STEM Education

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Degree awarded:
Ph.D. in STEM Education

Program web site:
https://www.stonybrook.edu/sciedphd/

Application
https://graduateadmissions.stonybrook.edu/apply/

STEM Education

The Institute for STEM Education (I-STEM) provides graduate education leading to a PhD in STEM Education for those who wish to work as

1. university or college STEM educators, directing STEM teacher education programs, working closely with schools and school systems on local, state, and national STEM projects.
2. university research or policy specialists, with the bulk of their time spent on guiding research on various aspects of STEM instruction.
3. directors and supervisors in K-12 school systems, covering the design and implementation of STEM programs at local, county and state levels; and,
4. classroom teachers with improved knowledge of STEM education theory and practice.

A carefully sequenced series of STEM education core courses and research experiences, coupled with exposure to STEM education events at state and national levels, provide the backbone of the program. Students are introduced to current STEM education research areas. As part of the coursework students are required to complete research projects, write, and submit articles for publication, make presentations at STEM education conferences and learn to use computer and library research resources.

Beyond the STEM education core coursework, students take courses in statistics and research methodologies, complete breadth and depth requirements in STEM content areas and undertake independent research under the guidance of advisors in STEM education and in their STEM cognate discipline. The program is open to part-time students from the region, who should complete the program in approximately five to six years.

STEM Education Admission Requirements:
The following will be required.

1. A bachelor’s degree in a STEM subject
2. A master’s degree in either a scientific field or in education
3. Official transcripts of all colleges and universities attended
4. Graduate GPA of at least 3.0
5. 3 letters of recommendation
6. Interview and writing sample
7. Statement of intent
8. Completed application form
9. Acceptance by the Graduate School

For more information visit the I-STEM website at https://www.stonybrook.edu/sciedphd/

Program faculty and students will be able to draw upon a wide range of academic, professional, and cultural resources. These include academic programs in Asian & Asian American Studies, China Studies, Japanese Studies, Korean Studies, and South Asian Studies, as well as Cultural Analysis and Theory, Business, Journalism, Media Studies, Linguistics, Religious Studies, Philosophy, History, and various social sciences. In terms of professional development, PEP (Professional Education Program) coordinates with the Department of Asian and Asian American Studies and Foreign Language Teacher Preparation Program to offer teacher certification programs for Chinese, Japanese and Korean. Moreover, the Language Learning and Research Center (LLRC) offers a state-of-the-art multimedia language center at Stony Brook University, with a wide variety of materials and technologies to assist scholars and students of Asian languages. The Center for Multilingual and Intercultural Communication (MIC) provides opportunities for research across languages and cultures. Master’s students seeking to pursue a study abroad opportunities during their graduate training will work with the Office of the International Academic Programs and Services. In addition, there are a variety of social and cultural activities and services offered through the Mattoo Center for India Studies, the Japan Center at Stony Brook, the Center for Korean Studies, the Charles B. Wang Center, as well as the diverse student organizations represented on campus.
Degree Requirements for the Ph.D. in STEM Education

A. Course Requirements (5 of the following courses - 15 credits)
CSM 600 History and Philosophy of STEM Education
CSM 610 Nature and Practice of Science
CSM 620 STEM Teacher Education
CSM 630 STEM Education Research Seminar
CSM 640 Directed Study in STEM Education (may be taken more than once)
CSM 650 Introduction to Measurement and Assessment in STEM Education

B. Statistics and Research Methodology Courses (3 courses – 9 credits, which may include the following)
CSM 635 Qualitative Research Methods in STEM Education
CSM 645 Introduction to Quantitative Research Methods

C. STEM Content Breadth and Depth Courses (up to 4 courses -12 credits)
The courses to be taken depend upon the type of master’s degree that the entering student holds. Students holding a master’s degree in a specific scientific discipline will be required to complete graduate courses in other STEM disciplines. Students holding master's degrees in education will be required to complete graduate coursework in their scientific field. The required breadth and depth courses are determined by transcript review by the Graduate Program Director upon acceptance into the program.

