24 29

**Degrees Granted:** Other (1)

**Faculty:** Full-time teaching/research faculty (1)  
 Part-time teaching/research faculty (1)  
 Part-time research faculty (2)

**Research Areas:**

- Development of a clinical information system
- Dynamic therapy with dynamic leaf-movement of a multi-leaf collimator system
- Implementation of a Macro Monte Carlo (MMC) algorithm on a parallel computer for clinical use in radio-oncology
- Stereotatic radiosurgery
- Dose measurements in diagnostic radiology

**Financial Assistance:** None

<b>Students:</b>	full-time	part-time
undergraduate	-	1
masters	-	-
doctorate	-	1
post-doctorate	-	2
other	-	-

**Student financial assistance programmes:** Scholarships nationally sponsored  
 Fellowships nationally sponsored

**Research facilities:** Betatron  
 3 Linearaccelerators  
 Counting Laboratories  
 X-ray facilities  
 Anthropomorphic Phantoms

**Professional Certification:** 14d course in radiation protection at PSI



**University Basel**  
Institut für Kernphysik  
Klingelbergstr. 82  
CH-4056 Basel  
SWITZERLAND

**Contact person:** Dr. J. Jourdan  
**Tel:** +41 61 267 3689 **Fax:** +41 61 267 3784  
**e-mail:** jourdan@ubacli.unibas.ch

**Degrees  
Granted:**

**Faculty:**

**Research Areas:** No research in radiation protection

The facilities available are exclusively used to train physics, chemistry, and reactor operation students in reactor-physics, measurement and analysis of experiments using radioactive substances and radiation protection.

**Financial  
Assistance:** none

<b>Students:</b>	<hr/>	
	full-time	part-time
undergraduate		
masters		
doctorate	none	
other		

**Student financial  
assistance  
programmes:** none

**Research  
facilities:** AGN-211-P research reactor  
2 Counting laboratories equipped with various detection systems  
Geiger counters  
solid state detectors  
scintillation counters  
Ge, Si detectors

**Professional  
Certification:** licensed reactor operator  
licensed reactor operation supervisor  
licensed radiation protection technician

**University Basel**  
 Radiological Physics  
 Abt. für Radiologische Physik  
 Departement Medizinische Radiologie  
 Kantonsspital Basel  
 CH-4031 Basel  
 SWITZERLAND

**Contact person:** Prof, Ph. D. J. Roth  
**Tel:** +41 61 265 31 41 **Fax:** +41 61 265 3135

**Degrees Granted:** None

**Faculty:** Part-time teaching/research faculty (2)

- Research Areas:**
- Calculation of doses in patient during nuclear medicine procedures
  - Doses in patient during radiodiagnostic procedures (e.g. chest, CT)
  - Neutron and photon doses around medical accelerators
  - Attenuation measurements (walls, new materials for aprons and gloves) during radiodiagnostic procedures
  - comparisons of algorithms for dose calculations, comparisons of dosimeters in radiodiagnostic
  - Whole body counting

**Financial Assistance:** None

<b>Students:</b>	full-time	part-time
undergraduate	-	-
masters	-	-
doctorate	-	3
post-doctorate	-	2
other	-	-

**Student financial assistance programmes:** none

**Research facilities:** whole body counter  
 medical accelerators, after loading (1r-192)  
 X-ray apparatus  
 Co-60 source (only for research and training)  
 different types of dosimeters; TLD

**Professional Certification:**

## **UNITED KINGDOM**

### **INDEX**

1. University of Surrey

**University of Surrey**  
Department of Physics (Teaching Department)  
Guildford GU2 5XH  
UNITED KINGDOM

**Contact person:** Mrs. S. Jenner (MSc course Secretary)  
**Tel:** +44 (1483) 259324 **Fax:** +44 (1483) 259 501  
**e-mail:** s.jenner@surrey.ac.uk

**Degrees Granted:** MSc (~20 diplomas granted per year)  
BSc in Physics with Environmental Protection  
Msc in Radiation and Environmental Protection  
(one year full time, two years part time)  
Msc in Medical Physics  
PhD in Radiation Physics

**Curricula:** course booklet available upon request

**Faculty:** Full-time teaching/research faculty (5 members)  
Visiting faculty (10 members)

Professor W. Gellently, Head of Department  
Dr. W. B. Gilboy, Chairman of Course Board  
Dr. R. C. Barrett, Reader  
Dr. W.N. Catford, Lecturer  
Dr. A. S. Clough, Senior Lecturer  
Dr. E. J. Morton, Lecturer  
Dr. N.M. Spyrou, Reader  
D. P. M. Walker, Lecturer

**Research Areas:**

- Miniature spectrometry systems for sophisticated personal electronic dosimetry
- Extra-sensitive LiF TLD for verification of radiation therapy planning
- Design of amorphous silicon image sensors for low dose medical and industrial radiography
- Study of room temperature semiconductor radiation detector and spectroscopy systems
- Image processing for dose reduction in medical fluroscopy
- Monte-Carlo simulation of electron transport at low energies ( $< 100$  keV)
- X-ray tube design
- High resolution ( $10 \mu\text{m}$ ) three dimensional tomographic imaging of small objects ( $< 1\text{cm}^3$ )

**Financial Assistance:** IAEA, EPSRC and British Council are all potential sources of funding for visitors

<b>Students:</b>		full-time	part-time
	undergraduate	-	-
	masters	36	18
	doctorate	4	2
	other	-	-
<b>Student financial assistance programmes:</b>	Scholarships: Nationally/Regionally/Corporately and Professional Society sponsored Fellowships: Nationally sponsored		
<b>Research facilities:</b>	Lead-lined room for X-ray system development Pulsed laser and associated optical equipment for detailed study of semiconductor radiation devices High accuracy electronics test fixtures for characterisation of semiconductor radiation detectors Numerous X-ray tubes, including a microfocal X-ray source Design tools for analogue and digital radiation instrumentation development		
<b>Professional Certification:</b>	n/a		

## UNITED STATES

### INDEX

<u>Program Name</u>	<u>Location</u>	<u>Degree Granted</u>		
1. Bloomsburg University	Pennsylvania	BS		
2. Central Florida Community College	Florida	AS		
3. Clemson University	South Carolina		MS	PhD
4. Colorado State University	Colorado		MS	PhD
5. Dickinson College	Pennsylvania	BS		
6. Francis Marion University	South Carolina	BS		
7. Georgetown University	Washington, DC		MS	
8. Georgia Institute of Technology	Georgia		MS	PhD
9. Idaho State University	Idaho	BS	MS	PhD
10. Lakeshore Technical College	Wisconsin	AA		
11. Louisiana State University	Louisiana		MS	
12. Massachusetts Institute of Technology	Massachusetts		MS	PhD
13. National Technical University			MS	
14. N. New Mexico Comm. College	New Mexico	AA		
15. Ohio State University	Ohio		MS	PhD
16. Oregon State University	Oregon	BS	MS	
17. Purdue University	Indiana	BS	MS	PhD
18. San Diego State University	California		MS	
19. Texas A&M University	Texas	BS	MS	PhD
20. Texas State Technical College	Texas	AA		
21. University of Cincinnati	Ohio		MS	PhD
22. University of Florida (Env. Eng.)	Florida		MS	PhD
23. University of Florida (Nuclear Eng.)	Florida	BS	MS	PhD
24. University of Kentucky	Kentucky		MS	
25. University of Massachusetts Lowell	Massachusetts	BS	MS	PhD
26. University of Michigan (Public Health)	Michigan		MS	PhD
27. University of Michigan (Nuclear Eng.)	Michigan	BS	MS	PhD
28. University of Missouri-Columbia	Missouri		MS	PhD
29. University of Missouri-Rolla	Missouri	BS	MS	PhD
30. University of Nevada Las Vegas	Nevada	BS	MS	
31. University of North Carolina	North Carolina		MS	PhD
32. University of Pittsburgh	Pennsylvania		MS	PhD
33. University of Tennessee	Tennessee		MS	PhD
34. University of Texas HSC-San Antonio	Texas		MS	
35. University of Wisconsin	Wisconsin		MS	PhD
36. Washington State University Tri-Cities	Washington		MS	

*Note: Indicates incomplete survey information as of April 9, 1997*

## 1. BLOOMSBURG UNIVERSITY

Department of Physics

Telephone: (717) 389-4107 / Fax: (717) 389-2094

### **Program Director:**

Dr. Jack G. Couch  
Bloomsburg University  
Physics Department  
Bloomsburg, Pennsylvania 17815  
(717) 389-4152

### **HP Degrees Granted:**

B.S. in Health Physics

**Remote Delivery of Course:** None

### **BS**

<b>HP Enrollment (Fall 1996):</b>	11
<b>HP Graduates (9/94 to 8/95):</b>	2
<b>HP Graduates (9/95 to 8/96):</b>	2

**Health Physics Faculty** (325% FTE toward the HP program)

Jack G. Couch, Professor of Physics and Health Physics Program Director (717-389-4152); Ph.D. Texas A&M University 1966; Nuclear instrumentation, environmental radiation measurements, applied health physics.

### **Other Faculty**

**Wilfred J. Reilly**, Assistant Professor of Physics.

**Christopher Bracikowski**, Assistant Professor of Physics.

**P. James Moser**, Professor of Physics.

**Gunther L. Lang**, Assistant Professor of Physics.

### **Other Information**

The B.S. degree in health physics has a strong laboratory and instrumentation orientation. An off-campus internship in health physics is required. The Physics Department in which the B.S. health physics degree is offered has a total faculty of nine individuals.

**2. CENTRAL FLORIDA COMMUNITY COLLEGE**  
Department of Radiation Protection Technology  
Telephone: (904) 237-2111, Ext. 376 / Fax: (904) 237-0510

**Program Director:**

Ms. Rhonda L. Rawls  
Central Florida Community College  
P.O. Box 1388  
Ocala, Florida 34478-1388

**HP Degrees Granted:**

A.S. in Radiation Protection Technology

**Remote Delivery of Course:** Yes (Introductory Course now available)

**AS**

<b>HP Enrollment (Fall 1996):</b>	26
<b>HP Graduates (9/94 to 8/95):</b>	18
<b>HP Graduates (9/95 to 8/96):</b>	11

**Health Physics Faculty** (325% FTE toward the HP program)

**Rhonda L. Rawls**, Program Coordinator and Associate Professor of Radiation Protection and Environmental Sciences (352-237-2111, Ext. 376 or 352-854-2322 Ext. 376); M.A. University of South Florida 1994.

**Stephen H. MacKenzie**, Assistant Professor of Radiation Protection and Environmental Sciences and Program Coordinator of Environmental Sciences (352-237-2111, Ext. 376 or 352-854-2322 Ext. 376); M.A. University of South Florida 1994.

**Other information**

Previous college course work is evaluated and applied toward the A.S. degree, as appropriate. This can accelerate the students program of study and allow for completion in less than two years. The division also offers an A.S. degrees in Environmental Science Technology (Hazardous Materials).

**Student Financial Assistance**

Scholarships available (contact Program Director)

**Research Facilities**

Utilize the University of Florida Training Reactor (UFTR) for Co-op students.

### 3. CLEMSON UNIVERSITY

Department of Environmental Systems Engineering  
Telephone: (864) 656-3276 / Fax: (864) 656-0672

#### **Program Director:**

Dr. Robert A. Fjeld  
Rich Environmental Research Laboratory  
Clemson Research Park  
Clemson University  
Clemson, South Carolina 29634-0919  
(864) 656-1010  
**email:** fjeld@clemson.edu  
**website:** <http://www.eng.clemson.edu/~ese>

#### **HP Degrees Granted:**

M.S. in Environmental Systems Engineering  
Ph.D. in Environmental Systems Engineering

**Remote Delivery of Course:** None

	<b>MS</b>	<b>PhD</b>
<b>HP Enrollment (Fall 1996):</b>	10	5
<b>HP Graduates (9/94 to 8/95):</b>	7	0
<b>HP Graduates (9/95 to 8/96):</b>	10	0

#### **Health Physics Faculty** (325% FTE toward the HP program)

**Robert A. Fjeld**, Professor of Environmental Systems Engineering (864-656-1010); Ph.D. The Pennsylvania State University 1976; Environmental transport, dose and risk assessment, radioactive waste management. [**email:** [fjeld@clemson.edu](mailto:fjeld@clemson.edu)]

**Timothy A. DeVol**, Assistant Professor in Environmental Systems Engineering (864-656-1014); Ph.D. University of Michigan 1991; Radiation detection instrumentation, environmental measurements, environmental applications of nuclear techniques. [**email:** [tim.devol@clemson.edu](mailto:tim.devol@clemson.edu)]

**Thomas J. Overcamp**, Professor of Environmental Systems Engineering (864-656-3276); Ph.D. Massachusetts Institute of Technology 1973; Atmospheric transport, mixed waste vitrification. [**email:** [tjvrc@clemson.edu](mailto:tjvrc@clemson.edu)]

#### **Other Faculty**

**Alan W. Elzerman**, Professor and Chair of Environmental Systems Engineering.

**David L. Freedman**, Assistant Professor of Environmental Systems Engineering.

**C. P. Leslie Grady, Jr.**, Professor of Environmental Systems Engineering.

**Tanju Karamfil**, Assistant Professor of Environmental Systems Engineering.

## **CLEMSON UNIVERSITY (Continued)**

**Cindy M. Lee**, Assistant Professor of Environmental Systems Engineering.  
**Frank L. Parker**, Eminent Scientist.

### **Other Information**

The department offers a nuclear environmental specialty which focuses on environmental and waste management aspects of nuclear technologies and the nuclear fuel cycle. General areas of interest include environmental health physics; radioactivity measurement; hazardous, radioactive, and mixed waste treatment and disposal; risk assessment; and transport of radioactive and chemical contaminants in the environment. Currently active projects include (1) development of a technique for the rapid measurement of non-gamma emitting radionuclides in environmental samples, (2) the measurement of sorption parameters for select radionuclides in soils; (3) vitrification of mixed wastes, and (4) risk assessment. In addition, an internship program is available through which students may work on a variety of environmental restoration and waste management projects at a Department of Energy facility.

### **Student Financial Assistance**

Fellowships, Student Research Assistantships, Student Research Assistantships, DOE Internships (limited to U.S. citizens).

### **Research Facilities**

The Department of Environmental Systems Engineering is located in a 5-year-old, 40,000 square foot office and laboratory facility in the Clemson Research Park. The laboratory building contains a counting laboratory, a radiation detection research laboratory, a radiochemistry laboratory, and a general purpose radiation laboratory. Adjacent to the laboratory is the Clemson Environmental Technologies Laboratory consisting of two state-of-the-art analytical laboratories, two high bay laboratories for scale-up projects, and a demonstration area. These facilities are specially designed for research and treatment technologies related to hazardous, radioactive, and mixed wastes. Please visit our web site at <http://www.eng.clemson.edu/~ese> for more information on our department. Graduate school applications may be found at <http://www.grad.clemson.edu>.

**4. COLORADO STATE UNIVERSITY**  
Department of Radiological Health Sciences  
Telephone: (970) 491-5222 / Fax: (970) 491-0623

**Program Director:**

Dr. Thomas B. Borak  
Department of Radiological Health Sciences  
Colorado State University  
Ft. Collins, Colorado 80523-1673  
(970) 491-6450  
**email:** tborak@vines.colostate.edu

**HP Degrees Granted:**

M.S. in Health Physics  
M.S. in Radioecology  
Ph.D. in Health Physics  
Ph.D. in Radioecology

**Remote Delivery of Course:** Selected courses in the MS and PhD programs

	<b>MS</b>	<b>PhD</b>
<b>HP Enrollment (Fall 1996):</b>	12	5
<b>HP Graduates (9/94 to 8/95):</b>	11	2
<b>HP Graduates (9/95 to 8/96):</b>	6	3

**Health Physics Faculty** (325% FTE toward the HP program)

**Thomas B. Borak, CHP**, Professor (970-491-6450); Ph.D. Vanderbilt University 1969; Radiation physics, dosimetry. [**email: tborak@vines.colostate.edu**]

**Shawki A. Ibrahim**, Associate Professor (970-491-1593); Ph.D. New York University 1980; Radiochemistry. [**email: jebrown@vines.colostate.edu**]

**F. Ward Whicker**, Professor (970-491-5343); Ph.D. Colorado State University 1965; Radioecology. [**email: wwhicker@vines.colostate.edu**]

**David J. Rowan**, Assistant Professor (970-491-0483); Ph.D. McGill University, 1991; Aquatic Radioecology. [**email: drowan@vines.colostate.edu**]

## **COLORADO STATE UNIVERSITY (Continued)**

### **Other Faculty**

**Joel S. Bedford**, Professor of Radiation Biology.

**Mortimer M. Elkind**, Professor of Radiation Biology.

**Michael H. Fox**, Professor of Radiation Biology.

**Edward L. Gillette**, Professor of Radiation Biology.

### **Visiting Faculty Financial Assistance**

There are now standing financial assistance programs for visiting faculty. Occasionally there is support through existing research grants or international agencies such as IAEA, NATO, etc.

### **Student Financial Assistance**

Graduate research assistantships are available through funded research programs in the Department. Availability will vary depending on funding and enrollment.

### **Research Facilities**

Low level counting laboratory, instrumentation and dosimetry laboratory, whole body counter, radioanalytical chemistry laboratory, 6-MV electron accelerator, <sup>60</sup>Co and <sup>137</sup>Cs irradiators. The faculty have collaborative arrangements with Los Alamos National Laboratory, Lawrence Berkeley National Laboratory and the Savannah River Ecology Laboratory.

