

Edison of Medicine: Training Tomorrow's Inventors

The new Edison of Medicine program will be specifically designed to encourage the inventors of tomorrow. Serial inventors like Da Vinci and Edison have had huge impact on human society. This program strives to bring out the "inventorship" of students.

PURPOSE AND NATURE OF PROGRAM

Science, particularly in the biological realm, is taking on new dimensions. There is increased societal emphasis on the concept that the scientific community should focus on solving basic human problems or creating new possibilities and vision. These goals are often best addressed through a multi-disciplinary effort. These goals and means of implementation are embodied in the tenants of the New American University. In particular the aim of making use-inspired science both a driver for solutions of problems as well as the source of basic research breakthroughs is becoming a theme at ASU. Implicit in this vision is the requirement for a new type of scientist that, at a minimum, can readily work in the context of diverse scientific disciplines, if not actually have training in multiple disciplines. They will have an appreciation of how to innovate new technologies and how to use them to create new basic knowledge. This new dimension in scientific literacy should not be at the expense of traditional excellence in discipline training.

The need for the expansion of the dimension in scientific doctoral training is becoming recognized at several levels. A recent study of the National Academy of Sciences points out that 95% of graduating doctorates in the physical and biological sciences do NOT enter the academy. A large proportion, take their training to employment in non-scientific positions. As noted by the Arizona Roadmap sponsored by the Flinn Foundation, increasingly companies in the biotech sector will involve technologies at the intersection of information, biology, engineering and the physical sciences. If our training programs are to meet this new demand, we will need to train students that have discipline training in the biological-related sciences, yet be facile in interdisciplinary research and innovation. Scientists with this type of training should foster the focus in the Phoenix area on biotechnology in the broad sense as well as the State aspirations in this area.

While many graduate training programs at ASU are responding to this new vision, there is not yet a graduate program in the biological sciences designed to take in the breadth of training experience students will need, with a program of study explicitly focusing on training in interdisciplinary, use-inspired science and no program has an emphasis in inventions.

The mission of this new program will be to train highly qualified students in a biology related discipline at the same time maximizing the training in how to conduct and participate in interdisciplinary science with a strong use-inspired mission. The students will interact with inventors of a variety of backgrounds to learn their stories and methods.

The Edison of Medicine program will have these features

Core Course: *A new Core Course for the BDGP will be an intensive one year course that will provide core training in all the relevant bio-related areas (biophysics, biomedical engineering, chemistry, molecular biology, biochemistry, cell biology, immunology, developmental biology, evolution and computation/modeling). The major questions of each discipline will be explored. In addition the integration areas – for example, synthetic biology, systems biology, artificial tissues, drug development – will be taught. A series of elective satellite sessions will allow students to explore specific areas in more depth. The emphasis will be on interdisciplinary invention.*

Personal Course Design: *At the end of the first year the students will chose the discipline concentration for their studies and the mentor for their research. The student and his/her committee will then formulate a set of courses that meet the training objectives for the student. For example, a student may want discipline training in bioengineering but with particular emphasis on immunology.*

Emphasis on Use-Inspired Research and Interdisciplinary Training: *Students will be strongly urged to choose research projects that are use-focused, especially of large impact, and promise rich interdisciplinary experiences. In particular they will be exposed in the first year to the thematic, Apollo-type projects that are developing at ASU. This includes projects in nanoscience, human-computer interface, personalized medicine and infectious diseases. Every effort will be to engage students on projects of new inventions.*

Extensive Mentorship: *In order to meet all the goals of this training program it will be necessary to emphasize effective mentorship. Students will meet often formally and informally with their committee mentors to ensure that the coursework and research is proceeding in optimal fashion.*

Broadening Experiences: *In keeping with the idea of creating a cadre of next generation scientists that are societally engaged and able to communicate well, the EOM program will have a number of workshops offered. This will include ones on Public Presentation, Evaluating Societal Impacts of Research, Intellectual Property and How to Invent. Besides standard seminars for students to hear and present the latest work, students will be required to engage in speaking to the lay public about their work*