

University Senate

Proposed: December 13, 2012

Adopted: December 13, 2012

**RESOLUTION TO ESTABLISH A DEPARTMENT OF SYSTEMS BIOLOGY
AT THE COLLEGE OF PHYSICIANS AND SURGEONS**

WHEREAS, in the last decade, the widespread availability of novel genome-scale experimental techniques and the ubiquity of large-scale computing platforms have made it possible to generate and analyze massive amounts of data, enabling the development of quantitative models, and

WHEREAS, the new discipline emerging at the intersection of the experimental and computational biomedical sciences is called systems biology, and

WHEREAS, this new discipline has become one of the most effective frameworks for accelerating scientific discovery, and

WHEREAS, Columbia has in recent years emerged as a leader in systems biology in terms of funding, publications and program size, and

WHEREAS, a new Columbia Initiative in Systems Biology, created and funded in 2010, enabled the recruitment of outstanding new faculty in the field, and

WHEREAS, through the Center for Computational Biology and Bioinformatics, Columbia is home to a world-class computational infrastructure, and

WHEREAS, an increasing number of universities and research institutes around the United States now offer programs organized around systems biology, and

WHEREAS, the Columbia University Medical Center governing board and the Provost have identified systems biology as a major direction for scientific development in the coming years, and

WHEREAS, a focused department will help Columbia attract top research talent in this emerging field, and

WHEREAS, there is a pressing market need for researchers trained in this field,

THEREFORE BE IT RESOLVED that the Senate approve the establishment of a Department of Systems Biology at the College of Physicians and Surgeons.

BE IT FURTHER RESOLVED that the resolution be forwarded to the President and the Trustees of Columbia University for appropriate action.

Proponent:
Committee on Education

Proposal to Create a Department of Systems Biology at Columbia University Medical Center

**Submitted by Andrea Califano and Barry Honig
May 17, 2012**

The golden age of many scientific disciplines has coincided with the development of quantitative, analytical, and predictive models. From chemistry, to physics, to economics such models have complemented the disciplines' original empirical foundations by providing new tools for the rapid generation and testing of relevant hypotheses. In many disciplines an additional period of expansion occurred when computers made it possible to numerically solve complex problems that could not be addressed at the analytical level.

In biology and medicine, the use of quantitative predictive models is a recent development. In the last decade, the widespread availability of novel genome-scale experimental techniques and the ubiquity of large-scale computing platforms have made it possible to generate and analyze massive amounts of data, enabling the development of quantitative models. These developments have heralded a new age for predictive biology and personalized/precision medicine.

The new discipline emerging at the intersection of the experimental and computational biomedical sciences is called systems biology. It has become one of the most effective frameworks for accelerating scientific discovery in both basic and translational research. A number of leading institutions around the country including Harvard University, Stanford University, MD Anderson Cancer Center, and Mt. Sinai School of Medicine have capitalized on the promise of the new discipline by creating departments of systems biology and systems pharmacology. These departments have addressed pressing needs in education and training and have become catalysts for the recruitment of outstanding faculty and students.

Over the past decade, through the combined efforts of the Center for Computational Biology and Bioinformatics and the JP Sulzberger Columbia Genome Center, Columbia University has emerged as a leader in systems biology in terms of systems biology-related National Institutes of Health (NIH) funding, publications, and program size. This academic achievement has been strongly complemented by the development of a remarkable onsite technological infrastructure, including one of the world's largest supercomputers dedicated to biological and medical research as well as state-of-the-art genomic, high-throughput screening, and high-content imaging equipment.

In response to this extraordinary growth, as well as to competitive recruitment pressure from peer institutions, a new Columbia Initiative in Systems Biology was created and funded in 2010. This enabled the recruitment of four outstanding new faculty members — bringing the total

number of affiliated systems biology faculty at Columbia (spanning both campuses) to 22 — with four to five additional recruits slated in the next two years.

This expansion has laid the groundwork for the proposed formation of a Department of Systems Biology, to be located primarily at the Columbia University Medical Center, but with joint appointees on the Morningside campus as well. Our proposal is motivated by critical opportunities and institutional priorities, including recruitment, education, fundraising, and interdisciplinary collaborations.

Historically, recruiting outstanding faculty with specialized training in systems biology has been virtually impossible. This was primarily because the candidates' research focus was not generally compatible with the more traditional objectives of existing university departments. In contrast, our recent recruitment successes have been possible because of the creation of the Initiative in Systems Biology and the expectation that it will attain departmental status.

Similarly, in terms of education and training, most of the students who apply to systems biology programs at Harvard, Stanford, and MIT fail to apply to Columbia because this discipline is not formally represented at our university. Offering a departmental home and a focused curriculum in systems biology would have an enormous impact on our ability to attract the best students.

In addition, the liaison between the basic and clinical sciences created by systems approaches creates unique opportunities to raise philanthropic support, such as has been achieved by the Lewis-Sigler Institute at Princeton, the Broad Institute, and the Department of Systems Biology at MD Anderson Cancer Center.

Finally, the creation of a Department of Systems Biology will open countless opportunities for new types of interdisciplinary and intercampus collaborations at Columbia. The department will become a resource for the entire university and will support the major genomic platforms — such as next-generation sequencing and high-throughput screening — that have become indispensable tools for performing cutting-edge research.