## 5. DICKINSON COLLEGE

Department of Physics and Astronomy

Telephone: (717) 245-1413 / Fax: (717) 245-1642

### **Program Director:**

Dr. John Luetzelschwab  
Department of Physics and Astronomy  
Dickinson College  
Carlisle, Pennsylvania 17013-2896  
**email:** luetzelj@dickinson.edu  
**website:** www.physics.dickinson.edu

### **HP Degrees Granted:**

B.S. in Physics

**Remote Delivery of Course:** None

### **BS**

<b>HP Enrollment (Fall 1996):</b>	2
<b>HP Graduates (9/94 to 8/95):</b>	0
<b>HP Graduates (9/95 to 8/96):</b>	0

**Health Physics Faculty** (325% FTE toward the HP program)

**John Luetzelschwab, CHP**, Professor of Physics (717-245-1241); Ph.D. Washington University 1968; Radon measurement. [**email:** luetzelj@dickinson.edu]

### **Student Financial Assistance**

Regular undergraduate loans, grants, and work study.

### **Research Facilities**

HPGe gamma spectroscopy system, Ge(Li) gamma spectroscopy system, alpha/beta counting system, neutron howitzer, radon source.

## 6. FRANCIS MARION UNIVERSITY

Department of Chemistry and Physics

Telephone: (803) 661-1381 / Fax: (803) 661-4616

### **Program Director:**

Dr. L. D. Hendrick

Department of Chemistry & Physics

Francis Marion University

P.O. Box 100547

Florence, South Carolina 29501

(803) 661-1441

**email:** hendrick@scarolina.fmarion.edu

### **HP Degrees Granted:**

B.S. in Health Physics (no specialty)

**Remote Delivery of Course:** None

### **BS (Junior/Senior)**

**HP Enrollment (Fall 1996):** 6

**HP Graduates (9/94 to 8/95):** 5

**HP Graduates (9/95 to 8/96):** 4

### **Health Physics Faculty** (325% FTE toward the HP program)

**David M. Peterson.**, Professor of Physics (803-661-1445); Ph.D. North Carolina State University 1975; Nuclear physics, instrumentation.

**[email: peterson@scarolina.fmarion.edu]**

**R. Seth Smith**, Associate Professor of Physics (803-661-1453); Ph.D. Louisiana State University 1986; Lasers, electronics. **[email: smith@scarolina.fmarion.edu]**

**Christopher G. Fasano**, Assistant Professor of Physics (803-661-1452); Ph.D. University of Chicago 1988; Nuclear theory. **[email: fasano@scarolina.fmarion.edu]**

**Lynn D. Hendrick**, Professor of Physics (803-661-1441); Ph.D. University of South Carolina 1966; Atomic/nuclear physics, general health physics.

**[email: hendrick@scarolina.fmarion.edu]**

**Roger J. Loucks**, Assistant Professor of Physics (803-661-1444); Ph.D. University of Illinois 1996; Nuclear theory. †**[email: loucks@scarolina.fmarion.edu]**

### **Student Financial Assistance**

Undergraduate scholarship

## **6. FRANCIS MARION UNIVERSITY (cont.)**

### **Research Facilities**

Counting laboratory - 4 stations with computerized MCAs with electronics and detectors, neutron howitzer ( $^{252}\text{Cf}$  source), TLD system.

### **Professional Certification**

Graduates of our program have been very successful in passing the American Board of Health Physics Certification Exam.

## 7. GEORGETOWN UNIVERSITY

Health Physics Program

Department of Radiation Medicine

Telephone: (202) 687-2212 / Fax: (202) 784-3323

### **Program Director (Interim):**

Dr. Marko Moscovitch

Health Physics Program

The Research Building, #W201

Georgetown University Medical Center

3800 Reservoir Road, NW

Washington, DC 20007-2197

202-687-8993

202-687-2221 (fax)

**email:** [moscovim@medlib.georgetown.edu](mailto:moscovim@medlib.georgetown.edu)

**website:** <http://www.dml.georgetown.edu/depts/radiation/hphysics/HealthPhys.html>

### **HP Degrees Granted:**

M.S. in Radiation Science

**Remote Delivery of Course:** None

### **MS**

**HP Enrollment (Fall 1996):** 23

**HP Graduates (9/94 to 8/95):** 5

**HP Graduates (9/95 to 8/96):** 2

### **Health Physics Faculty** (325% FTE toward the HP program)

**Allen Brodsky, CHP**, Adjunct Professor for Radiation Science (410-208-1015); Sc.D. University of Pittsburgh 1966; Operational health physics, regulatory policy.

**Timothy J. Jorgensen**, Assistant Professor of Radiation Medicine (202-687-1810); Ph.D. Johns Hopkins University 1984; Radiation biology.

**[email: [jorgensent@odrge.odr.georgetown.edu](mailto:jorgensent@odrge.odr.georgetown.edu)]**

**Usha Kasid**, Associate Professor of Radiation Medicine (202-687-2226); Ph.D. University of Punjab 1978; Radiation biology, molecular carcinogenetics.

**[email: [kasidu@gunet.georgetown.edu](mailto:kasidu@gunet.georgetown.edu)]**

**Marko Moscovitch**, Interim Director and Associate Professor of Radiation Medicine, (202-687-8993); Ph.D. Ben Gurion University of the Negev (Israel) 1985; Thermoluminescent dosimetry (TLD), environmental monitoring, space radiation detection.

**[email: [moscovim@medlib.georgetown.edu](mailto:moscovim@medlib.georgetown.edu)]**

## **GEORGETOWN UNIVERSITY (Continued)**

**James E. Rodgers**, Associate Professor of Radiation Science (202-687-2212); Ph.D. University of California, Riverside 1972; Radiation dosimetry, Monte Carlo simulation, radiation shielding. [email: jr@gamma.rip.georgetown.edu]

**Charlie Willis, CHP**, Adjunct Instructor (301-415-1091); M.S. Northwestern Louisiana; Environmental health physics, regulatory policy.

### **Other Faculty**

**Francis Atkins, Ph.D.**

**Jonathan Jackson, Ph.D.**

**Mira Jung, Ph.D.**

**Stephen A. McGuire, Ph.D.**

**Donald A. McRae, Ph.D.**

**Seong K. Mun, Ph.D.**

**Azam Niroomand-Rad, Ph.D.**

**Vicente Notario, Ph.D.**

**Sarada Prasad, Ph.D.**

**David A. Schauer, Ph.D.**

**Peter Thraves, Ph.D.**

**Barry Wessels, Ph.D.**

### **Other Information**

The Health Physics program offers a Master of Science degree with an option to specialize in Health Physics or Environmental Health Physics. For students who select the environmental option, the focus of the internships and the thesis will be directed more towards environmental radiation protection. The program has been designed to provide students with the necessary theoretical and practical knowledge to become competent health physicists. Students in the program will have the opportunity to gain valuable experience in various areas associated with health physics, such as basic radiation physics, radiation detection and dosimetry, environmental radiation protection, and radiation biology. Applicants to the Master's program are selected on a competitive basis by a faculty committee which evaluates the application, letters of recommendation, and academic record. For full-time students, it is expected that the Master's program can be completed in two years. Part-time students taking two courses per semester would be expected to complete the program in approximately three years. The program offers evening courses to enable working part-time students to participate.

### **Visiting Faculty Financial Assistance**

Both visiting faculty and postdoctoral fellowships are occasionally available.

## **GEORGETOWN UNIVERSITY (Continued)**

### **Student Financial Assistance Program**

Georgetown University has an extensive student financial assistance program. In addition, the program is funded by external grants from NASA and the DOE Health Physics Faculty Research Award Program. Occasionally student fellowships are available.

### **Research Facilities**

The program is located on the campus of Georgetown University in a new research building with spacious laboratories and state-of-the-art equipment, including thermoluminescence dosimetry (TLD), and radiation detection and spectroscopy systems. In addition, we have a computer laboratory equipped with the latest models silicon graphics workstation (Indigo<sup>2</sup> Solid Impact R-10000) and a variety of Pentium and Macintosh workstations.

**8. GEORGIA INSTITUTE OF TECHNOLOGY**  
Health Physics Program  
George W. Woodruff School of Mechanical Engineering  
Telephone: (404) 894-3204 / Fax: (404) 894-8336

**Program Director:**

Dr. Ward O. Winer  
George W. Woodruff School of Mechanical Engineering  
Georgia Institute of Technology  
Atlanta, GA 30332-0405  
(404) 894-3200  
Fax: 404-894-1658  
**email:** ward.winer@me.gatech.edu

**HP Degrees Granted:**

M.S. in Health Physics  
Ph.D. in Nuclear Engineering (Health Physics Option)

**Remote Delivery of Course:** Entire M.S. curriculum  
Selected courses from the Ph.D. program

	<b>MS</b>	<b>PhD</b>
<b>HP Enrollment (Fall 1996):</b>	44	14
<b>HP Graduates (9/94 to 8/95):</b>	21	1
<b>HP Graduates (9/95 to 8/96):</b>	14	4

**Health Physics Faculty** (<sup>3</sup>25% FTE toward the HP program)

**Nolan E. Hertel**, Associate Professor, Nuclear Engineering and Health Physics (404-894-3717; Fax: 404-894-3733); Ph.D. University of Illinois 1979; Radiation shielding, high-energy neutron/particle interactions, radiation dosimetry and phantoms, radiological assessment, waste management.  
**[email: nolan.hertel@me.gatech.edu]**

**Rodney Ice, CHP**, Principal Research Scientist, Neely Nuclear Research Center (404-894-3621, Fax: 404-853-9325); Ph.D. Purdue University 1967; Radiopharmaceuticals, radioprotectants, boron neutron capture theory.  
**[email: rodney.ice@nnrc.gatech.edu]**

**Bernd Kahn**, Professor Emeritus, Nuclear Engineering and Health Physics, and Director, Environmental Resource Center (404-894-3766, Fax: 404-894-3733); Ph.D. Massachusetts Institute of Technology 1960; Analytical radiochemistry, radiological surveillance at nuclear power facilities, measurement of radionuclides at environmental levels. **[email: bernd.kahn@me.gatech.edu]**

## **GEORGIA INSTITUTE OF TECHNOLOGY (Continued)**

**C-K Chris Wang**, Assistant Professor, Nuclear Engineering and Health Physics (404-894-3727, Fax: 404-894-3733); Ph.D. Ohio State University 1989; Neutron capture therapy, radiation detection and radiation dosimetry.

[email: [chris.wang@me.gatech.edu](mailto:chris.wang@me.gatech.edu)]

**Show H. Fong**, Assistant Professor, Nuclear Engineering and Health Physics (404-894-3718, Fax: †404-894-3733); Ph.D. Northwestern University 1990; Health physics, risk assessment, environmental restoration.

### **Other Faculty**

**S. I. Abdel-Khalik**, Southern Nuclear Professor, Nuclear Engineering and Health Physics.

**Sue B. Clark**, Adjunct Assistant Professor, Environmental Chemistry.

**Kenneth W. Crase**, Adjunct Professor, Radiation Protection Policy.

**S. James Cullom**, Adjunct Assistant Professor, Nuclear Medicine Imaging.

**Geoffrey G. Eichholz**, Regents' Professor Emeritus, Nuclear Engineering and Health Physics.

**Don S. Harmer**, Professor of Physics.

**Ratib A. Karam**, Professor, Nuclear Engineering and Health Physics.

**James A. Mulholland**, Assistant Professor of Civil Engineering and Environmental Engineering.

**Farzad Rahnema**, Associate Professor, Nuclear Engineering and Health Physics.

**Michael T. Ryan**, Adjunct Professor, Low-level Radioactive Waste

**Weston M. Stacey**, Callaway and Regents' Professor, Nuclear Engineering and Health Physics.

**Jon H. Trueblood**, Adjunct Professor, Digital Imaging

**F. Ward Whicker**, Adjunct Professor, Radioecology

**Ward O. Winer**, Regents Professor and Chair, School of Mechanical Engineering.

**William J. Wepfer**, Professor and Director for Graduate Programs, School of Mechanical Engineering.

**Edward K. Yeagers**, Associate Professor of Biology.

### **Other Information**

The video M.S. health physics program has been expanded to include live two-way video classes to the Medical College of Georgia. This distance learning program serves the Central Savannah River Region.

### **Visiting Faculty Financial Assistance**

No formal program at present.

## **GEORGIA INSTITUTE OF TECHNOLOGY (Continued)**

### **Student Financial Assistance**

Research and teaching assistantships, fellowships, and tuition waivers are available to graduate students. Graduate assistantships carry a twelve-month stipend ranging from \$13,000 to \$16,000 and include a waiver of out-of-state tuition. President's Fellowships and Woodruff Fellowships of up to \$5000 which supplement graduate assistantships, are available to qualified students wishing to pursue the Ph.D. Federal, industrial, and private fellowships are also available. International students must guarantee their first-year support but are eligible to compete for awards on a quarterly basis.

### **Research Facilities**

5-MW nuclear research reactor, subcritical assembly, 300,000 curie  $^{60}\text{Co}$  sources, hot cells. Extensive laboratories in radiochemistry, materials preparations, nuclear spectroscopy, plasma diagnostics, and radiobiology. Nuclear Research Center, Fusion Research Center, Environmental Resources Center. Only a few hours away are the Savannah River Plant, known for its research in material behavior, and the Oak Ridge National Laboratory, one of the world's largest research establishments.

## 9. IDAHO STATE UNIVERSITY

Department of Physics

Telephone: (208) 236-2350 / Fax: (208) 236-4649

### **Program Director:**

Dr. Richard Brey  
Department of Physics  
Campus Box 8106  
Idaho State University  
Pocatello, Idaho 83209  
**email:** brey@physics.isu.edu

### **HP Degrees Granted:**

B.S. in Physics (Health Physics Emphasis)  
M.S. in Physics (Health Physics Emphasis)  
Ph.D. in Nuclear Science and Engineering (Health Physics Emphasis)

**Remote Delivery of Course:** Selected courses in the BS, MS, and PhD programs are offered to remote locations within the state of Idaho in real-time via microwave video communication.

	<b>BS</b>	<b>MS</b>	<b>PhD</b>
<b>HP Enrollment (Fall 1996):</b>	25	28	2
<b>HP Graduates (9/94 to 8/95):</b>	9	1	
<b>HP Graduates (9/95 to 8/96):</b>	5	4	

### **Health Physics Faculty** (325% FTE toward the HP program)

**Richard R. Brey**, Assistant Professor of Health Physics (208) 236-2667; Ph.D. Purdue University 1994; Applied health physics, Environmental health physics.

**[email: brey@physics.isu.edu]**

**Thomas F. Gesell**, Professor of Health Physics (208-236-3669); Ph.D. University of Tennessee 1971; Dosimetry, environmental health physics.

**[email: gesell@physics.isu.edu]**

### **Other Faculty**

**Douglas P. Wells**, Associate Professor of Health Physics

**Michael Abbott**, Adjunct Professor of Health Physics

**Donald Alexander**, Adjunct Professor of Health Physics

**Rick Cummings**, Adjunct Professor of Health Physics

**Bernard Graham**, Adjunct Professor of Health Physics

**Yale Harker**, Adjunct Professor of Health Physics

**IDAHO STATE UNIVERSITY (Continued)**

**John Horan**, Adjunct Professor of Health Physics  
**Mark Otis**, Adjunct Professor of Health Physics  
**Art Rood**, Adjunct Professor of Health Physics  
**Bill Serrano**, Adjunct Professor of Health Physics  
**Klaus Buzzi**, Affiliate Professor of Health Physics  
**Mark Davidson**, Affiliate Professor of Health Physics  
**Karen Langley**, Affiliate Professor of Health Physics  
**Todd Lewis**, Affiliate Professor of Health Physics  
**Steve Oberg**, Affiliate Professor of Health Physics  
**James O'Rear**, Affiliate Professor of Health Physics  
**Rudy Varesco**, Affiliate Professor of Health Physics

**Other Information**

The nearby Idaho National Engineering Laboratory offers opportunities for students to gain practical experience and to conduct thesis research in a DOE environment. Idaho State University operates two separate environmental radioactivity monitoring and assessment laboratories. The Idaho State University Department of Physics operates the Idaho Small Accelerator Facility which currently operates several accelerators including two Van de Graaff accelerators, three electron LINAC accelerators, and a radiofrequency quadrupole accelerator. This facility will be increasing the number of available accelerators in the near future. Additionally Idaho State University operates an AGN-201 research and training reactor.

## 10. LAKESHORE TECHNICAL COLLEGE

Department of Health Physics

Telephone: (414) 684-4408 / Fax: (414) 693-3564

### **Program Director:**

Dr. Douglas G. Gossen  
Department of Health Physics  
Lakeshore Technical College  
1290 North Avenue  
Cleveland, Wisconsin 53015

### **HP Degrees Granted in Health Physics:**

A.A. in Health Physics

**Remote Delivery of Courses:** Selected courses in the A.A. curriculum; entire curriculum by the Fall of 1998.

### **AA**

<b>HP Enrollment (Fall 1996):</b>	7
<b>HP Graduates (9/94 to 8/95):</b>	15
<b>HP Graduates (9/95 to 8/96):</b>	12

### **Health Physics Faculty** (325% FTE toward the HP program)

**Douglas G. Gossen**, Coordinator of Health Physics Department (414-684-4408, ext. 221); Ph.D. LaSalle University 1996; Applied health physics, radiochemistry.

**Daniel J. Shannon**, Health Physics Instructor, M.S. Georgia Tech. 1995; Radiological emergencies, applied health physics.

### **Other Information**

Annually, the program offers 40 hours of refresher courses and the NRRPT examination.

## 11. LOUISIANA STATE UNIVERSITY AND A&M COLLEGE

Nuclear Science Center

Telephone: (504) 388-2163 / Fax: (504) 388-2094

### **Program Director:**

Dr. Edward N. Lambremont  
Director and Professor  
Nuclear Science Center  
Louisiana State University and A&M College  
Baton Rouge, Louisiana 70803-5820  
(504) 388-2744  
**email:** nssec@lsumvs.sncc.lsu.edu  
**website:** <http://www.leeric.lsu.edu/nsc>

### **HP Degrees Granted:**

M.S. in Nuclear Science and Engineering [Areas of Specialization: Health Physics, Medical Radiation Sciences (Physics), Nuclear Engineering, Basic and Applied Research]

**Remote Delivery of Course:** None

### **MS**

<b>HP Enrollment (Fall 1996):</b>	10
<b>HP Graduates (9/94 to 8/95):</b>	2
<b>HP Graduates (9/95 to 8/96):</b>	3

**Health Physics Faculty** (325% FTE toward the HP program)

**Edward N. Lambremont**, Director and Professor of Nuclear Science (504-388-2744); Ph.D. Ohio State University 1958; Radiation effects on biological systems, radiation safety, US Council for Energy Awareness spokesman on nuclear power.

