University Senate

Proposed: April 27, 2018

Adopted: By voice vote
with no abstentions

RESOLUTION TO ESTABLISH A PROGRAM LEADING TO AN M.D./M.A. IN BIOMEDICAL INFORMATICS (P&S AND GSAS)

WHEREAS, many medical students wish to complement their medical education with research and training in the science of information and empirical discovery, the foundation of computational techniques, and the application of these techniques to medicine, biology, and public health; and

WHEREAS, the Graduate School of Arts and Sciences master's program in biomedical informatics offers a uniform foundation in the field with core courses in methods, techniques, and theories, while objectives and domain electives will enable medical students to apply these methods to and perform quality research in clinical informatics, public health informatics, or translational informatics; and

WHEREAS, modern medicine requires a cadre of professionals who can bridge the divide between medicine and technology, able to distinguish which interventions are both important and feasible from those which are neither important nor feasible; and

WHEREAS, Columbia's medical students have expressed interest in such a combined program and a number have already enrolled in the master's program; and

WHEREAS, there is only one comparable program in the Northeast and only three nationally; and

WHEREAS, graduates of the program will be qualified to work as clinical faculty, non-clinical faculty or research scientists;

NOW, THEREFORE, BE IT RESOLVED that the Senate approve the creation of a joint program leading to an M.D./M.A. in Biomedical Informatics.

BE IT FURTHER RESOLVED that the Education Committee review the program five years after its inauguration.

Proponent:

Education Committee

1) Purpose

The purpose of the MD/MA program is to integrate graduate-level training in Biomedical Informatics with the training of medical students. Information technology and methodology are critical to medicine. Medical students have continually shown interest in additional training in biomedical informatics, as complementary to medicine, because Informatics and Health Information Technology have become important components to healthcare. The combined MD/MA program in Biomedical Informatics will be geared to medical students who desire to broaden their medical training with a foundation, research, and practical experience in biomedical informatics. The content of the combined program will be similar to that of our MA program, consisting of core courses, educational objectives, and research in Biomedical Informatics. Our aim is to develop research and computational skills for medical students. This combined program will be greater than the individual programs, and will enable medical students the opportunity to contribute to and become innovators in improving health care with solutions involving information technology and data science.

B) How does the new program relate to ongoing programs? Will it replace any existing program(s)?

Does the proposed program completely or partially duplicate (an) existing program(s) in any other unit of the University?

This MD/MA program is unique within Columbia University in that it will be a combination of the medical degree program and the MA program in Biomedical Informatics department in the Graduate School of Arts and Sciences. It will be geared specifically to those medical students who desire to enhance their medical training with research and training in the science of information and empirical discovery, the foundation of computational techniques, and the application of these techniques to medicine, biology, and public health. Our discipline is motivated by the desire to make new biomedical discoveries, to enable safe and high-quality health care, and to improve the health of the population using computational and information science techniques. Our curriculum is designed to provide a uniform foundation in our field by including core courses, which provide a foundation in general Biomedical Informatics methods, techniques, and theories, while objectives and domain electives will enable medical students to apply these methods to and to perform quality research in one or more areas of specialization in clinical informatics, public health informatics, or translational informatics. Currently DBMI offers the following graduate-level programs: a PhD program, a combined MD/PhD program, a postdoctoral degree or non-degree program funded by the National Library of Medicine and an MA program. Except for the combined MD/PhD program, the other programs are standalone and medical students enrolled in the MA degree when they had already graduated from medical school. The missions of the Medical School and the Department of Biomedical Informatics involve training future leaders and scientists in each respective field. The proposed combined program furthers the mission of the Medical School and the Department of Biomedical Informatics by providing a multidisciplinary educational experience that is not available in either program alone. Upon successful completion of the program, graduates are expected to have a strong foundation in the fundamental techniques of biomedical informatics as well as in medicine, and will have a stronger ability to face the current challenges in health care related to informatics, data science, and computational technology.

2) Need

A) Why is the proposed program needed locally, statewide or nationally?