D. Independent Research (Minimally - 18 credits to include 12 credits of CSM 699 or CSM 700)
CSM 699 Dissertation Research on Campus or CSM 700 Dissertation Research Off Campus

E. Qualifying examination
Students will complete a qualifying examination upon the completion of all the STEM education core courses. The qualifying examination will have three components:
1. Paper 1 – a common examination question for all students based on a topic from the STEM education core courses.
2. Paper 2 - an individualized examination question, written by the student’s advisor, based upon a student’s dissertation research area.
3. An oral presentation and defense of the two papers

F. Research Proposal
Students are required to prepare and defend a dissertation proposal based on their proposed research. The students will present a formal written dissertation proposal that includes details of the research questions, a complete literature review, the methods chosen to answer the research questions and details of how the collected data will be analyzed. The proposal will be presented and defended in an oral hearing before the dissertation committee. If appropriate, Institutional Review Board (IRB) approval to conduct the research will be secured. On satisfactory completion of the dissertation proposal, a recommendation for advancement towards candidacy will be forwarded to the Graduate School.

G. Advancement to Candidacy
When the above requirements have been satisfactorily completed, a recommendation for advancement to candidacy for the Ph.D. will be forwarded to the Graduate School.

H. Dissertation
The dissertation research outlined in the thesis proposal will be supervised by the committee, which will normally include both STEM education and STEM faculty.

I. Dissertation Defense
The dissertation defense, which completes the requirement for the Ph.D. consists of a public seminar presentation of the dissertation work followed by an oral examination before the dissertation examining committee.

J. Teaching Experience
A semester of a practicum in teaching will be required in addition to the completion of the STEM Teacher Education core course. This may include making seminar presentations, assisting in laboratories, STEM teacher professional development, and leading discussion sessions. Formal and informal feedback on a candidate’s teaching will be provided by program faculty.

K. Residence Requirement
For full-time students, the University requires at least two consecutive semesters of full-time graduate study.

PhD in STEM Education Faculty
Kelly, Angela, Associate Professor of Physics. Ph.D., 2006, Teachers College, Columbia University: Science education; physics education; engineering education; physical science access for traditionally underserved groups; socio-cognitive perspectives of STEM participation and persistence.
Sheppard, Keith, Associate Professor of Biology and Cell Biology and Director of Institute for STEM Education. Ed.D., 1997, Teachers College, Columbia University: Science education, chemistry education, physics education, history of science education, science learning, science teacher education.

**Affiliated Faculty**

Aubrecht, Katherine, Associate Professor of Chemistry. Ph.D., 1999, Cornell University: Development of learning materials about sustainability for the chemistry curriculum; context-based approaches in chemical education; biodegradable and bio-renewable polymers; environmentally benign synthetic methodology.


Bugallo, Mónica, Professor of Electrical and Computer Engineering and Faculty Director of the Women in Science and Engineering Program (WISE). Ph.D., 2001, University of A Coruña, Spain: Statistical signal processing; engineering education; women in science and engineering.

Lopez, Glenn R., Professor of Marine Sciences. Ph.D., 1976, Stony Brook University: Marine biology; benthic ecology; animal-sediment interactions.

Moloney, Daniel, Research Associate Professor of Biochemistry and Cell Biology, Director of NIH Bridges to Baccalaureate Program, and Director of Biotechnology Teaching Laboratories. Ph.D., Stony Brook University: cell signaling regulation; cancer chemoprevention; DNA barcoding; biotechnology; STEM education.

Scarlatos, Lori L., Associate Professor of Computer Science. Ph.D., 1993, Stony Brook University: Educational technology; tangible, physical, multi-modal, and collaborative human-computer interfaces; serious games; computer graphics; multimedia.

Zachar, Zuzana, Research Assistant Professor of Biochemistry and Cell Biology and Director of Masters of Arts in Teaching Biology Program. Ph.D., Stony Brook University: Cancer chemotherapy; transposon biology; regulation of alternative splicing of mRNA and nuclear architecture; biology education of teachers.

*NOTE: The course descriptions for this program can be found in the corresponding program PDF or at COURSE SEARCH.*