**John C. Courtney, CHP**, Professor of Nuclear Engineering (504-388-2740); D.Engr. Catholic University of America 1965; Radiation shielding, health physics, radiation measurement, safety analysis of nuclear facilities, training program development.

**Erno Sajo**, Professor of Nuclear Engineering (504-388-2762); Ph.D. Lowell University 1989; Reactor engineering, computer and mathematical modeling of radionuclide transport, fluid mechanics, dynamics and thermal analysis of reactor systems.

**L. Max Scott, CHP**, Associate Professor of Nuclear Science (504-388-2747); Ph.D. Purdue University 1961; Radiation Safety Officer (LSU System and Baton Rouge Campus); Radiation safety, health physics.

## **LOUISIANA STATE UNIVERSITY AND A&M COLLEGE (Continued)**

**Mark L. Williams**, Professor of Nuclear Engineering (504-388-2745); Ph.D. University of Tennessee 1979; Nuclear reactor physics, radiation transport theory, perturbation theory, numerical methods for reactor analysis.

### **Other Faculty**

**Oscar Hidalgo-Salvatierra**, Adjunct Assistant Professor of Nuclear Science.

**Sheldon A. Johnson**, Adjunct Assistant Professor of Nuclear Science.

### **Student Financial Assistance**

Research assistantships

### **Research Facilities**

Facilities for both biological and physics science and engineering research utilizing isotopes and radiation sources are located in the NSC. Radiation measurement equipment includes low-background, high-sensitivity liquid and solid scintillation detectors, and a gas-flow proportional counter. Gamma spectroscopy and dosimetry systems are used in a variety of investigations. A mass spectrometer laboratory is maintained to support stable tracer research. The Center maintains an extensive inventory of radiation monitoring instruments and calibrated standard sources. Radiation sources include two kilocurie cobalt irradiation facilities, neutron sources, and a natural subcritical assembly. The Perkins Cancer Center has extensive facilities and equipment for radiation dosimetry, treatment planning, teletherapy, brachytherapy, and other instruments used in treatment of human neoplastic disease and related disorders.

## 12. MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Department of Nuclear Engineering

Telephone: (617) 253-3801 / Fax: (617) 258-7437

### **Program Director:**

Dr. Jacquelyn C. Yanch  
Department of Nuclear Engineering  
E25-330  
Massachusetts Institute of Technology  
Cambridge, Massachusetts 02139-4307  
**email:** jcy@webiel.mit.edu

### **HP Degrees Granted:**

M.S. in Nuclear Engineering (health physics option)  
Ph.D. or Sc.D. in Nuclear Engineering (health physics option)

**Remote Delivery of Course:** None

	<b>MS</b>	<b>PhD</b>
<b>HP Enrollment (Fall 1996):</b>	6	4
<b>HP Graduates (9/94 to 8/95):</b>	0	1
<b>HP Graduates (9/95 to 8/96):</b>	0	2

**Health Physics Faculty** (325% FTE toward the HP program)

**Jacquelyn C. Yanch**, Associate Professor of Nuclear Engineering (617-258-6999); Ph.D. University of London 1988; Nuclear medical imaging, computational modeling in both therapy and image restoration, radiation health physics, neutron dosimetry. [**email:** jcy@webiel.mit.edu]

**Kenneth Czerwinski**, Assistant Professor of Nuclear Engineering (617-253-3843); Ph.D. University of California, Berkeley, 1992; Actinide spectroscopy, actinide thermodynamics, environmental chemistry of actinide elements, radiation health physics, geochemical modeling. [**email:** kczer@mit.edu]

**Xia-Lin Zhou**, Assistant Professor of Nuclear Engineering (617-258-7430); Ph.D. Massachusetts Institute of Technology 1993; Neutron reflection and scattering spectroscopies, neutron source engineering, neutron capture therapy. [**email:** xlzhou@mit.edu]

**Otto K. Harling**, Professor of Nuclear Engineering (615-253-4201); Ph.D. Penn State 1962; Research reactor applications, experimental materials research, neutron research. [**email:** oharling@mit.edu]

## **MASSACHUSETTS INSTITUTE OF TECHNOLOGY (Continued)**

**Sow-Hsin Chen**, Professor of Nuclear Engineering (615-253-3810); Ph.D. McMaster University, Canada 1964; Applied neutron physics and spectroscopy, applications of laser light scattering to biological problems. [email: [sowhsin@mit.edu](mailto:sowhsin@mit.edu)]

**Sidney Yip**, Professor of Nuclear Engineering (615-253-3809); Ph.D. University of Michigan 1962; Atomistic simulations, condensed matter sciences, statistical mechanics, neutron scattering. [email: [syip@mit.edu](mailto:syip@mit.edu)]

### **Other Faculty**

**Mujid S. Kazimi**, Professor of Nuclear Engineering.

**Fred W. McWilliams**, Head of Radiation Protection, MIT Reactor.

**Francis X. Massé, CHP**, Radiation Protection Officer for MIT.

### **Student Financial Assistance**

Fellowships, teaching assistantships, research assistantships

### **Research Facilities**

5-MW MIT Research Reactor plus associated laboratories, 4.1-MeV high current particle accelerator for biomedical research, scanning electron facility, an RFQ proton generator for neutron tomography and non-destructive testing, a waste encapsulation laboratory, neutron activation analysis laboratory, NMR laboratory, medical imaging laboratory, and other.

### 13. NATIONAL TECHNICAL UNIVERSITY

Department of Health Physics

Telephone: (970) 495-6400 / Fax: (970) 484-0668

#### **Program Director:**

Dr. Thomas B. Borak  
Department of Radiological Health Sciences  
Colorado State University  
Ft. Collins, Colorado 80523  
(970) 491-6450  
Fax: (970) 491-0623  
**email:** tborak@vines.colostate.edu

#### **HP Degrees Granted:**

M.S. in Health Physics

**Remote Delivery of Course:** Entire MS curriculum

#### MS

<b>HP Enrollment (Fall 1996):</b>	14
<b>HP Graduates (9/94 to 8/95):</b>	4
<b>HP Graduates (9/95 to 8/96):</b>	3

#### Health Physics Advisory Committee

**Thomas B. Borak**, Department of Radiological Health Sciences (970-491-5222, Fax: 970-491-0623); Colorado State University. [**email:** tborak@vines.colostate.edu]

**David Hintenlang**, 202 Nuclear Sciences Ctr., University of Florida, Gainesville (352-392-8112, Fax: 352-392-3380). [**email:** dhinten@nervm.nerdc.ufl.edu]

**Robert R. Landolt**, School of Health Sciences, Purdue University (317-494-1440, Fax: 317-496-1377). [**email:** landoltr@purdue.edu]

**Nolan E. Hertel**, Woodruff School of Mechanical Engineering, Health Physics Program, Georgia Institute of Technology (404-894-3717, Fax: 404-894-3733). [**email:** nolan.hertel@me.gatech.edu]

#### Participating Universities

Colorado State University, University of Florida, Georgia Institute of Technology, University of Illinois, and Purdue University. In addition to required courses at these institutions, elective courses can be selected from over 40 participating universities.

## NATIONAL TECHNICAL UNIVERSITY (Continued)

### **Other Information**

National Technical University offers a M.S. degree in Health Physics. The curriculum consists of courses from participating universities with recognized graduate programs in radiation protection. NTU students enroll in university courses as they are being delivered to residents on campus. However, they view these lectures by satellite transmission at subscribing institutions such as government laboratories or companies. Courses have been selected to provide the basics of health physics required for professional development and certification by the American Board of Health Physics. Thirty-two semester credits are required in radiation physics, radiation detection, radiochemistry, radiation biology, principles of health physics, environmental health physics, and public health. Students must also take two laboratory courses that are scheduled at participating universities for two weeks during the summer term. The final course is the preparation of a formal paper involving a special topic approved by the academic advisor. This is usually directly related to and can be completed at the student's place of employment.

#### 14. NORTHERN NEW MEXICO COMMUNITY COLLEGE

Department of Radiation Science

Telephone: (505) 747-2218 / Fax: (505) 747-2180

**Program Director:**

Ms. Donna Foster  
Director, Radiation Sciences  
Northern New Mexico Community College  
1002 North Onate St.  
Española, New Mexico 87532

**HP Degrees Granted:**

A.A.S. in Radiation Protection  
A.S.S. in Environmental Restoration and Waste Management Science

**Remote Delivery of Course:** Selected courses are sent to Los Alamos National Laboratory

**AA**

<b>HP Enrollment (Fall 1996):</b>	16
<b>HP Graduates (9/94 to 8/95):</b>	3
<b>HP Graduates (9/95 to 8/96):</b>	2

**Health Physics Faculty** (325% FTE toward the HP program)

**Michael Duran**, M.S. Colorado State University 1993.

**Anthea Stamelatos**, B.S. College of St. Francis, Joliet.

**Lawrence Scott Walker**, B.A. University of Northern Colorado 1973.

## 15. THE OHIO STATE UNIVERSITY

Department of Nuclear Engineering

Telephone: (614) 292-8519 / Fax: (614) 292-3163

### Program Director:

Dr. Thomas E. Blue

Health Physics Program Director

2091 Robinson Laboratory

206 West 18th Avenue

Columbus, Ohio 43210-1107

(614) 292-0629

**email:** [tblue@melanoma.eng.ohio-state.edu](mailto:tblue@melanoma.eng.ohio-state.edu)

**website:** <http://rclsgi.eng.ohio-state.edu/nuclear/>

### HP Degrees Granted:

M.S. in Nuclear Engineering (Health Physics Option)

Ph.D. in Nuclear Engineering (Health Physics Option)

**Remote Delivery of Course:** Selected courses in the MS and PhD programs

	MS	PhD
<b>HP Enrollment (Fall 1996):</b>	7	5
<b>HP Graduates (9/94 to 8/95):</b>	4	0
<b>HP Graduates (9/95 to 8/96):</b>	5	0

**Health Physics Faculty** (325% FTE toward the HP program)

**Don W. Miller**, Professor and Chairman of Nuclear Engineering (614-292-7979); Ph.D. The Ohio State University 1971; Reactor instrumentation, reactor dynamics and control, nuclear medical instrumentation, artificial intelligence applied to plant operations, digital x-ray radiography.

**[email: [miller.68@osu.edu](mailto:miller.68@osu.edu)]**

**Thomas E. Blue**, Professor of Nuclear Engineering (614-292-0629); Ph.D. University of Michigan 1978; Radiation protection, boron neutron capture therapy, accelerator neutron source design, radiation dosimetry, solid state nuclear track detectors.

**[email: [tblue@melanoma.eng.ohio-state.edu](mailto:tblue@melanoma.eng.ohio-state.edu)]**

**Audeen W. Fentimen**, Associate Professor of Engineering Graphics and Nuclear Engineering (614-292-7930); Ph.D. The Ohio State University 1982; Nuclear waste management, fuel management, criticality safety. **[email: [fentiman.1@osu.edu](mailto:fentiman.1@osu.edu)]**

## THE OHIO STATE UNIVERSITY (Continued)

### Other Faculty

**Tunc Aldemir**, Professor of Nuclear Engineering.

**Walter E. Carey, CHP**, Emeritus Associate Professor of Nuclear Engineering and Zoology and Past Director, Office of Radiation Safety.

**Richard N. Christensen**, Professor of Nuclear and Mechanical Engineering

**Nilendu Gupta**, Professor of Nuclear Engineering.

**Mardi Hastings**, Associate Professor of Mechanical and Nuclear Engineering.

### Other Information

Approved institution for the DOE Applied Health Physics Fellowships. Typically receive annually one Institute for Nuclear Power Operations Health Physics Fellowship.

### Student Financial Assistance

Financial assistance to graduate students in Nuclear Engineering is available. After a consideration of academic experience and pertinent industrial experience, graduate students may be designated research associates or teaching associates, or may qualify for fellowships. Fellowships are available through the University, DOE, INPO, NRC and NSF. Stipends are competitive within OSU and with Graduate Programs at other schools; in addition, tuition and fees which range from \$7,236.00 to \$17,256.00 per year are waived. The deadline for fellowship applications is January 1.

Application for all forms of financial assistance administered by the department as well as the Graduate School may be made by completing the appropriate portion of the application form for admission to the Graduate School. Application materials may be obtained by writing to:

Admissions Office, The Ohio State University, 1800 Cannon Drive,  
Columbus, OH 43210-1200 USA

-----or-----

Chair, Nuclear Engineering Program, The Ohio State University, 206 West  
18th Avenue, Columbus, OH 43210-1107 USA

## 16. OREGON STATE UNIVERSITY

Department of Nuclear Engineering

Telephone: (541) 737-2343 / Fax: (541) 737-0480

### Program Director:

Dr. Jack F. Higginbotham  
Department of Nuclear Engineering  
Oregon State University  
Radiation Center C116  
Corvallis, Oregon 97331-5902  
(541) 737-7046  
email: [higginjf@rc.orst.edu](mailto:higginjf@rc.orst.edu)

### HP Degrees Granted:

B.S. in Radiation Health Physics  
M.S. in Radiation Health Physics  
Ph.D. in Radiation Health Physics

Remote Delivery of Course: None

	BS	MS
HP Enrollment (Fall 1996):	26	13
HP Graduates (9/94 to 8/95):	3	3
HP Graduates (9/95 to 8/96):	4	8

Health Physics Faculty (325% FTE toward the HP program)

**Stephen E. Binney**, Professor of Nuclear Engineering (541-737-7068); Ph.D. University of California, Berkeley 1970; Applications of nuclear instrumentation and techniques, production of medical radioisotopes, boron neutron capture therapy, transmutation of radionuclides, nuclear radiation shielding.

[email: [binneys@ne.orst.edu](mailto:binneys@ne.orst.edu)]

**Brian Dodd**, Director, Radiation Center and Professor of Nuclear Engineering (541-737-2344); Ph.D. University of London 1973; Health physics, radioactive materials transportation, emergency response, research reactor management.

[email: [doddb@rc.orst.edu](mailto:doddb@rc.orst.edu)]

**Jack F. Higginbotham, PE, CHP**, Associate Professor of Nuclear Engineering (541-737-7046); Ph.D. Kansas State University 1987; Radiation protection, activation analysis, gamma-ray and beta-particle spectroscopy, nuclear instrumentation.

[email: [higginjf@rc.orst.edu](mailto:higginjf@rc.orst.edu)]

## **OREGON STATE UNIVERSITY (Continued)**

**Kathryn A. Higley, CHP**, Assistant Professor of Nuclear Engineering, (541-737-0675); PhD Colorado State University 1992; Human and ecological risk assessment, environmental pathway analysis, environmental radiation monitoring, radionuclide and hazardous chemical transport, radiochemistry, neutron activation analysis and environmental regulation.  
[email: [higleyk@ne.orst.edu](mailto:higleyk@ne.orst.edu)]

### **Other Faculty**

**Arthur G. Johnson**, Professor Emeritus of Nuclear Engineering

**Andrew C. Klein**, Graduate Administrator and Associate Professor of Nuclear Engineering.

**Todd S. Palmer**, Assistant Professor of Nuclear Engineering.

**José N. Reyes Jr.**, Associate Professor of Nuclear Engineering.

**John C. Ringle**, Associate Dean of the Graduate School and Professor of Nuclear Engineering

### **Other Information**

Vacant position in the program (currently recruiting). Program is housed in the OSU Radiation Center which has a 1.1 MW TRIGA reactor,  $^{60}\text{Co}$  irradiator, instrument calibration facilities as well as full analytical and laboratory capabilities. The Department of Nuclear Engineering at Oregon State University also offers B.S., M.S., and Ph.D. degrees in nuclear engineering.

## 17. PURDUE UNIVERSITY

School of Health Sciences

Telephone: (765) 494-1419 / Fax: (765) 496-1377

### **Program Director:**

Dr. Paul Ziemer  
School of Health Sciences  
Purdue University  
1338 Civil Engineering Building  
West Lafayette, Indiana 47907-1338

### **HP Degrees Granted:**

B.S. in Health Physics  
M.S. in Health Physics  
Ph.D. in Health Physics

**Remote Delivery of Course:** Selected courses in the MS program as part of the MS health physics degree from National Technological University.