The full potential of health information technology to improve patient outcomes and safety will require a cadre of professionals who can bridge the divide between medicine and technology. Development of usable and safe health IT requires oversight by physicians who also have a deep understanding of the potential and limitations of technology. These hybrid professionals, trained in both medicine and biomedical informatics, will be able to distinguish which interventions are both important and feasible from those which are neither important nor feasible. Furthermore, these hybrid professionals will focus on usability and workflow, two critical areas that often determine whether a health IT intervention will be useful and successful, that have largely been ignored. The goal of the MD-Masters dual program is to train these key participants so that

they can oversee the development and implementation of useful, safe and effective technology into the complex medical space. The dual MD/MA degree is more beneficial for students than two separate degrees taken sequentially. When students with an interest in informatics take the MD and MA degrees sequentially, then they get less opportunity to do advanced research. When it is done sequentially, they get their MD research time before they have done their MA degree. As a result, their MD research addresses relatively trivial problems. If they take the MA during the MD, before the fourth year of medical school, they are better prepared for research, and then they can carry out advanced informatics research during their fourth year of medical school. There are also logistical benefits for them. If they apply for an internship after their degrees and they do them sequentially, then they would have to spend about a month of time on interviews in the first semester of the MA program, which is difficult to do with courses. If they do the combined program, then the interviews fall during their research time, which is more flexible to schedule.

B) Have students at the University or elsewhere requested this program? How many?

A number of current MD students at Columbia University have shown interest in a combined program, and some MD students are spending a month in our department during their research rotations to learn more about the field. In addition, students who have MD degrees from Columbia University or elsewhere have taken our standalone MA degree. Overall, there have been about 12 MDs who have graduated or are currently enrolled in our standalone MA program. Some of the MDs enrolled in our MA program shortly after finishing their MD degrees and others enrolled later. Some of them enrolled as part-time students and others enrolled as full-time students. Most of the full-time students took more than 1 year to finish the program because they required more time to complete their research and Master's essay. We have also have had a continuous group of about 3-5 MDs each year enrolled in our MA program who were or still are postdoctoral fellows funded by the National Library of Medicine.

C) If the program is career or professionally oriented, have persons in the profession or career requested establishment of the program? Have the employment needs of professionals in the field been taken into account when designing the program?

MD students have requested establishment of the program. Our MA program is geared to train a broad range of career interests, and has taken into account training needs of MDs in biomedical informatics. The strength of our program in meeting the employment needs of MDs in the field is demonstrated by the productive careers of many of our graduates. 37 MDs have completed an MA degree from our program (as postdoctoral fellows or standalone students) who are now current leaders involved in health informatics positions in academia and industry, have faculty appointments in clinical departments, or are working in healthcare technology positions. These MDs would not have been as well prepared for leadership roles in biomedical informatics without training in our program.

D) What other institutions in the metropolitan area and in the Northeast offer similar programs?

The only other dual MD-Master's degree program in Biomedical Informatics in the Northeast is offered by The Robert Wood Johnson Medical School in conjunction with the University of Medicine and Dentistry of New Jersey and the New Jersey Institute of Technology. This program is an MD/MS program and is available to Robert Wood Johnson Medical School students after completion of the second year and may result in program completion in 18 months. Students in the dual MD/MS program offered by the Robert Wood Johnson Medical School must complete at least 36 credits hours of which at least 30 are formal courses, which include: core courses, an area of specialization, electives, and directed thesis or project. Our proposed program differs from their program in that our program results in an MD/MA degree, and is intended for Medical School students at Columbia University who have completed 3 years of medical school, and who have taken their boards. These students take a leave from medical school for the fourth year and enter the MA program for a year, and then return to medical school in the fifth year. They are expected to complete the coursework for the MA program in one year and successfully complete 30 credits (6 credits of which they receive from the MD program) during that time. The courses required for the MA degree are the same as those for the standalone MA, and include core courses, a biostatistics course, at least one elective course, and directed research (which consists of a research project in Biomedical Informatics). These students may finish research that

culminates in their Master's essay during the year that they are in the MA program, but that would be unusual. Typically, they will be able to complete their research and Master's essay as part of their scholarly project rotation in medical school subsequent to finishing their MA coursework. Only one school in the Northeast is offering this dual program as it is a new trend in the field of MD education because information technology is recognized as being increasingly important in medicine. Our program differs in content from the Robert Wood Johnson program in that our program is closely tied to real world healthcare environments. Many of our faculty members have leadership positions at Columbia University Medical Center (CUMC) or New York-Presbyterian Hospital (NYP), and collaborate with our students to provide information services and innovations which become part of clinical workflows, changing the way medicine is practiced in real-time. The MD/MA students will also be provided an opportunity to become familiar with and/or interact with an operational clinical information system. There are two other dual degree MD/MS programs in the country: one is offered by Vanderbilt University and the other by Stanford University.