

University Senate

Proposed: February 7, 2014
Adopted: February 7, 2014
by voice vote with no dissent

**RESOLUTION TO APPROVE A MASTER OF SCIENCE
IN ENVIRONMENTAL HEALTH SCIENCES (MSPH)**

WHEREAS, environmental pollution threatens the health of all; and

WHEREAS, there is a need in both industry and government for individuals with an academic science background in toxicology, risk assessment and industrial and environmental hygiene; and

WHEREAS, there is a growing need for expertise and training in radiation public health policy and a pressing need, especially in light of current events, to communicate the underlying science and relative health risks and benefits of radiation to the general public, elected officials and regulators; and

WHEREAS, the primary goal of the proposed master's degree is to provide an outstanding and thorough scientific underpinning to the Mailman School educational experience with a concentration in either toxicology or radiological sciences; and

WHEREAS, the proposed program offers an alternative for those students anticipating scientific careers in toxicology or radiological sciences for whom the broader public health curriculum is not practical or desirable; and

WHEREAS, the Mailman School can draw on its own faculty as well as courses in other divisions of the university for this offering; and

WHEREAS, the proposed program does not duplicate any existing program;

NOW, THEREFORE, BE IT RESOLVED that the Senate approve the program leading to a Master of Science in Environmental Health Sciences.

BE IT FURTHER RESOLVED that the resolution be forwarded to the Trustees of Columbia University for their approval.

Proponent
Committee on Education

The Department of Environmental Health Sciences (EHS) in the Columbia University Mailman School of Public Health seeks to enrich and expand our student's educational and professional opportunities by offering the Master of Science (MS) degree, with concentrations initially offered in Toxicology and in Radiological Sciences.

The availability of a MS degree in EHS will offer flexibility to those students with focused technical academic interests who seek the intensive scientific training in a MS degree program. This will increase the competitiveness of the department and its ability to attract high quality students with varied career interests. We anticipate that the proposed program will be sought out by students seeking employment opportunities requiring a strong, focused scientific education combined with specific training, practicum and research experience in toxicology or radiological sciences. We intend to utilize the expertise and resources of our current EHS faculty, research facilities and course offerings but in a more concentrated and directed format taking advantage of the considerable depth and background in these areas within our department. We believe that the addition of a MS degree will enrich our ability to provide desirable academic training to students seeking challenging careers in Environmental Health Sciences. We also believe opportunities for practical experience gained during research experiences, internships and practicums bode well for the future professional success of our graduates.

Toxicology: Typically, EHS students seek careers in diverse areas of government, academia and industry. For example, EHS students with expertise in toxicology have often found employment in government regulatory agencies, non-governmental environmental organizations, or in for-profit companies involved in occupational health and safety or environmental remediation. Over the past decade, there has been a subtle shift among employers with an increased preference for job candidates with strong toxicological science backgrounds. In surveys of our recent EHS MPH toxicology graduates, we noted that some have struggled to find employment, with the biggest issue being sufficient training and background in this field. This observation was confirmed by surveying a number of potential governmental and private employers. To meet this need, we propose to offer the MS degree in EHS, permitting those students focused on a technical career in toxicology to take an intensive course load in this subject area.

Radiological Sciences: The proposed EHS MS degree with concentration in Radiological Sciences will focus exclusively on 1) Radiobiology and 2) Health Physics. We do not seek to provide expertise in Medical Physics as that degree is offered by the Department of Applied Physics and Applied Mathematics in the School of Engineering. We expect the Radiological Sciences Program will fill a unique niche among Schools of Public Health, especially with a growing needed for Public Health professionals with expertise in this field. This Radiological Sciences MS degree program is fundamentally designed to provide training and expertise to students interested in combining Environmental Health Sciences, Public Health, Health Physics and Radiobiology as they relate to non-medical ionizing radiation exposures, including exposure assessment, regulation, radiobiology research, nuclear safety and security, environmental protection and/or dosimetry. It is particularly designed to be differentiated from the Medical Physics program offered on the downtown campus by providing expertise in these areas and

not medical and diagnostic use of radiation. While there will be some overlap with Medical Physics in the introductory courses in radiation science, we expect to offer course and curricula uniquely designed for the Radiological Sciences student. We are also motivated by the recognition that in addition to technical training there is a growing need for broad expertise and training in radiation public health policy and a pressing need, especially in light of current events, to effectively communicate the underlying science and relative health risks and benefits to the general public, elected officials and regulators.

1) Radiobiology: Radiobiology is the scientific discipline charged with understanding at the biophysical, physiological, cellular or molecular level how ionizing or non-ionizing radiation affects living tissue. Radiation biologists are often concerned with the environmental and public health effects of accidental medical, industrial or nuclear exposures, nuclear accidents and radiological terrorism. The Columbia University Medical Center, and in particular several faculty jointly appointed in our department and in the allied *Center for Radiological Research* (CRR) in the Department of Radiation Oncology, is recognized for its academic expertise in radiobiology and radiation research

2) Health Physics: Unlike Medical Physics, a related discipline whose primary focus is on the safe use of radiation in medical diagnosis and treatment, and primarily in hospital or healthcare settings, the focus of Health Physics is on protecting the general public from the harmful effects of radiation and is primarily concerned with the safe use of ionizing and non-ionizing radiation in government, industry, nuclear power, research, academia, the military and medicine. Health Physics includes study of radiation exposures resulting from industrial use, nuclear power generation, natural geography, accident or terrorist activity. Workplace settings may include commercial entities tasked with environmental cleanup of radiological hazards, government or non-profit organizations helping develop radiation policy and standards, nuclear power plants, and academic institutions.

In summary, we believe that by combining our overlapping interests and expertise in public health, environmental exposure assessment, epidemiology, radiobiology and health physics we will address an urgent need for training and competency for those students interested in expanding their health physics careers to include radiological public health, regulatory matters, administration and legislation. There is also need for training and expertise to understand concepts and measures to minimize risk and provide reliable estimates of radiological exposure. Such need for competency and informed scientific expertise was evident during the recent discourse and discussion surrounding the human health risks posed by the Fukushima nuclear power accident. Disproportionate fear and anxiety among the public can be traced, in part to a lack of informed scientific discourse and discussion and a relative paucity of public health officials who could speak credibly and confidently about potential human health risks arising from such exposures. Despite a current public downturn in support for nuclear power, the growing energy demands of this country and abroad suggest that there is still an urgent need to train future generation of personnel in government, defense, academic research and the nuclear power industries.

In light of these facts, we believe that this new MS degree program, with tracks in *Toxicology* and *Radiological Sciences*, is sorely needed, and offers a unique opportunity to combine training in Environmental Health Sciences, Public Health, Toxicology, Radiobiology and Health Physics with additional opportunities to develop expertise in Public Health Policy as related to a wide variety of potential environmental exposures including, but not limited to, contamination arising from the civilian use of nuclear material.