	<b>BS</b>	<b>MS</b>	<b>PhD</b>
<b>HP Enrollment (Fall 1996):</b>	16	4	2
<b>HP Graduates (9/94 to 8/95):</b>	9	4	1
<b>HP Graduates (9/95 to 8/96):</b>	11	1	0

### **Health Physics Faculty** (325% FTE toward the HP program)

**Robert Landolt**, Professor of Health Sciences (765-494-2699); Ph.D. Purdue University 1968; Radioactive waste management, health physics aspects of decommissioning.  
[email: landoltr@purdue.edu]

**Paul L. Ziemer, CHP**, Professor and Head, School of Health Sciences (765-494-1435); Ph.D. Purdue University 1962; Solid state dosimetry, radon transport through soil and other materials.  
[email: ziemer@purdue.edu]

**John D. Zimbrick**, Professor of Health Sciences (765-494-1408); Ph.D. University of Kansas 1967; Molecular radiobiology, radiation dosimetry.  
[email: zimbrick@purdue.edu]

### **Other Faculty**

**Stanley Shaw**, Professor of Nuclear Pharmacy.

**James Schweitzer**, Assistant Professor of Health Sciences and Radiation Safety Officer.

**Frank Rosenthal**, Associate Professor of Occupational and Environmental Health Sciences.

**Neil Zimmerman**, Associate Professor of Occupational Safety and Health.

## 18. SAN DIEGO STATE UNIVERSITY

Department of Physics

Telephone: (619) 594-6240 / Fax: (619) 594-5485

### **Program Director:**

Dr. Patrick J. Papin  
Department of Physics  
San Diego State University  
San Diego, California 92182-1233  
**email:** patrick.papin@sdsu.edu

### **HP Degrees Granted:**

M.S. in Radiological Health Physics

**Remote Delivery of Course:** None

### **MS**

<b>HP Enrollment (Fall 1996):</b>	15
<b>HP Graduates (9/94 to 8/95):</b>	6
<b>HP Graduates (9/95 to 8/96):</b>	6

### **Health Physics Faculty** (325% FTE toward the HP program)

**Patrick J. Papin**, Professor of Physics (619-594-6240); Ph.D. University of California 1985, Computational methods in dosimetry, shielding, and medical imaging, Neutron-gamma mixed field dosimetry. [**email:** patrick.papin@sdsu.edu]

**Gordon Shckelford**, Lecturer in Radiological Health Physics (619-594-6240); M.S. San Diego State University 1974, Nuclear instrumentation and methods.  
[**email:** gshackelford@sciences.sdsu.edu]

**Eric Goldin, CHP**, Lecturer in Radiological Health Physics and Radiation Biology, ABHP Certified Health Physicist (Comprehensive and Power Reactor Health Physics), Health Physics Engineer, Southern California Edison (619-594-6240); Ph.D. University of Texas 1976, Nuclear power reactor health physics.

**Ralph Cerbone**, Lecturer in Radiological Health Physics (619-594-6240); Ph.D. Rensselaer Polytechnic Institute 1967, Computational methods in shielding, nuclear engineering.

## **SAN DIEGO STATE UNIVERSITY (Continued)**

### **Other Faculty**

**Steven J. Goetsch**, Lecturer in Radiological Health Physics.

**Michael Russell**, Lecturer in Radiological Health Physics.

**Sharon Thompson**, Lecturer in Radiological Health Physics.

### **Other Information**

Our Health Physics Program is a participating university in the Department of Energy Applied Health Physics Fellowship program. We also have students who are supported by the Nuclear Regulatory Commission Graduate Fellowship program. Health Physics curriculum includes applied health physics courses in areas of nuclear power reactor health physics (in cooperation with San Onofre Nuclear Generating Station) and medical health physics (in cooperation with the Naval Hospital, San Diego).

### **Student Financial Assistance**

The department currently supports students as both teaching and research assistantships. Students also have numerous opportunities for scholarships and fellows.

### **Research Facilities**

On campus facilities include: Nuclear counting laboratories with radioisotope preparation capabilities, neutron generator facility, x-ray laboratory, whole-body counter, instrument calibration facility (including gamma and neutron sources), computational radiological physics laboratory (with high-speed supercomputer access). Off campus facilities: Through elective courses and special study students have access to equipment and facilities at San Onofre Nuclear Generating Station, various hospitals (with nuclear medicine, diagnostic and radiation therapy facilities), and biotech laboratories.

### **Professional Certification**

Graduates of our program have been very successful in passing the American Board of Health Physics Certification Exam.

## 19. TEXAS A&M UNIVERSITY

Department of Nuclear Engineering

Telephone: (409) 845-4161 / Fax: (409) 845-6443

### Program Director:

Dr. John W. Poston, Sr.  
129 Zachry Engineering Center  
Department of Nuclear Engineering  
Texas A&M University  
College Station, Texas 77843-3133  
**email:** jwp8890@zeus.tamu.edu

### HP Degrees Granted:

B.S. in Radiological Health Engineering  
M.S. in Health Physics  
Ph.D. in Nuclear Engineering (Health Physics Option)

**Remote Delivery of Courses:** None

	BS	MS	PhD
<b>HP Enrollment (Fall 1996):</b>	15	19	12
<b>HP Graduates (9/94 to 8/95):</b>	3	16	4
<b>HP Graduates (9/95 to 8/96):</b>	8	8	3

### Health Physics Faculty (325% FTE toward the HP program)

**John W. Poston, Sr.**, Department Head and Professor of Nuclear Engineering (409-845-4161); Ph.D. Georgia Institute of Technology 1971, External and internal dosimetry, applied health physics.  
**[email: jwp8890@zeus.tamu.edu]**

**Leslie A. Braby**, Research Professor (409-862-1798); Ph.D. Oregon State University 1972; Microdosimetry, radiation biology, space radiation, radiation detection.  
**[email: labraby@unix.tamu.edu]**

**Ian S. Hamilton**, Lecturer (409-845-8101); Ph.D. Texas A&M University 1995; Radiation detection, external dosimetry, radiation biology.  
**[email: ish6197@acs.tamu.edu]**

**Milton E. McLain, Jr., CHP**, Professor Emeritus of Nuclear Engineering (409-845-4107); Ph.D. Georgia Institute of Technology 1972; Health physics in power plant research and industrial applications, radon measurements, radioactivity measurements, dosimetry of fission product gases.

## **TEXAS A&M UNIVERSITY (Continued)**

**W. Wilson Pitt, Jr., PE**, Adjunct Professor of Nuclear Engineering and Assistant Department Head (409-845-4166); Ph.D. University of Tennessee at Knoxville 1969; Waste management, fuel reprocessing, environmental fate and transport.

**[email: [wwpitt@tamu.edu](mailto:wwpitt@tamu.edu)]**

**W. Dan Reece**, Associate Professor of Nuclear Engineering and Director, Nuclear Science Center (409-847-8946); Ph.D. Georgia Institute of Technology 1988; Radiation transport, location of breach of clad, assessment of effective dose equivalent from external sources, hot particles.

**[email: [w-reece@tamu.edu](mailto:w-reece@tamu.edu)]**

### **Other Faculty**

**William H. Marlow**, Associate Professor of Nuclear Engineering.

**James C. Rock, PE, CIH**, Associate Professor of Industrial Hygiene.

**Stuart L. Shalat**, Associate Professor of Industrial Hygiene.

**John P. Wagner**, Associate Professor of Safety Engineering.

### **Other Information**

The Department of Nuclear Engineering also offers M.S. degrees in both Industrial Hygiene and Safety Engineering. Current plans are to merge HP, IH, and SE programs at the PhD level into a combined degree program in Health Protection Engineering. Texas A&M is an approved site for the DOE Applied Health Physics Fellowship, the DOE Nuclear Engineering & Health Physics Fellowship, and the INPO Health Physics Fellowship.

### **Visiting Faculty Financial Assistance**

Faculty wishing to spend sabbatical leave at Texas A&M are welcome. Financial arrangements are negotiated on an individual basis but may encompass half-time to full support for the academic year. The Department has a long history of such arrangements with several national laboratories as well as some foreign institutions.

### **Student Financial Assistance**

Scholarships, fellowships, and assistantships are available through the Department, the College, and the University. All applications for our graduate program are automatically considered for financial aid. The Department is an approved site for the DOE Applied Health Physics Fellowships, the DOE Nuclear Engineering and Health Physics Fellowships, and the INPO Health Physics Fellowship.

### **Research Facilities**

1 MW TRIGA research reactor, 5 W AGN-201M training reactor, 5 accelerators, Nuclear counting laboratory, Radon laboratory, Thermoluminescence Dosimetry Laboratory, Etched-track Detection Laboratory, Nuclear spectroscopy laboratory, Liquid scintillation counting laboratory, Radiochemistry Laboratory

**TEXAS A&M UNIVERSITY** (Continued)

**Professional Certification**

The M.S. and Ph.D. programs in health physics prepare the student for Part I of the certification examination administered by the American Board of Health Physics. Eligibility of Part II of examination is based on professional experience.

## 20. TEXAS STATE TECHNICAL COLLEGE WACO

Radiation Protection Technology

Telephone: (817) 867-4877 / Fax: (817) 867-2300

### **Program Director:**

David Day  
Radiation Protection Technology Department  
3801 Campus Drive  
Waco, Texas 76705  
(817) 867-4841

### **HP Degrees Granted:**

Associate of Applied Science in Radiation Protection Technology

**Remote Delivery of Course:** None

### **AAS**

<b>HP Enrollment (Fall 1996):</b>	16
<b>HP Graduates (9/94 to 8/95):</b>	13
<b>HP Graduates (9/95 to 8/96):</b>	6

### **Health Physics Faculty** (>25% FTE toward the HP program)

**Linda K. Morris**, Radiation Safety Officer and Instructor (817-867-2952); M.S. Biophysics (Health Physics) Texas A&M University 1971. [**email: [lmorris@tstc.edu](mailto:lmorris@tstc.edu)**]

**Gary Nordwig**, Instructor (817-867-2992); M.S. University of Texas School of Public Health at Houston 1986. [**email: [gnordwig@tstc.edu](mailto:gnordwig@tstc.edu)**]

### **Other Information**

Radiation Protection Technology (RPT) is clustered with the Occupational Safety and Health (OSH) and Hazardous Materials Management Technology (HMM) Departments. Students receive basic training from all three (RPT, OSH, and HMM) departments and then specialize in one area.

## 21. UNIVERSITY OF CINCINNATI

Department of Mechanical, Industrial & Nuclear Engineering

Telephone: (513) 556-2739 / Fax: (513) 556-3390

### Program Director:

Henry B. Spitz  
University of Cincinnati  
Department of Mechanical, Industrial & Nuclear Engineering  
598 Rhodes Hall  
P. O. Box 210072  
Cincinnati, Ohio 45221-0072  
(513) 556-2003  
**email:** henry.spitz@uc.edu

### HP Degrees Granted:

M. S. in Health Physics  
M. S. & Ph. D. in Nuclear Engineering  
Ph. D. in Radiological Engineering  
Ph. D. in Medical Physics

**Remote Delivery of Course:** None

	MS	PhD
<b>HP Enrollment (Fall 1996):</b>	28	16
<b>HP Graduates (9/94 to 8/95):</b>	7	1
<b>HP Graduates (9/95 to 8/96):</b>	7	3

### Health Physics Faculty (<sup>3</sup> 25% FTE toward HP Program)

**Leroy Eckart**, Professor & Associate Dean (513-556-2739); Ph. D., University of Cincinnati, 1971:  
Radiological Engineering, risk assessment, pathway analysis, nuclear waste management.  
**[email: roy.eckart@uc.edu]**

**Henry Spitz**, Associate Professor & Program Director (513-556-2003): Ph. D., New York University, 1978: Internal radiation dosimetry, in vivo whole body counting, tissue substitute materials, bioassay, radiation detection & measurement, environmental radioactivity, epidemiology.  
**[email: henry.spitz@uc.edu]**

**John Valentine**, Assistant Professor (513-556-2482); Ph. D., University of Michigan, 1993:  
Radiation measurements, scintillator detector research, radiological characterization, medical imaging, Monte Carlo simulation.  
**[email: john.valentine@uc.edu]**

## **UNIVERSITY OF CINCINNATI (continued)**

**Alvin Shapiro**, Professor (513-556-2014); Ph. D., University of Cincinnati, 1968: Radiation shielding, reactor computations, radiation dosimetry, neutron transport, criticality.  
[email: alvin.shapiro@uc.edu]

### **Other Faculty**

**James Neton**, Ph. D., CHP, Adjunct Assistant Professor

**Linda Bauer**, Ph. D., Adjunct Assistant Professor

**Paul Feller**, Ph. D., Adjunct Professor

**James Anno**, Ph. D., Professor Emeritus

**Raymond Wood**, Ph. D., Adjunct Assistant Professor

### **Other Information**

The Health Physics Program is part of a comprehensive academic program in Nuclear and Radiological Engineering in the College of Engineering at the University of Cincinnati. Although Nuclear and Radiological Engineering is located in the Department of Mechanical, Industrial, and Nuclear Engineering, collaborations in academic and research activities with the Department of Environmental Health in the College of Medicine and Civil and Environmental Engineering in the College of Engineering are typically arranged to provide students with the broadest possible range of experience. The Ph. D. program in Medical Physics is conducted in collaboration with the Radiology Department of the University of Cincinnati Medical College. The Health Physics Program actively participates in the Health and Environmental Risk Institute which involves multi-disciplinary research in risk assessment, risk communication, environmental analysis, exposure assessment, and risk management and incorporates the Colleges of Engineering, Medicine, Arts & Science, and Law.

### **Visiting Faculty Financial Assistance**

Arrangements for visiting faculty working on collaborative research and academic programs are arranged on an individual basis depending upon available funds.

### **Student Financial Assistance**

Many types of financial assistance are available to full-time students enrolled in the Nuclear Engineering Program. Qualifying graduate students in the College of Engineering may receive a University Graduate Scholarship (UGS) which covers tuition for the academic year and the summer quarters. There are less no service obligations associated with the UGS. A few University Graduate Assistantships (UGA) are available each year which, in addition to tuition and fees (approximately \$800/yr), provide the student with a stipend during the regular academic year. In return for the stipend, the UGA requires approximately 15 to 20 hours of service per week in the Nuclear Engineering academic and/or research program. Research Assistantships (RA) are often available for the student to participate on externally-funded research projects which may serves thesis or project research topics.

## **UNIVERSITY OF CINCINNATI (continued)**

The Nuclear Engineering Program also has a few fellowships that are restricted to students having U.S. citizenship. Graduate awards supported by University funds are subject to specific guidelines and requirements. Any student who has been accepted for entrance into the graduate program can be considered for financial assistance. Initial decision on such assistance are made by the Nuclear Engineering Faculty, usually in March of each year. Academic excellence is the major criterion for these awards, but additional information submitted with the application, such as reports or publications, and reference letters are also considered.

### **Research Facilities**

The Nuclear Engineering Program at the University of Cincinnati has an elaborate arrangement of research and academic facilities, including laboratories for radiochemistry, radiation detection instrumentation, alpha and gamma spectroscopy, and sample preparation. In addition, two whole body counters and a  $^{60}\text{Co}$  pool irradiator are available as well as several computer facilities for performing Monte Carlo analysis. The Nuclear Engineering Program is also a participant in the Health and Environmental Risk Institute, a multidisciplinary research institute involved with environmental analysis, exposure assessment, human health risk assessment, risk communication, and risk management.

## 22. UNIVERSITY OF FLORIDA

Department of Environmental Engineering Sciences  
Telephone: (352) 392-0836 / Fax: (352) 392-3076

### Program Director:

Dr. W. Emmett Bolch, Jr.  
Department of Environmental Engineering Science  
P.O. Box 116450  
University of Florida  
Gainesville, Florida 32611  
(352) 392-5074  
**email:** ebolch@nervm.nerdc.ufl.edu

### HP Degrees Granted:

M.S. / M.E. in Environmental Engineering Sciences (Health Physics)  
Ph.D. in Environmental Engineering Sciences (Health Physics)

**Remote Delivery of Course:** None

	MS/ME	PhD
<b>HP Enrollment (Fall 1996):</b>	6	3
<b>HP Graduates (9/94 to 8/95):</b>	6	1
<b>HP Graduates (9/95 to 8/96):</b>	5	1

### Health Physics Faculty (325% FTE toward the HP program)

**W. Emmett Bolch, Jr., PE**, Professor and Associate Chairman of Environmental Engineering (352-392-5074); Ph.D. University of California at Berkeley 1967, Environmental surveillance for radioactivity, radioactive waste treatment, radiochemistry, analysis of radioactivity, remedial actions, radon.  
**[email: ebolch@nervm.nerdc.ufl.edu]**

**Wesley E. Bolch, PE, CHP**, Associate Professor of Nuclear and Radiological Engineering, (352-846-1361); PhD University of Florida 1988, External and internal radiation dosimetry, medical health physics, nuclear medicine dosimetry, NMR imaging / dosimetry of bone and bone marrow, microdosimetry, radiation effects to DNA, virtual radiation detection instrumentation development via LabVIEW programming. **[email: wesley-bolch@ufl.edu]**

**David E. Hintenlang**, Associate Professor of Nuclear and Radiological Engineering (352-392-8112); Ph.D. Brown University 1985, Medical health physics, radiolytic decomposition of mixed waste, real-time dosimetry and phantom development, indoor radon transport and computer modeling, and non-ionizing radiation health physics. **[email: dhinten@nervm.nerdc.ufl.edu]**

## **UNIVERSITY OF FLORIDA (Environmental Engineering) (Continued)**

**William S. Properzio**, Associate Professor of Environmental Engineering, Director of Environmental Health & Safety Division (352-392-1591); Ph.D. University of Florida 1975; Health physics, medical health physics, environmental hazards, and industrial safety.

**Charles E. Roessler, CHP**, Professor Emeritus of Environmental Engineering (507-362-8958); Ph.D. University of Florida 1967; Environmental health physics, radon. Available for limited student committees and advising on research projects.

### **Other Faculty**

**Eric R. Allen**, Professor of Environmental Engineering (Air Pollution).

**W. Lamar Miller**, Professor of Environmental Engineering (Hazardous Waste).

### **Other Information**

The Health Physics Program at the University of Florida is a cooperative effort of the Departments of Environmental Engineering Sciences (EES) and Nuclear Engineering Sciences (NES). The core coursework is essentially the same, however, departmental requirements and options are different. EES requires additional chemistry, environmental toxicology, and an environmental engineering course. EES students can emphasize electives in hazardous wastes, industrial hygiene, or air pollution control. Current research areas in the EES Department include risk assessment, remediation survey techniques, GIS application in health physics, environmental surveillance, radon mitigation at the development stage, and radiation risk reduction in pediatric diagnostic radiology.

### 23. UNIVERSITY OF FLORIDA

Department of Nuclear and Radiological Engineering  
Telephone: (352) 392-1401 / Fax: (352) 392-3380

**Program Director:**

Dr. David E. Hintenlang  
Department of Nuclear and Radiological Engineering  
202 Nuclear Sciences Center  
University of Florida  
Gainesville, Florida 32611  
**email:** dhinten@nervm.nerdc.ufl.edu

**HP Degree Granted:**

B.S. in Nuclear Engineering Sciences (Radiation Protection)  
M.S. / M.E. in Health Physics (Nuclear Power Option)  
M.S. / M.E. in Health Physics (Medical Health Physics Option)  
M.S. / M.E. in Health Physics (Waste Management Option)  
Ph.D. in Nuclear Engineering Sciences (Health Physics)

**Remote Delivery of Course:** Selected courses in the MS program as part of the MS in Health Physics degree offered by National Technical University

	<b>BS</b>	<b>MS/ME</b>	<b>PhD</b>
<b>HP Enrollment (Fall 1996):</b>	6	20	8
<b>HP Graduates (9/94 to 8/95):</b>	3	8	1
<b>HP Graduates (9/95 to 8/96):</b>	3	14	1

**Health Physics Faculty** (325% FTE toward the HP program)

**Samim Anghaie**, Professor of Nuclear and Radiological Engineering, (352-392-1421); PhD Pennsylvania State University 1982; Nuclear reactor design, nuclear reactor thermal hydraulics, single- and multi-phase flow and heat transfer, radiation spectroscopy, applied particle transport. [**email:** anghaie@inspi.ufl.edu]

**Wesley E. Bolch, PE, CHP**, Associate Professor of Nuclear and Radiological Engineering, (352-846-1361); PhD University of Florida 1988; External and internal radiation dosimetry, medical health physics, nuclear medicine dosimetry, NMR imaging / dosimetry of bone and bone marrow, microdosimetry, radiation effects to DNA, virtual radiation detection instrumentation development via LabVIEW programming. [**email:** wesley-bolch@ufl.edu]

**UNIVERSITY OF FLORIDA (Nuclear and Radiological Engineering) (Continued)**

**W. Emmett Bolch, Jr., PE**, Professor and Associate Chairman of Environmental Engineering (352-392-5074); Ph.D. University of California at Berkeley 1967; Environmental surveillance for radioactivity, radioactive waste treatment, radiochemistry, analysis of radioactivity, remedial actions, radon.

**[email: ebolch@nervm.nerdc.ufl.edu]**

**Frank J. Bova**, Professor of Radiation Oncology (352-395-0287); Ph.D. University of Florida 1977; Applications of medical physics in radiation oncology, stereotactic radioneurosurgery.

**[email: bova.radonc@shands.ufl.edu]**

**Jeffrey R. Fitzsimmons**, Professor of Radiology (352-395-0291); Ph.D. University of Florida 1979; Magnetic resonance imaging and spectroscopy, radiofrequency probe development, biomedical instrumentation, computer applications to medicine.

**[email: jeff@ufnmr.health.ufl.edu]**

**David E. Hintenlang**, Associate Professor of Nuclear Engineering Sciences (352-392-8112); Ph.D. Brown University 1985, Medical health physics, radiolytic decomposition of mixed waste, real-time dosimetry and phantom development, indoor radon transport and computer modeling, and non-ionizing radiation health physics. **[email: dhinten@nervm.nerdc.ufl.edu]**

**Alan M. Jacobs**, Professor of Nuclear and Radiological Engineering (352-392-2549); PhD Pennsylvania State University 1963; Mathematical analysis and diagnostic applications of radiation transport in matter, especially in nuclear reactor systems, medical and industrial radiographic imaging.

**Zuofeng Li**, Assistant Professor of Radiation Oncology (352-395-0287); D. Sc. Washington University 1989; Development of graphics-based 3D computer treatment planning systems for brachytherapy, dosimetry of radioactive stents for treatment of restenosis, remote-afterloading of low-dose rate and high-dose rate brachytherapy sources, brachytherapy dose calculation algorithms.

**[email: zuofeng@nervm.nerdc.ufl.edu]**

**Chihray Liu**, Assistant Professor of Radiation Oncology (352-395-0287); Ph.D. University of Nebraska-Lincoln 1988; 3D treatment planning and treatment evaluation in radiation therapy, brachytherapy treatment planning for stereotactic brain, interstitial, intracavitary, and permanent implants, clinical hyperthermia.

**[email: liucr.radonc@shands.ufl.edu]**

**Jatinder R. Palta**, Professor of Radiation Oncology, Chief of Physics, UF Cancer Center (352-395-0287); Ph.D. University of Missouri 1981; Three-dimensional treatment planning, techniques and displays, radiation dosimetry and beam characterization.

**[email: paltajr.radonc@shands.ufl.edu]**

## **UNIVERSITY OF FLORIDA (Nuclear and Radiological Engineering) (Continued)**

**William S. Properzio**, Associate Professor of Environmental Engineering, Director of Environmental Health & Safety Division (352-392-1591); Ph.D. University of Florida 1975; Health physics, medical health physics, environmental hazards, and industrial safety. [email: [bill@pliny.ehs.ufl.edu](mailto:bill@pliny.ehs.ufl.edu)]

**Katherine N. Scott**, Professor of Radiology (352-395-0291); Ph.D. University of Florida 1966; Nuclear magnetic resonance spectroscopy, NMR in vivo spectroscopy, biomedical applications of NMR. [email: [scottk@xray.ufl.edu](mailto:scottk@xray.ufl.edu)]

**Shailendra S. Shukla**, Assistant Professor of Radiology (352-395-0291); Ph.D. Ohio University 1981; Nuclear medicine, instrumentation and SPECT, bone densitometry, ultrasound physics. [email: [liucr.radonc@shands.ufl.edu](mailto:liucr.radonc@shands.ufl.edu)]

**William G. Vernetson**, Associate Engineering, Director of Nuclear Facilities (352-392-1408); Ph.D. University of Florida 1979; Reactor safety and risk assessment, technology and design, reactor operations and training in the nuclear industry, heat and mass transfer in reactor systems, radiation safety, neutron activation analysis and health physics.

**Timothy Zhu**, Assistant Professor of Radiation Oncology (352-395-0287); Ph.D. Brown University 1991; 2D and 3D radiation therapy treatment planning of external photon and electron beams. [email: [timzhu@nervm.nerdc.ufl.edu](mailto:timzhu@nervm.nerdc.ufl.edu)]

### **Other Faculty**

**G. Ronald Dalton**, Professor of Nuclear and Radiological Engineering

**Nils J. Diaz**, Professor Emeritus of Nuclear and Radiological Engineering

**Edward T. Dugan**, Associate Professor of Nuclear and Radiological Engineering

**William H. Ellis**, Associate Professor Emeritus of Nuclear and Radiological Engineering

**James S. Tulenko**, Professor and Chairman of Nuclear and Radiological Engineering

**Dale A. Lundgren**, Professor of Environmental Engineering

**Nancy P. Mendenhall**, Professor and Chair of Radiation Oncology

**W. Lamar Miller**, Professor of Environmental Engineering

**Charles E. Roessler, CHP**, Professor Emeritus of Environmental Engineering

**Genevieve S. Roessler**, Associate Professor Emeritus of Nuclear and Radiological Engineering

**Glen J. Schoessow**, Professor Emeritus of Nuclear and Radiological Engineering

**Edward V. Staab**, Professor and Chair of Radiology

## **UNIVERSITY OF FLORIDA (Nuclear and Radiological Engineering) (Continued)**

### **Other Information**

The Health Physics Program at the University of Florida is a cooperative effort of the Departments of Nuclear Engineering Sciences (NES) and Environmental Engineering Sciences (EES). Students enrolled in the Health Physics Program within NES may choose to concentrate their Master's studies in one of three areas: (1) power generation health physics, (2) radioactive waste management, or (3) medical health physics. The department also offers graduate degrees in nuclear engineering, engineering physics, and medical physics. Beginning in the Fall of 1997, the department will begin a 5th graduate degree program in Biomedical Engineering. The University of Florida is an approved site for U.S. Department of Energy fellowships and Nuclear Regulatory Commission fellowships. In addition, the department awards at least one National Academy of Nuclear Training fellowship in health physics per year.

### **Visiting Faculty Financial Assistance**

The department occasionally hosts sabbatical leave for visiting faculty. Financial arrangements are negotiated on an individual basis.

### **Student Financial Assistance**

Scholarships, fellowships, and assistantships are available through the Department, the College, and the University. The Department is an approved site for the DOE Applied Health Physics Fellowships, the DOE Nuclear Engineering and Health Physics Fellowships, and the INPO Health Physics Fellowship.

### **Research Facilities**

Facilities associated with the NRE Department: University Florida Training Reactor, Neutron Activation Analysis Laboratory, Nuclear Detection Teaching Laboratory with four LabVIEW detection workstations, Digital Computation Facility, Hot Cell Facility, TLD Processing Laboratory, Robotics and Virtual Reality Laboratory, Dosimetry Phantom Development Laboratory, Non-Destructive Testing Facility, X-Ray Exposure Facility, Land-Mine Detection Facility, Innovative Space Nuclear Power Institute, Neutron Howitzer. Other on-campus facilities include: Shands Cancer Center, Shands Teaching Hospital, Radioneurosurgery Facility, UF Brain Institute, VA Hospital, Center for Structural Biology (NMR imaging and electron microscopy).

### **Professional Certification**

The M.S. and Ph.D. programs in health physics prepare the student for Part I of the certification examination administered by the American Board of Health Physics. Eligibility of Part II of examination is based on professional experience.

## 24. UNIVERSITY OF KENTUCKY

Program in Radiation Sciences, Division of Radiation Sciences,  
Department of Clinical Sciences  
Telephone: (606) 323-1100 ext. 248 / Fax: (606) 257-1816

### **Program Director:**

Dr. Ralph C. Christensen  
Room 207 CAHP Building  
University of Kentucky Medical Center  
Lexington, Kentucky 40536-0003  
(606)-323-1100 ext. 248  
email: rcchri1@pop.uky.edu

### **HP Degrees Granted:**

M.S. in Health Physics (medical health physics emphasis)  
M.S. in Radiological Medical Physics (therapy medical physics emphasis)

**Remote Delivery of Course:** None

### **MS**

<b>HP Enrollment (Fall 1996):</b>	9
<b>HP Graduates (9/94 to 8/95):</b>	1
<b>HP Graduates (9/95 to 8/96):</b>	2

**Health Physics Faculty** (325% FTE toward the Radiation Science program)

**Ralph Christensen**, Associate Professor and Director, Division of Radiation Sciences (606-323-1100 ext. 248); Ph.D. University of California at Berkeley 1971; (radiation biophysics); Dosimetry, manpower issues, education and training quality.

### **Other Faculty**

**Goeffrey Ibbott**, Assistant Professor of Radiation Medicine.

**Ali Soleimani-Meigooni**, Assistant Professor of Radiation Medicine.

**Guy Simmons**, Professor of Nuclear Medical Physics.

### **Other Information**

We offer a program in Radiation Science with two possible degree options: one in Health Physics and one in Radiological Medical Physics. M.S. in Health Physics: specialization areas are medical health physics and general health physics. M.S. in Radiological Medical Physics: Specialization area is therapy medical physics.

## 25. UNIVERSITY OF MASSACHUSETTS LOWELL

Physics Department/Radiological Sciences Program

Telephone: (508) 934-3286 / Fax: (508) 441-0934

### Program Director:

Dr. Clayton S. French  
Radiological Sciences Program  
University of Massachusetts Lowell  
1 University Avenue  
Lowell, Massachusetts 01854

### HP Degrees Granted:

B.S. in Physics /Radiological Health Physics Option

M.S. in Radiological Sciences and Protection

Ph.D. in Physics/Radiological Sciences Option

**Remote Delivery of Course:** None

	BS	MS	PhD
<b>HP Enrollment (Fall 1996):</b>	15	19	15
<b>HP Graduates (9/94 to 8/95):</b>	9	15	1
<b>HP Graduates (9/95 to 8/96):</b>	5	11	1

### Health Physics Faculty (325% FTE toward the HP program)

**George E. Chabot, CHP**, Professor of Radiological Sciences (508-934-3288); Ph.D. University of Lowell 1985; Shielding, dosimetry, radiochemistry.

[email: [chabotg@woods.uml.edu](mailto:chabotg@woods.uml.edu)]

**Jesse Y. Harris**, Professor Emeritus of Radiological Sciences, (508-934-3771); Ph.D. Rutgers University 1968; Radiation biology, environmental radiation, environmental impact evaluation.

[email: [harrisj@woods.uml.edu](mailto:harrisj@woods.uml.edu)]

**Clayton S. French, CHP**, Associate Professor of Radiological Sciences (508-934-3286); Ph.D. University of Lowell 1985; Health physics, mathematical modeling, computer programming. [email: [frenchcf@aol.com](mailto:frenchcf@aol.com)]

**Kenneth W. Skrable, CHP**, Professor Emeritus of Radiological Sciences (508-934-3287); Ph.D. Rutgers the State University 1969; Health physics, internal dose, external dose.

[email: [skrablekw@aol.com](mailto:skrablekw@aol.com)]

## UNIVERSITY OF MASSACHUSETTS LOWELL (Continued)

### Other Faculty

**Gus. P. Couchell**, Professor of Physics, Nuclear Physics Program.

**Walter A. Schier**, Professor of Physics, Nuclear Physics Program.

**Arthur Mittler**, Professor of Physics, Nuclear Physics Program.

**Gunther H. R. Kegel**, Professor of Physics, Nuclear Physics Program.

### Other Information

All of the academic programs are strongly based in the physical and biological sciences. A five-year BS/MS degree option is available. Graduate students can receive support under DOE, INPO, NRC, and industry-based research fellowships. A limited number of teaching assistantships are available to qualified students. Scholarships are available to undergraduates. All students are given opportunities for gaining applied work experience through internships at the UML Nuclear Center, hospitals, nuclear power stations, and other participating organizations.

### Visiting Faculty Financial Assistance

UMass Lowell has no in-place program for supporting visiting faculty. UMass Lowell considers requests for visiting faculty on a case by case basis and may provide financial support or matching funding under certain circumstances.

### Student Financial Assistance

UMass Lowell offers a wide variety of financial assistance including scholarships, fellowships, student teaching assistantships, student research assistantships, and work study programs.

### Research Facilities

UMass Lowell has a 1-MW Research Reactor, 5-MW Van Der Graaff Accelerator, radiochemistry and radiobiology laboratories, nuclear instrumentation laboratory, environmental radioactivity measurement laboratories, operational health physics laboratory, dosimetry laboratory, X-ray facility, and computer room dedicated to the Radiological Sciences Program. Off-campus research venues are available at nearby hospitals, radiopharmaceutical production facility, power reactor utility companies, universities, and engineering companies.

### Professional Certification

Students in Radiological Sciences are encouraged to obtain ABHP certification. In addition to offering an elective graduate course in ABHP Certification Preparation, M.S. degree candidates can opt to take Part I of the ABHP as an alternative to the comprehensive examination required for students who choose to complete a 3-credit research project rather than a 9-credit thesis.

## 26. UNIVERSITY OF MICHIGAN

School of Public Health

Telephone: (313) 936-0763 / Fax: (313) 764-9424

### **Program Director:**

Dr. James E. Martin  
School of Public Health  
University of Michigan  
Ann Arbor, Michigan 48109-2029

### **HP Degrees Granted:**

M.S. in Health Physics  
Ph.D. in Health Physics

**Remote Delivery of Course:** None

	<b>MS</b>	<b>PhD</b>
<b>HP Enrollment (Fall 1996):</b>	12	2
<b>HP Graduates (9/94 to 8/95):</b>	6	0
<b>HP Graduates (9/95 to 8/96):</b>	6	1

### **Health Physics Faculty** (325% FTE toward the HP program)

**Stephen P. Ethier**, Assistant Professor of Radiation Biology, Department of Radiation Oncology; Ph.D. University of Tennessee 1982; Radiation biology and cancer risk.

**David M. Hamby, CHP**, Assistant Professor of Radiological Health, Environmental & Industrial Health; Ph.D. University of North Carolina 1989; Environmental radiation and risk assessment.

**James E. Martin**, Associate Professor of Radiological Health, Environmental & Industrial Health; Ph.D. University of Michigan 1965; Health physics, radiation physics, radioactive waste management, radiological assessment, radioanalytical measurements, internal radiation dosimetry.

**Joseph A. Miklos**, Lecturer and Research Investigator in Radiological Health, Environmental & Industrial Health; MPH University of Michigan 1980; Thermoluminescent dosimetry.

### **Student Financial Assistance**

Scholarships, fellowships, limited number of student teaching and student research assistantships.

**UNIVERSITY OF MICHIGAN (School of Public Health) (Continued)**

**Research Facilities**

Resources for graduate training in radiation protection are extensive and of high quality. Our laboratories contain radioanalytical facilities, two X-ray machines, radon sources, and beta, gamma, and neutron sources (PuBe and  $^{252}\text{Cf}$ ) traceable to the National Institute of Standards and Technology. Our equipment is extensive for work in dosimetry, radon, and radwaste; the National Testing Laboratory for performance for personnel dosimeters was demonstrated here. Students use ionization chambers, an extrapolation chamber, TLD readers, germanium detectors, multichannel analyzers, alpha and beta spectrometers, a liquid scintillation analyzer, a low-background alpha/beta counter, and portable survey meters. Students also have access to a 2 MW<sub>t</sub> research reactor, large computers, a linear accelerator, a cyclotron, and other research facilities.

**27. UNIVERSITY OF MICHIGAN**  
Department of Nuclear Engineering & Radiological Sciences  
Telephone: (313) 764-4260 / Fax: (313) 763-4540

**Program Director:**

Professor Kim Kearfott  
University of Michigan  
Department of Nuclear Engineering & Radiological Sciences  
2355 Bonisteel Blvd., Rm. 1906 Cooley Bldg.  
Ann Arbor, Michigan 48109-2104  
(313) 763-9117  
**email:** kearfott@umich.edu

**HP Degrees Granted:**

B.S.E. in Nuclear Engineering (Radiological Health Engineering Option)  
M.Eng. in Radiological Health Engineering  
M.S.E. or M.E. in Nuclear Engineering (Nuclear Measurements and Imaging Option)  
Ph.D. in Nuclear Engineering (Radiological Health Engineering Option)  
Ph.D. in Nuclear Engineering ( Nuclear Measurements and Imaging Option)

**Remote Delivery of Course:** Selected courses in the BS, MS, and PhD programs.

	<b>BS</b>	<b>MS</b>	<b>MEng</b>	<b>PhD</b>
<b>HP Enrollment (Fall 1996):</b>	14	2	12	19
<b>HP Graduates (9/94 to 8/95):</b>	15	3	3	3
<b>HP Graduates (9/95 to 8/96):</b>	13	2	12	3

**Health Physics Faculty** (325% FTE toward the HP program)

**William R. Martin**, Professor of Nuclear Engineering & Radiological Sciences and Senior Associate Dean, College of Engineering (313-764-5534); Ph.D. University of Michigan 1976; Nuclear reactor theory and analysis, computational particle transport, Monte Carlo methods, advanced computers.  
**[email: wrm@engin.umich.edu]**

**Ronald F. Fleming**, Professor of Nuclear Engineering & Radiological Sciences and Director of Michigan Memorial Phoenix Project (313-764-6215); Ph.D. University of Michigan 1975; Nuclear measurements, neutron dosimetry, radiation spectroscopy, nuclear reactor operations.  
**[email: flemingr@f.imag.itd.umich.edu]**

## **UNIVERSITY OF MICHIGAN (Nuclear Engineering & Radiological Sciences) (Continued)**

**Michael J. Flynn**, Adjunct Associate Professor of Nuclear Engineering & Radiological Sciences (313-764-4260); Ph.D. University of Michigan 1975; Radiation imaging, digital radiography, computed tomography, x-ray microscopy, dynamic radiography. [email: [mikef@rad.hfh.edu](mailto:mikef@rad.hfh.edu)]

**James P. Holloway**, Assistant Professor of Nuclear Engineering & Radiological Sciences (313-936-3126), Ph.D. University of Virginia 1989; Mathematical modeling and analysis, numerical methods, radiation transport and shielding, nuclear reactor physics. [email: [hagar@engin.umich.edu](mailto:hagar@engin.umich.edu)]

**Kimberlee J. Kearfott, CHP**, Professor of Nuclear Engineering & Radiological Sciences (313-764-4260); Sc.D Massachusetts Institute of Technology 1980; Radiation protection engineering, radiation imaging, radiation detection, internal and external radiation dosimetry, radon gas detection and mitigation, medical physics, medical health physics. [email: [kearfott@umich.edu](mailto:kearfott@umich.edu)]

**Glenn F. Knoll**, Professor of Nuclear Engineering & Radiological Sciences (313-936-0121); Ph.D. University of Michigan 1963; Nuclear instrumentation, radiation spectroscopy, radiation imaging. [email: [Glenn\\_F\\_noll@um.cc.umich.edu](mailto:Glenn_F_noll@um.cc.umich.edu)]

**Edward W. Larsen**, Professor of Nuclear Engineering & Radiological Sciences (313-936-0124); Ph.D. Rensselaer 1971; Radiation transport processes, radiation therapy. [email: [edlarsen@engin.umich.edu](mailto:edlarsen@engin.umich.edu)]

**David Wehe**, Associate Professor of Nuclear Engineering & Radiological Sciences (313-764-5225); Ph.D. University of Michigan 1984; Radiation detection, radiation imaging. [email: [dkw@engin.umich.edu](mailto:dkw@engin.umich.edu)]

### **Other Faculty**

**A. Ziya Akcasu**, Professor of Nuclear Engineering & Radiological Sciences.

**Micheal Atzmon**, Associate Professor of Nuclear Engineering & Radiological Sciences.

**Mary L. Brake**, Associate Professor of Nuclear Engineering & Radiological Sciences.

**James J. Duderstadt**, Director of the Millennium Institute, University of Michigan and Professor of Nuclear Engineering & Radiological Sciences.

**Ronald M. Gilgenbach**, Professor of Nuclear Engineering & Radiological Sciences.

**David Hamby**, Assistant Professor of Environmental and Industrial Health.

**UNIVERSITY OF MICHIGAN (Nuclear Engineering) (Continued)**

**Terry Kammash**, Stephan S. Attwood Professor of Engineering and Professor of Nuclear Engineering & Radiological Sciences.

**Y. Y. Lau**, Professor of Nuclear Engineering & Radiological Sciences.

**John C. Lee**, Professor of Nuclear Engineering & Radiological Sciences.

**James E. Martin, CHP**, Associate Professor of Environmental and Industrial Health.

**Joseph A. Miklos**, Instructor of Environmental and Industrial Health.

**Gary S. Was**, Professor of Nuclear Engineering & Radiological Sciences.

## 28. UNIVERSITY OF MISSOURI-COLUMBIA

Nuclear Engineering Program

Telephone: (573) 882-3550 / Fax: (573) 884-4801

### Program Director:

Dr. William H. Miller  
Nuclear Engineering Program  
E2433 Engineering Building East  
University of Missouri-Columbia  
Columbia, Missouri 65211  
**email:** ne@risc1.ecn.missouri.edu

### HP Degrees Granted:

M.S. in Nuclear Engineering (Health Physics Option)  
Ph.D. in Nuclear Engineering (Health Physics Option)

**Remote Delivery of Course:** Entire MS and PhD curricula

	MS	PhD
<b>HP Enrollment (Fall 1996):</b>	8	11
<b>HP Graduates (9/94 to 8/95):</b>	5	0
<b>HP Graduates (9/95 to 8/96):</b>	5	0

### Health Physics Faculty (325% FTE toward the HP program)

**William H. Miller, PE**, Chairman and Professor of Nuclear Engineering (573-882-9692); Ph.D. University of Missouri 1976; Proton recoil neutron spectrometers, angular energy and neutron spectra measurements, gamma-ray imaging, energy systems, public information.  
**[email:** whmiller@risc1.ecn.missouri.edu]

**Tushar Ghosh**, Director of Graduate Studies and Assistant Professor of Nuclear Engineering (573-882-9736); Ph.D. Oklahoma State University 1989; Mass transfer in absorption processes-experimental and theoretical investigation, absorption phenomena (particularly radon) in biological systems, kinetics and reaction mechanisms of catalytic reactions, activation of coals, indoor air quality.  
**[email:** ghosh@ecvax2.ecn.missouri.edu]

## UNIVERSITY OF MISSOURI-COLUMBIA (Continued)

**Susan M. Langhorst, CHP**, Campus Radiation Safety Officer and Assistant Professor of Nuclear Engineering (573-882-7221). [email: [ehssue@mmccmail.missouri.edu](mailto:ehssue@mmccmail.missouri.edu)]

**Sudarshan K. Loyalka, PE**, Curators' Professor, Professor of Nuclear Engineering and Director of Particulate Systems Research Center (573-882-3568); Ph.D. Stanford University 1967; Kinetic theory of gases, neutron transport, mechanics of aerosols including radon progeny, physics and thermal hydraulics of nuclear reactors, reactor safety analysis. [email: [loyalka@ecvax2.ecn.missouri.edu](mailto:loyalka@ecvax2.ecn.missouri.edu)]

**Robert V. Tompson**, Assistant Professor of Nuclear Engineering (573-882-2881); Ph.D. University of Missouri 1988; Kinetic theory of gases, experimental and theoretical aerosol mechanics, neutron transport theory, nuclear reactor physics and safety. [email: [tompson@ecvax2.ecn.missouri.edu](mailto:tompson@ecvax2.ecn.missouri.edu)]

### Other Faculty

**Evan Boote**, Adjunct Assistant Professor of Nuclear Engineering, Assistant Professor of Radiology.

**Julie Dawson**, Adjunct Assistant Professor of Nuclear Engineering, ABR.

**Gary Ehrhardt**, Adjunct Assistant Professor of Nuclear Engineering, Research Reactor.

**Michael Glascock**, Adjunct Assistant Professor of Nuclear Engineering, Research Reactor.

**Keith Hickey, CHP**, Adjunct Assistant Professor of Nuclear Engineering.

**Kiratadas Kutikkad**, Adjunct Assistant Professor of Nuclear Engineering, Research Reactor.

**Stephen Pickup**, Adjunct Assistant Professor of Nuclear Engineering.

**Mark A. Prelas, PE**, Professor of Nuclear Engineering.

**Wynn A. Volkert**, Professor of Radiology and Nuclear Engineering.

### Other Information

Participating university for the DOE Applied Health Physics Fellowship Program. Affiliated closely with the Research Reactor (10 MWth) and its 120 employees as engaged in research, isotope production, radiation services, and radioactivity shipment.

## 29. UNIVERSITY OF MISSOURI-ROLLA

Department of Nuclear Engineering

Telephone: (314) 341-4720 / Fax: (314) 341-6309

### **Program Director:**

Dr. Arvind Kumar  
102 Fulton Hall  
University of Missouri-Rolla  
Rolla, Missouri 65401  
(314) 341-4747

### **HP Degrees Granted:**

B.S. in Nuclear Engineering (Health Physics Option)  
M.S. in Nuclear Engineering (Health Physics Option)  
Ph.D. in Nuclear Engineering (Health Physics Option)

**Remote Delivery of Course:** Selected courses in the BS program

	<b>BS</b>	<b>MS</b>	<b>PhD</b>
<b>HP Enrollment (Fall 1996):</b>	2		
<b>HP Graduates (9/94 to 8/95):</b>	3		
<b>HP Graduates (9/95 to 8/96):</b>		1	1

### **Health Physics Faculty** (325% FTE toward the HP program)

**Albert E. Bolon**, Associate Professor of Nuclear Engineering and Director of the UMR Nuclear Reactor Facility (314-341-4746); Ph.D. Iowa State 1965; Research reactor uses, dose rate measurements from spent nuclear fuel, radiation effects on materials. **[email: [abolon@umr.edu](mailto:abolon@umr.edu)]**

**Nicholas Tsoulfanidis**, Professor of Nuclear Engineering, Radiation Safety Officer, Assistant Dean of The School of Mines and Metallurgy (314-341-4745); Ph.D. University of Illinois 1968; Radiation transport, radiation dose calculations, radiation protection (health physics and shielding). **[email: [tsoul@umr.edu](mailto:tsoul@umr.edu)]**

### **Research Facilities**

A 200-kW nuclear research reactor, state-of-the-art radiation counting equipment.

### **Student Financial Assistance**

Scholarships, fellowships, and assistantships are available.

**30. UNIVERSITY OF NEVADA LAS VEGAS**

Department of Health Physics

Telephone: (702) 895-4320 / Fax: (702) 895-4819

**Interim Chair:**

Dr. Mark Rudin  
4505 Maryland Parkway  
Las Vegas, Nevada 89154-3037  
(702) 895-3299  
**email:** mrudin@ccmail.nevada.edu

**HP Degrees Granted:**

B.S. in Health Physics  
M.S. in Health Physics

**Remote Delivery of Course:** None

	<b>BS</b>	<b>MS</b>
<b>HP Enrollment (Fall 1996):</b>	35	9
<b>HP Graduates (9/94 to 8/95):</b>	1	
<b>HP Graduates (9/95 to 8/96):</b>	1	

**Health Physics Faculty** (325% FTE toward the HP program)

**Mark J. Rudin**, Interim Chair, Department of Health Physics (702-895-4320); PhD Purdue University 1989; Environmental restoration, waste management, risk analysis.  
**[email: mrudin @ccmail.nevada.edu]**

**Other information**

Established an M.S. degree in Health Physics in 1996. The Department includes undergraduate programs in Nuclear Medicine and Comprehensive Imaging.

**31. UNIVERSITY OF NORTH CAROLINA**  
Department of Environmental Sciences and Engineering  
Telephone: (919) 966-3840 / Fax: (919) 966-7911

**Program Director:**

James E. Watson, Jr.  
Department of Environmental Sciences and Engineering  
University of North Carolina  
Capel Hill, North Carolina 27599-7400  
**email:** james\_watson@unc.edu

**Degrees Granted in Health Physics:**

M.S. in Public Health  
M.S. in Environmental Sciences and Engineering  
Ph.D. in Environmental Sciences and Engineering

**Remote Delivery of Course:** None

	<b>MS</b>	<b>PhD</b>
<b>HP Enrollment (Fall 1996):</b>	5	1
<b>HP Graduates (9/94 to 8/95):</b>	5	0
<b>HP Graduates (9/95 to 8/96):</b>	2	1

**Health Physics Faculty** (325% FTE toward the HP program)

**Douglas J. Crawford-Brown**, Professor (919-966-6026); Ph.D. Georgia Institute of Technology 1980; Development of mathematical theories of radionuclide biokinetics dosimetry, development of mathematical theories of cancer causation.

**[email: cbrown@sphvax.sph.unc.edu]**

**James E. Watson, Jr.**, Professor (919-966-3840); Ph.D. University of North Carolina 1970; Indoor radon and radon in drinking water, low-level radioactive waste management.

**[email: james\_watson@unc.edu]**

**Donald G. Willhoit, CHP**, Associate Professor (919-962-5507); Sc.D. University of Pittsburgh 1964; Low-level radioactive waste management, hazardous waste management in the institutional environment. **[email: dgw.hsafety@mhs.unc.edu]**

**Other Faculty**

**Merril Eisenbud**, Adjunct Professor of Radiological Hygiene

**Philip E. Hamrick, CHP**, Adjunct Associate Professor of Radiological Hygiene

**UNIVERSITY OF NORTH CAROLINA (Continued)**

**Parker C. Reist**, Professor of Air and Industrial Hygiene

**Bobby M. Wilson**, Adjunct Instructor of Radiological Hygiene

**Other Information**

Program provides education in industrial hygiene as well as health physics.

**Visiting Faculty Financial Assistance**

Visiting faculty member would need to be self-supported.

**Student Financial Assistance**

Fellowships, student teaching assistantships, student research assistantships.

**Research Facilities**

Radiological laboratories equipped with a full compliment of radiation detection instrumentation.

## 32. UNIVERSITY OF PITTSBURGH

Environmental and Occupational Health

Telephone: (412) 967-6500 / Fax: (412) 624-1020

### Program Director:

Dr. H. Gregg Claycamp  
University of Pittsburgh  
Environmental and Occupational Health  
260 Kappa Drive  
Pittsburgh, Pennsylvania 15238  
**email:** hgc2@vms.cis.pitt.edu

### HP Degrees Granted:

M.S. in Environmental and Occupational Health  
Post-M.S. Certification in Radiation Health  
Ph.D. in Environmental and Occupational Health

**Remote Delivery of Course:** None

	MS	PhD
<b>HP Enrollment (Fall 1996):</b>	4	0
<b>HP Graduates (9/94 to 8/95):</b>	2	0
<b>HP Graduates (9/95 to 8/96):</b>	2	0

**Health Physics Faculty** (325% FTE toward the HP program)

**William L. Bigbee**, Associate Professor of Environmental and Occupational Health and Co-Leader, Molecular Carcinogenesis Program, University of Pittsburgh Cancer Institute; Ph.D. University of Oregon 1975; Biochemistry and molecular epidemiology. [**email:** wlbbee@pitt.edu]

**H. Gregg Claycamp, CHP**, Associate Professor of Environmental and Occupational Health (412-967-6524); Ph.D. Northwest University 1982; Radiation and chemical risk assessment, mechanisms of radiation-induced DNA damage, effective dose from low- LET radiation. [**email:** hgc2@vms.cis.ipitt.edu]

**Bernard L. Cohen**, Professor of Physics and Adjunct Professor of Environmental and Occupational Health (412-624-9245); D.Sc. Carnegie Mellon University 1950; Radon measurement and assessments, radiation and hazardous waste wastes risk analysis.

**Jerry C. Rosen, CHP**, Associate Professor of Environmental and Occupational Health, University Radiation Safety Officer (412-624-2728); M.S. University of Rochester 1965; Internal dosimetry, environmental radiation measurements, radiation doses.

## UNIVERSITY OF PITTSBURGH (Continued)

**William R. Schell**, Professor Emeritus of Environmental and Occupational Health (412-967-6581); Ph.D. University of Washington 1963; Applications of isotopic and radiochemical tracers to environmental problems, development of nuclear measurement methods, assessment of radioactive materials.

**Michael J. Tobin**, Assistant Professor of Environmental and Occupational Health (412-967-6582); Ph.D. Carnegie Mellon University 1986; Novel radiochemical separations, radiotracer applications, migration of environmental contaminants. [email: [tobin@vms.cis.pitt.edu](mailto:tobin@vms.cis.pitt.edu)]

**Niel Wald**, Professor of Environmental and Occupational Health, Professor of Radiology (School of Medicine) (412-624-2735); M.D. New York University 1948; Chromosome damage from radiation and other environmental mutagens, automated cytogenetic dosimetry, clinical management of radiation injury.  
[email: [wald@vms.cis.pitt.edu](mailto:wald@vms.cis.pitt.edu)]

### Other Faculty

**Walter F. Good**, Assistant Professor of Environmental and Occupational Health, Associate Professor of Radiology (School Of Medicine).

**John M. Herron**, Research Assistant Professor of Environmental and Occupational Health, Research Associate Professor of Radiology (School Of Medicine).

**Chris Shaw**, Professor of Environmental and Occupational Health, Associate Professor of Radiology (School Of Medicine).

### Visiting Faculty Financial Assistance

No formal mechanism is in place. Opportunities to collaborate on specific projects arise occasionally.

### Student Financial Assistance

Approved DOE Applied Health Physics Fellowship site. Applicants may be considered for graduate assistantships.

### Research Facilities

The program is housed in a large laboratory research building that includes radiation laboratories, cytogenetics, biochemistry, molecular biology, and computer laboratories. Access to whole-body counting, high-dose radiation facilities, and research in radiation imaging is possible depending on the research interests of the student.

### 33. THE UNIVERSITY OF TENNESSEE

Department of Nuclear Engineering

Telephone: (615) 974-5048 / Fax: (615) 974-0668

#### **Program Director:**

Dr. H. L. Dodds  
Department of Nuclear Engineering  
The University of Tennessee  
Knoxville, Tennessee 37996-2300

#### **HP Degrees Granted:**

M.S. in Nuclear Engineering (concentration in Radiological Engineering)  
Ph.D. in Nuclear Engineering (concentration in Radiological Engineering)

**Remote Delivery of Course:** None

	<b>MS</b>	<b>PhD</b>
<b>HP Enrollment (Fall 1996):</b>	22	10
<b>HP Graduates (9/94 to 8/95):</b>	13	0
<b>HP Graduates (9/95 to 8/96):</b>	11	1

#### **Health Physics Faculty** (325% FTE toward the HP program)

**P. G. Groer**, Associate Professor of Nuclear Engineering (615-974-5048); Ph.D. Vienna 1967; Radiation risk analysis, radiation dosimetry (external and internal), Bayesian estimation techniques, reliability and probabilistic risk assessment.

[email: [utne@utkux.utk.edu](mailto:utne@utkux.utk.edu)]

**E. M. Katz**, Associate Professor of Nuclear Engineering (615-974-5048); Ph.D. University of Tennessee 1975; Health physics laboratory.

**L. F. Miller**, Professor of Nuclear Engineering (615-974-5048); Ph.D. Texas A&M University 1976; Radiological assessments, radiation dosimetry, nuclear instrumentation, neural networks, computational methods.

[email: [utne@utkux.utk.edu](mailto:utne@utkux.utk.edu)]

#### **Other Faculty**

**Abu Ahmed**, Adjunct Professor of Nuclear Engineering

**William Casso**, Adjunct Professor of Nuclear Engineering

**Keith Eckerman**, Adjunct Professor of Nuclear Engineering

**Paul Frame, CHP**, Adjunct Professor of Nuclear Engineering

**Gloria Mai**, Adjunct Professor of Nuclear Engineering

**THE UNIVERSITY OF TENNESSEE (Continued)**

**Rafael Perez**, Professor of Nuclear Engineering

**David Simpson, CHP**, Adjunct Professor of Nuclear Engineering

**Joseph Thie**, Adjunct Professor of Nuclear Engineering

**James Turner, CHP**, Adjunct Professor of Nuclear Engineering

**Other Information**

Our Adjunct Faculty are composed primarily of Health Physics professionals from Oak Ridge National Laboratory or Oak Ridge Associated Universities who teach health physics courses and/or direct graduate student research in health physics.

**Visiting Faculty Financial Assistance**

Office and secretarial support would be provided.

**Student Financial Assistance**

Scholarships, fellowships, student teaching and research assistantships.

**Research Facilities**

Nuclear instrumentation laboratory, reactor simulator, <sup>252</sup>Cf irradiation facility, computing laboratory, low-enriched graphite-moderated subcritical assembly, sample assay laboratory, wet chemistry laboratory, reactor facilities at ORNL.

**34. UNIVERSITY OF TEXAS  
HEALTH SCIENCE CENTER AT SAN ANTONIO**

Department of Radiology  
Telephone: (210) 567-5550 / Fax: (210) 567-5549

**Program Director:**

Gary D. Fullerton  
University of Texas Health Science Center at San Antonio  
Radiological Sciences  
7703 Floyd Curl Drive  
San Antonio, Texas 78284  
**email:** fullerton@uthscsa.edu

**HP Degrees Granted:**

M.S. in Medical Physics (Medical Health Physics Option)

**Remote Delivery of Course:** None

**MS**

<b>HP Enrollment (Fall 1996):</b>	1
<b>HP Graduates (9/94 to 8/95):</b>	1
<b>HP Graduates (9/95 to 8/96):</b>	0

**Health Physics Faculty** (325% FTE toward the HP program)

**Gary D. Fullerton**, Professor of Radiology, Division Chief, Radiological Sciences (210-567-5550); Ph.D. University of Wisconsin Madison 1975; Magnetic resonance imaging, MR contrast mechanisms, interaction of water with macromolecules, molecular sources of MR relaxivity, biophysics of medical imaging processes.  
**[email: fullerton@uthscsa.edu]**

**David Kopp**, Clinical Professor (210-567-5600); Ph.D. University of Kansas 1970; Nuclear medicine instrumentation.

**Jack Lancaster**, Associate Professor (210-567-8100); Ph.D. University of Texas Health Science Center at Dallas 1978; Medical imaging devices, acquisition, communications and display of medical images, general images analysis, processing and synthesis techniques for medical imaging.  
**[email: jlancaster@uthscsa.edu]**

**Wayne Wiatrowski, CHP**, Clinical Associate Professor (210-567-5550); Ph.D. University of Texas Health Science Center at San Antonio 1979; Operational health physics and radiation therapy.

**UNIVERSITY OF TEXAS HEALTH SCIENCE CENTER AT SAN ANTONIO (Continued)**

**Other Faculty**

**Martin L. Meltz**, Associate Professor of Radiobiology.

**Student Financial Assistance**

Student research assistantships

**Research Facilities**

Cyclotron used to produce positron-emitting radionuclides for human use research studies, nine linear accelerators used in radiation oncology, two High-Dose-Rate Brachytherapy systems.

### 35. UNIVERSITY OF WISCONSIN

Department of Medical Physics

Telephone: (608) 262-2170 / Fax: (608) 262-2413

#### **Program Director:**

Dr. Paul M. DeLuca, Jr.  
Department of Medical Physics  
1530 Medical Sciences Center  
1300 University Avenue  
Madison, Wisconsin 53706-1532  
(608) 262-2171  
**email:** pmd@cema.medphysics.wisc.edu

#### **Degrees Granted:**

M.S. in Medical Physics (Health Physics Option)  
M.S. and Ph.D. in Medical Physics

**Remote Delivery of Course:** None

	<b>MS</b>	<b>PhD</b>
<b>HP Enrollment (Fall 1996):</b>	22	21
<b>HP Graduates (9/94 to 8/95):</b>	16	6
<b>HP Graduates (9/95 to 8/96):</b>	13	7

#### **Health Physics Faculty** (325% FTE toward the HP program)

**Onofre T. DeJesus**, Associate Professor of Medical Physics and Radiology (608-263-8929); Ph.D. Virginia Polytechnic 1980; Radiopharmaceutical chemistry, positron emission tomography.  
**[email: odejesus@facstaff.wisc.edu]**

**Paul M. DeLuca, Jr.**, Professor and Chairman (608-262-2171); Ph.D. Notre Dame 1971; radiation protection (health physics), neutron dosimetry, radiobiological research with fast neutrons.  
**[email: pmd@cema.medphysics.wisc.edu]**

**Larry A. DeWerd**, Professor, CHS and Director of Radiation Calibration Service (608-263-0378); Ph.D. University of Wisconsin Madison 1970; Thermoluminescence dosimetry, electroradiography, quality assurance in diagnostic radiology.  
**[email: dewerd@facstaff.wisc.edu]**

**Michael N. Gould**, Associate Professor (608-263-6615); Ph.D. University of Wisconsin Madison 1977; Radiobiology and oncology. **[email: mgould@humonc.wisc.edu]**

**UNIVERSITY OF WISCONSIN (Continued)**

**James E. Holden**, Professor (608-262-5998); Ph.D. Pennsylvania 1971; External detection and mathematical modeling in tracer studies of biological transport and metabolism, mathematical image science.

[email: [holden@madmod.medphysics.wisc.edu](mailto:holden@madmod.medphysics.wisc.edu)]

**T. Rockwell Mackie**, Associate Professor (608-262-7358); Ph.D. Alberta Canada 1984; Radiotherapy treatment planning, Monte Carlo modeling, dosimetry, cavity theory.

[email: [mackie@macc.wisc.edu](mailto:mackie@macc.wisc.edu)]

**Ernest L. Madsen**, Professor (608-263-7932); Catholic University of America Washington D.C. 1968; Medical ultrasound imaging and tissue characterization, magnetic resonance imaging, hyperthermia via ultrasound.

[email: [elmadsen@facstaff.wisc.edu](mailto:elmadsen@facstaff.wisc.edu)]

**Charles A. Mistretta**, Professor (608-263-8313); Ph.D. Harvard 1968; digital radiography.

[email: [cmistrta@facstaff.wisc.edu](mailto:cmistrta@facstaff.wisc.edu)]

**Robert J. Nickles**, Professor and Director of the Cyclotron Facility (608-263-1026); Ph.D. University of Wisconsin Madison 1968; Generation and utilization of short-lived radionuclides for physiological measurements and diagnosis, positron emission tomography.

[email: [nickles@petrus.medphysics.wisc.edu](mailto:nickles@petrus.medphysics.wisc.edu)]

**Bhudatt R. Paliwal**, Professor and Director of Radiation Therapy Physics Section (608-263-8500); Ph.D. University of Texas at Houston 1973; Application of hyperthermia in treatment of cancer, electron-arc therapy, electron dosimetry and treatment planning, CT and MRI applications in radiotherapy treatment planning. [email: [paliwal@madrad.radiology.wisc.edu](mailto:paliwal@madrad.radiology.wisc.edu)]

**Walter W. Peppler**, Professor, CHS (608-263-3440); Ph.D. University of Wisconsin Madison 1981, Digital Fluoroscopy. [email: [wpeppler@facstaff.wisc.edu](mailto:wpeppler@facstaff.wisc.edu)]

**James A. Sorenson**, Professor (608-263-2608); Ph.D. University of Wisconsin Madison 1971; Magnetic resonance imaging, spectroscopy.

[email: [jasorens@facstaff.wisc.edu](mailto:jasorens@facstaff.wisc.edu)]

**Bruce R. Thomadsen**, Assistant Professor (608-263-8500); Ph.D. University of Wisconsin Madison 1989; Radiotherapy physics.

[email: [thomad@madrad.radiology.wisc.edu](mailto:thomad@madrad.radiology.wisc.edu)]

**Michael S. Van Lysel**, Associate Professor (608-263-9650); Ph.D. University of Wisconsin Madison 1983; Diagnostic imaging in cardiology, digital subtraction angiography.

[email: [vanlysel@facstaff.wisc.edu](mailto:vanlysel@facstaff.wisc.edu)]

## UNIVERSITY OF WISCONSIN (Continued)

**Ronald T. Wakai**, Associate Professor (608-262-2170); Ph.D. Illinois Urbana 1987; Biomagnetism, "SQUID" detectors. [email: [wakai@macc.wisc.edu](mailto:wakai@macc.wisc.edu)]

**James A. Zagzebski**, Professor and Vice-Chairman of the Department for Faculty Development and Research (608-265-4929); Ph.D. University of Wisconsin Madison 1972; Medical ultrasound imaging and tissue characterization, quality assurance of medical ultrasound systems, application of ultrasound in speech research, use of ultrasound in hyperthermia. [email: [jimzag@macc.wisc.edu](mailto:jimzag@macc.wisc.edu)]

### **Student Financial Assistance**

Teaching assistantships, fellowships, Wisconsin Alumni Research Foundation (WARF) Fellowships, Advanced Opportunity Fellowships (AOF), Departmental Fellowships, Research Assistantships, Project Assistantships, NIH National Research Service Award Traineeships.

### **Research Facilities**

Tomotherapy Research Facility, Proton Cyclotron, Radiation Calibration Laboratory, Radiation Therapy and Hyperthermia Laboratory, Digital Radiography Laboratory, Digital Cardiac Angiography Laboratory, Ultrasound Scattering Research and Phantom Development Laboratory, Magnetic Resonance Applied Imaging Laboratory, Biomagnetism Laboratory, Electron Storage Ring, 1-MW Triga Research Reactor, Nuclear Physics Laboratory.

### **36. WASHINGTON STATE UNIVERSITY TRI-CITIES**

Environmental Science Program

Telephone: (509) 372-7323 / Fax: (509) 372-7471

#### **Program Director:**

Dr. R. Gene Schreckhise  
Coordinator, Environmental Science Program  
Washington State University Tri-Cities  
100 Sprout Road  
Richland, WA 99352  
**email:** gschreck@beta.tricity.wsu.edu

#### **HP Degrees Granted:**

M.S. in Environmental Science (Environmental and Occupational Health Science Option)

**Remote Delivery of Course:** Limited to only WSU branch campuses

#### **MS**

<b>HP Enrollment (Fall 1996):</b>	3
<b>HP Graduates (9/94 to 8/95):</b>	4
<b>HP Graduates (9/95 to 8/96):</b>	3

**Health Physics Faculty** (325% FTE toward the HP program)

Presently, all the faculty members involved in the Environmental Science Program at WSU Tri-Cities are Adjunct. A B.S. degree in Environmental Science with the Environmental and Occupational Health Science option was initiated in August 1994.

#### **Visiting Faculty Financial Assistance**

We presently have no such program(s) other than obtaining appointments to Pacific Northwest National Laboratory (PNNL) through Associated Western Universities (AWU) or to one of the other Hanford contractors.

#### **Student Financial Assistance**

Teaching assistantships and part-time or work-study positions.

#### **Research Facilities**

General counting laboratory; access to world-class equipment and instruments on the Hanford Site.

#### **Professional Certification:**

Most of the students take the ABHP examination. Local HPS chapter provides a refresher course.

**CURRENTLY AVAILABLE FELLOWSHIPS/SCHOLARSHIPS FOR HEALTH PHYSICS  
STUDENTS**

**Title: American Dissertation Fellowship**

Sponsor: American Association of University Women (AAUW)

Admin: AAUW Education Foundation

Address: 2201 North Dodge Street

Box 4030

Iowa City, Iowa 52243

Telephone: (319) 337-1716

Fax: (319) 337-1204

Eligibility: (1) Awarded to women who will complete required course work and have passed all preliminary exams by November 15

(2) U. S. citizen or permanent resident alien.

Award: Stipend: \$14,500 (annually)  
(for full-time work on dissertation)

Due Date: November 15 - Fellowship year starts on July 1.

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**Title: Selected Profession Engineering Dissertation Fellowship**

Sponsor: American Association of University Women

Admin: AAUW Education Foundation

Address: 2201 North Dodge Street

Box 4030

Iowa City, Iowa 52243

Telephone: (319) 337-1716

Fax: (319) 337-1204

Eligibility: (1) Must be working on the final year of Master's degree

(2) U. S. citizen or permanent resident alien.

Award: Stipend: \$14,500 (annually)  
(for full-time work on dissertation)

Due Date: November 15 - Fellowship year starts on July 1.

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**Title: American Nuclear Society Undergraduate Scholarships**

Sponsor/ American Nuclear Society

Admin: 555 North Kensington Avenue  
La Grange Park, Illinois 60525

Telephone: (708) 352-6611

Eligibility: (1) Student must have completed one to two years of coursework in a program leading to a degree in nuclear science or engineering and who will be a sophomore in the upcoming year

(2) U.S. Citizen or permanent resident alien

(3) Sponsored by an ANS Local Section, Division, Student Branch, Committee, Member, or Organization Member

Award: \$1000 to \$3000

Due Date: March 1 - applications will be distributed to Faculty Advisors in early January

---

**Title: American Nuclear Society Graduate Scholarships**

Sponsor/ American Nuclear Society

Admin: 555 North Kensington Avenue  
La Grange Park, Illinois 60525

Telephone: (708) 352-6611

Eligibility: (1) Student must be enrolled in, or have been accepted in, a graduate program in nuclear science or engineering at a recognized educational institution

(2) U.S. Citizen or permanent resident alien

(3) Sponsored by an ANS Local Section, Division, Student Branch, Committee, Member, or Organization Member

Award: \$1000 to \$3500

Due Date: March 1 - applications will be distributed to Faculty Advisors in early January

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**Title: American Nuclear Society NEED Scholarship**

Sponsor/ American Nuclear Society

Admin: 555 North Kensington Avenue  
La Grange Park, Illinois 60525

Telephone: (708) 352-6611

Eligibility: (1) Student must have complete one year of coursework in a program leading to a degree in nuclear science or engineering and who will be a sophomore in the upcoming year

(2) U.S. Citizen or permanent resident

(3) Sponsored by an ANS Local Section, Division, Student Branch, Committee, Member, or Organization Member

(4) Demonstrated financial need

(5) Additional scholarship for women in a delayed educational situation

Award: \$3500

Due Date: March 1 - applications will be distributed to Faculty Advisors in early January

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**Title: Applied Health Physics Fellowship**

Sponsor: Office of Environment, Safety, and Health  
U.S. Department of Energy

Admin: Oak Ridge Institute for Science and Education

Address: Applied Health Physics Fellowship Program  
Science/Engineering Education Division  
Oak Ridge Institute for Science and Education  
Attn: Rose Etta Cox  
120 Badger Avenue  
P.O. Box 117  
Oak Ridge, TN 37831-0117

Telephone: (615) 576-9279

Fax: (615) 576-0202

Eligibility: (1) B.S. in physical sciences, life sciences, mathematics, or engineering

(2) Admission as a full-time graduate student in DOE participating university graduate program

(3) Complete not have more than one full-time academic term (semester or quarter) in graduate school

(4) U. S. citizen or permanent resident alien

Award: Stipend: \$14,400 (annually)

Practicum Allowance: \$300 (monthly)

Academic Allowance: \$1000

Tuition and Fees: Exact Amount

Travel Allowance: Varies

Due Date: Last Monday in January - call ~ September for current application.

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**Title: Burton J. Moyer Memorial Fellowship**

Sponsor: Health Physics Society

Admin: Academic Education Committee of HPS

Health Physics Society

1313 Dolley Madison Boulevard

McLean, Virginia 22101

Telephone: (703) 790-1745

Eligibility: Entering or currently enrolled and continuing students in a master's or doctoral degree program in radiation protection.

Award: One award of \$5000

One \$850 travel grant to attend the Annual HPS Meeting

Due Date: March 15 - applications published in HPS Newsletter in October

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**Title: Civilian Radioactive Waste Management Fellowship**

Sponsor: Office of Civilian Radioactive Waste Management

U.S. Department of Energy

Admin: Oak Ridge Institute for Science and Education

Address: Civilian Radioactive Waste Management (CRWM)

Fellowship Program

Science/Engineering Education Division

Oak Ridge Institute for Science and Education

Attn: Marcia DeMarcus

120 Badger Avenue

P.O. Box 117

Oak Ridge, TN 37831-0117

Telephone: 615-241-2890

Fax: 615-576-0202

Eligibility: (1) B.S. in physical sciences, life sciences, mathematics, or engineering

(2) Qualify for acceptance for currently enrolled as a full-time graduate student in DOE participating university graduate program

(3) U. S. citizen or permanent resident alien

(4) Doctoral students may apply; dissertation topic must not have been identified at time of application

Award: Stipend: \$14,400 (annually)

Practicum Allowance: \$300 (monthly)

Tuition and Fees: Exact Amount, \$8000 max.

Travel Allowance: Varies

Due Date: Last Monday in January - call ~ September for current application.

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**Title: Fannie and John Hertz Fellowships**

Sponsor: Fannie and John Hertz Foundation

Address: Box 5032

Livermore, California 94551-5032

Telephone: 510-373-1642

Eligibility: (1) B.S. degree;

(2) GPA equivalent to A-minus during last 2 years of undergraduate study

(3) U. S. citizen or permanent resident alien

(4) Must attend one of 26 specified graduate schools. Contact the Foundation for a list of eligible graduate schools and application forms and guidelines

(5) Fellowships cannot be used for Ph.D. in conjunction with professional studies (i.e., medical degree)

Award: ~ 25 fellowships awarded annually and are renewable up to 5 yrs.

Stipend: \$17,000 per year

Institutional Allowance: \$12,000 per year

Due Date: Third Friday in October

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**Title: Fusion Science Fellowship**

Sponsor: Office of Fusion Energy

U.S. Department of Energy

Admin: Oak Ridge Institute for Science and Education

Address: Civilian Radioactive Waste Management (CRWM)

Fellowship Program

Science/Engineering Education Division

Oak Ridge Institute for Science and Education

Attn: Cheryl Terry

120 Badger Avenue

P.O. Box 117

Oak Ridge, TN 37831-0117

Telephone: 615-576-9558

Fax: 615-576-0202

Eligibility: (1) Entering and first-year graduate students with degrees in engineering, the physical sciences, mathematics, or a related discipline

(2) U. S. citizen or permanent resident alien

Award: Annual Stipend: \$15,600 (annually)

Practicum Allowance: \$200 (monthly)

Tuition and Fees: Exact Amount

Due Date: Last Monday in January - call ~ September for current application.

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**Title: GEM Master's Fellowship**

Sponsor/ National Consortium for Graduate Degrees for Minorities in

Admin: Engineering and Science

Address: P.O. Box 537

Notre Dame, Indiana 46556

Telephone: 219-287-1097

Fax: 219-287-1486

Eligibility: (1) Belong to one of the ethnic groups: American-Indian, Black-American, Mexican-American, or Puerto Rican and other Hispanics

(2) U. S. citizen

(3) At time of application student must have attained at least junior-year status in accredited engineering discipline

Award: Stipend: \$6,000 (per academic year)

Payment of tuition and fees.

Due Date: Applications available August 15 of each year.

Deadline - December 1.

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**Title: GEM Ph.D. Engineering Fellowship**

Sponsor/ National Consortium for Graduate Degrees for Minorities in

Admin: Engineering and Science

Address: P.O. Box 537

Notre Dame, Indiana 46556

Telephone: 219-287-1097

Fax: 219-287-1486

Eligibility: (1) Belong to one of the ethnic groups: American-Indian, Black-American, Mexican-American, or Puerto Rican and other Hispanics.

(2) U. S. citizen.

(3) Must be applicant to the Ph.D. component and must have or be in the process of attaining Master's degree at the time of application.

Award: Stipend: \$12,000 (per calendar year)

Payment of tuition and fees.

Due Date: Applications available August 15 of each year.

Deadline - December 1.

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**Title: Health Physics Society Fellowships**

Sponsor: Health Physics Society

Admin: Academic Education Committee of HPS

Health Physics Society

1313 Dolley Madison Boulevard

McLean, Virginia 22101

Telephone: (703) 790-1745

Eligibility: Entering or currently enrolled and continuing students in a Master's or doctoral degree program in radiation protection.

Award: Four awards of \$4000 each.

One \$850 travel grant to attend the Annual HPS Meeting

Due Date: March 1 - applications published in HPS Newsletter in October

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**Title: Health Physics Society Fellowship for Part-Time Students**

Sponsor: Health Physics Society

Admin: Academic Education Committee of HPS

Health Physics Society

1313 Dolley Madison Boulevard

McLean, Virginia 22101

Eligibility: (1) Entering or currently enrolled and continuing students in a Master's or doctoral degree program in radiation protection.

(2) Demonstration of special financial need.

Award: One award of \$4000

One \$850 travel grant to attend the Annual HPS Meeting

Due Date: March 1 - applications published in HPS Newsletter in October

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**Title: Link Foundation Energy Fellowship**

Sponsor: Link Foundation

Admin: University of Rochester

Address: Office of the Provost

Attn: Barbara Granger

200 Administration Building

Rochester, New York 14627

Telephone: 716-275-5931

Eligibility: (1) Must be doctoral student in academic institution.

(2) Preference is given to proposals dealing directly with energy and that explore ideas not yet fully tested.

Award: Stipend: \$14,500 for one year

Fees: \$ 2,500

Publication Costs: \$ 1,000

Due Date: December 1 - Selections announced March 15

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**Title: Magnetic Fusion Energy Technology Fellowship**

Sponsor: Office of Fusion Energy

U.S. Department of Energy

Admin: Oak Ridge Institute for Science and Education

Address: Magnetic Fusion Science Fellowship Program (MFS)

Science/Engineering Education Division

Oak Ridge Institute for Science and Education

Attn: Cheryl Terry

120 Badger Avenue

P.O. Box 117

Oak Ridge, TN 37831-0117

Telephone: 615-576-9558

Fax: 615-576-0202

Eligibility: (1) Entering and first-year graduate students with degrees in related discipline; and  
(2) U. S. citizen or permanent resident alien.

Award: Annual Stipend: \$15,600 (annually)

Practicum Allowance: \$200 (monthly)

Tuition and Fees: Exact Amount

Travel Allowance: Actual Cost

Due Date: Last Monday in January - call ~ September for current application

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**Title: Merrill Eisenbud Fellowship**

Sponsor/ New York University Medical Center

Admin: Attn: Dr. Norman Cohen

Laboratory for Radiological Studies

Nelson Institute of Environmental Medicine

Sterling Lake Road

Tuxedo, New York 10987

Telephone: (914) 351-4368

Eligibility: Entering graduate students in the environmental health sciences program at NYU  
Medical Center

Award: \$12,000 annually

Due Date: Open deadline

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**Title: National Academy for Nuclear Training Undergraduate Scholarship**

Address: National Academy for Nuclear Training

700 Galleria Parkway

Atlanta, Georgia 30339

Telephone: (800) 828-5489

Eligibility: (1) U.S. citizen or U.S. national

(2) Considering a career in the nuclear power industry

(3) Be enrolled at an accredited U.S. college/university in an approved curriculum related to a career in the nuclear power industry

(4) Be free of post-graduate obligations (e.g., ROTC or NUPOC)

(5) Have a minimum GPA of 3.0

(6) Must have remaining at least one but no more than three academic years of study (for co-op students, no more than six in-school semesters or nine quarters)

Award: \$2,250 for one year

Due Date: Early February - applications sent to faculty representatives in early October

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**Title: National Academy for Nuclear Training Graduate Fellowship**

Sponsor: National Academy for Nuclear Training

Address: Contact individual health physics graduate program

Eligibility: Master's degree student or 5th year undergraduate with program emphasis in power generation health physics

Award: \$12,000 per year

Due Date: Contact individual health physics graduate program

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**Title: NRRPT Scholarships**

Sponsor: National Registry of Radiation Protection Technologists

Address: Dee Dee Woolhiser, NRRPT Executive Secretary

P.O. Box 6974

Kennewick, Washington 99336

Fax: (509) 586-2542

Eligibility: (1) Must be an active member of NRRPT at time of application

(2) Must be accepted in an accredited by an accredited educational institution

(3) Must be pursuing a program of study leading to an Associate's or Bachelor's degree or be qualified for an established professional certification in a technical discipline

Award: \$1000 per person per year (total of six awards per year)

Due Date: June 1 - awards to be made by August 31

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**Title: NSF Graduate Research Fellowship**

Sponsor: National Science Foundation

Admin: Oak Ridge Associated Universities

Address: 702 South Illinois Avenue

Suite B-102

Oak Ridge, Tennessee 37830

Telephone: (615) 483-3344

Eligibility: (1) Completion of no more than 30 semester hours (20 quarter hours) of graduate school following completion of the last baccalaureate degree in science or engineering

(2) U. S. citizen or national of the U. S.

Award: Fellowships for a 3-year tenure (usable over a 5-year period).

Stipend: \$14,400 (annually)

\$8,600 per fellow awarded to sponsoring institution.

Special international research travel allowance.

Due Date: Completed application (comprised of 2 parts) plus proposed plan of study/research, description of previous research experience, course reports and academic transcripts, reference reports, and GRE scores. Part 1 of application due early November; Part 2 in early December.

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**Title: Nuclear Engineering & Health Physics Fellowship**

Sponsor: Office of Nuclear Energy

U.S. Department of Energy

Admin: Oak Ridge Institute for Science and Education

Address: Nuclear Engineering & Health Physics Fellowship Program

Science/Engineering Education Division

Oak Ridge Institute for Science and Education

Attn: Cheryl Terry

120 Badger Avenue

P.O. Box 117

Oak Ridge, Tennessee 37831-0117

Telephone: (615) 576-9558

Fax: (615) 576-0202

Eligibility: (1) B.S. in physical sciences, life sciences, mathematics, or engineering

(2) Admission as a full-time graduate student in DOE participating university graduate program

(3) Not be enrolled, at the time of application, in a graduate program or have previously been enrolled

(4) U. S. citizen or permanent resident alien

Award: Stipend: \$14,400 (annually)

Practicum Allowance: \$300 (monthly)

Tuition and Fees: Exact amount

Travel Allowance: Varies due to program funding

Due Date: Last Monday in January - call ~ September for current application

**Title: Nuclear Regulatory Commission Graduate Fellowship**

Sponsor: Office of Personnel

U.S. Nuclear Regulatory Commission

Admin: Oak Ridge Institute for Science and Education

Address: NRC Graduate Fellowship Program

Science/Engineering Education Division

Oak Ridge Institute for Science and Education

Attn: Rose Etta Cox

120 Badger Avenue

P.O. Box 117

Oak Ridge, TN 37831-0117

Telephone: (615) 576-9279

Fax: (615) 576-0202

Eligibility: (1) B.S. in physical sciences, life sciences, mathematics, or engineering

(2) Acceptance as a full-time graduate student at an appropriate graduate program

(3) U. S. citizen

(4) Eligible for NRC employment, access authorization and/or employment clearance;

(5) Complete not more than one year of graduate school

(assumed to apply at the time of application).

Award: Stipend: \$1800 (monthly up to 2 years)

Tuition and Fees: Exact Amount

Orientation, Initial Work,

& Specialized Training: GG-7 (\$33K - \$35K) (9 mo minimum)

Full government benefits

Employment Obligation: GG-9 (\$37K - \$40K) (2 yrs for 1 yr)

Full government benefits

Education Allowance \$5,000 (annually)

Due Date: Third Monday in January - call ~ September for current application

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**Title: Panasonic Fellowship for Graduate Study in Health Physics**

Sponsor/ Panasonic Industrial Company

Admin: Attn: David Katzman

Two Panasonic Way

Secaucus, New Jersey 07094

Telephone: (201) 348-5339

Eligibility: (1) Current or entering graduate student in health physics or nuclear engineering

(2) Undergraduate or graduate GPA <sup>3</sup> 3.0

(3) Student must submit a research proposal in which a Panasonic TLD system will be utilized

Award: \$15,000 per year for up to 2 years

Due Date: March 15

**Title: Power Reactor Section / Health Physics Society Scholarship**

Admin: Scholarship Committee, Power Reactor Section

Address: Dick Warnoch  
San Onofre Nuclear Generating Station  
P.O. Box 128  
San Clemente, California 92672

Telephone: (714) 368-6784  
(714) 368-6049 (fax)

Eligibility: Junior or Senior undergraduate students or Associate Degree students enrolled in a health physics degree program at a college or university in the U.S.

Award: Six awards of \$1000 each (subject to annual funding)

Due Date: TBA

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**Title: Society of Women Engineers' Scholarships**

Sponsor/ Society of Women Engineers

Admin: 345 East 47th Street  
New York, New York 10017

Telephone: (212) 705-7855

Eligibility: (1) Entering freshman in an engineering program at an accredited institution; OR  
(2) Sophomore, junior, or senior in an engineering program at an accredited institution;

Award: \$1000

Due: Late April

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**Title: South Texas Chapter HPS Associate Degree Scholarship**

Sponsor/ South Texas Chapter of the Health Physics Society

Admin: Attn: Gary Nordwig  
Radiation Protection Technology Department  
3801 Campus Drive  
Waco, Texas 76705

Telephone: (817) 867-2992

Eligibility: Student is beginning or is currently performing full-time work toward an associate degree in health physics or related field offered by a undergraduate program at a Texas institution of higher education.

Award: \$550

Due: March 15

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**Title: South Texas Chapter HPS Bachelor's Degree Scholarship**

Sponsor/ South Texas Chapter of the Health Physics Society

Admin: Attn: Gary Nordwig  
Radiation Protection Technology Department  
3801 Campus Drive  
Waco, Texas 76705

Telephone: (817) 867-2992

Eligibility: Student is beginning or is currently performing full-time work toward an bachelor's degree in health physics or related field offered by a undergraduate program at a Texas institution of higher education.

Award: \$1100

Due: March 15

**NEA SURVEY OF  
UNIVERSITY-LEVEL EDUCATION PROGRAMMES  
IN RADIATION PROTECTION**

In order to foster better exchange of ideas and research in radiation protection, the CRPPH is sponsoring a survey of university-level education programmes. The objective of this survey is to produce a Handbook of information useful to those students wishing to pursue an education in radiation protection, or to those faculty members wishing to exchange ideas or collaborate with, or take sabbatical leave at other universities in different countries.

The results of this survey will be summarized, by country, and will be published as an OECD Nuclear Energy Agency document, which will be updated periodically.

1. **University/College Information**

University Name: .....

Department Teaching Radiation Protection: .....

*Note:* If radiation protection is a minor or specialty offered by another discipline (for example, mechanical engineering, chemical engineering, physics, etc.) please specify the parent department.

Address: .....

.....

.....

Contact person for further information:

Name: ..... Title: .....

Tel: ..... Fax: ..... e-mail: .....

2. **Degree Programmes Offered in Radiation Protection**

	Offered		Average Number of Diplomas Granted Per Year
	Yes	No	
Undergraduate Degree	<input type="checkbox"/>	<input type="checkbox"/>	.....
Master	<input type="checkbox"/>	<input type="checkbox"/>	.....
Other	<input type="checkbox"/>	<input type="checkbox"/>	.....
			.....

3. **Curricula**

Please attach a list of curriculum required for each degree listed above. Include all prerequisites for entry into the programme (required course work, standardized entry examination with minimum acceptable scores, etc.), and graduation requirements (Preliminary Examination, Qualifying Examination, Thesis, etc.).

4. **Faculty**

Please specify the number or average number of faculty members in radiation protection, in the below-listed categories, over the past 3 years.

- Full-time Teaching/Research Faculty: .....
- Part-time Teaching/Research Faculty: .....
- Full-time Research Faculty: .....
- Part-time Research Faculty: .....
- Visiting Faculty: .....
- Other Faculty: .....





7. **Students**

Please specify the number or average number of students in radiation protection, in the below-listed categories, over the past 3 years.

	Number of full-time students	Number of part-time students
Undergraduate Level	.....	.....
Master's Level	.....	.....
Doctorate Level	.....	.....
Post-Doctorate Level	.....	.....
Other (specify):	.....	.....

8. **Student Financial Assistance Programmes**

Please indicate whether the following types of financial assistance are available to students:

	YES	NO
<b>Scholarships:</b>		
- Nationally Sponsored	<input type="checkbox"/>	<input type="checkbox"/>
- Regionally Sponsored	<input type="checkbox"/>	<input type="checkbox"/>
- Corporately Sponsored	<input type="checkbox"/>	<input type="checkbox"/>
- Professional Society Sponsored	<input type="checkbox"/>	<input type="checkbox"/>
<b>Fellowships:</b>		
- Nationally Sponsored	<input type="checkbox"/>	<input type="checkbox"/>
- Regionally Sponsored	<input type="checkbox"/>	<input type="checkbox"/>
- Corporately Sponsored	<input type="checkbox"/>	<input type="checkbox"/>
- Professional Society Sponsored	<input type="checkbox"/>	<input type="checkbox"/>
<b>Student Teaching Assistantships:</b>		
	<input type="checkbox"/>	<input type="checkbox"/>
<b>Student Research Assistantships:</b>		
	<input type="checkbox"/>	<input type="checkbox"/>
Other (specify): .....	<input type="checkbox"/>	<input type="checkbox"/>

*Note:* For any positive responses, please attach information containing an address and phone number where detailed information can be acquired.





**Contact person:**

**Tel:**

**Fax:**

**Degrees Granted:**

**Faculty:**

Full-time teaching/research faculty (1)  
Part-time teaching/research faculty (1)  
Part-time research faculty (2)

**Research Areas:**

•

**Financial**

**Assistance:**

**Contact person:**

**Tel:**  
**e-mail:**

**Fax:**

**Degrees Granted:**

**Faculty:**

**Research Areas:** •

**Students:**

undergraduate  
masters  
doctorate  
other

full-time

part-time

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**Student financial  
assistance  
programmes:**

**Research  
facilities:**

**Professional  
Certification:**