



## **Integrative STEM Education Graduate Program ONLINE Graduate Certificate & Degree Options at VIRGINIA TECH**

In Spring 2006, Virginia Tech (VT) became the first in the US to offer an *Integrative STEM Education* graduate program. These new graduate degree options develop 21st century K-16 STEM educators, leaders, scholars, and researchers prepared to investigate, teach, and disseminate new integrative approaches to STEM teaching and learning. Our focus on the implementation and investigation of new integrative approaches to STEM education uniquely sets us apart from other STEM programs. *Integrative STEM Education* is an exemplar of the ideals set forth in *STEM Science for All Americans*, *Benchmarks for Science Literacy*, *Principles and Standards for School Mathematics*, *National Science Education Standards*, *Standards for Technological Literacy*, and *Educating the Engineer of 2020*.

### **INTEGRATIVE STEM EDUCATION Courses & Degrees [ONLINE]**

#### **Integrative STEM Education Core Courses:**

- EDCI 5804: STEM Education Foundations
- EDCI 5814: STEM Education Pedagogy
- EDCI 5824: STEM Education Trends & Issues
- EDCI 5834: STEM Education Research
- EDCI 5844: STEM Education Seminar (1SH)
- EDCI 5854: Biotechnology Literacy by Design
- EDCI 5964: Field Studies in [STEM] Education
- EDCI 5774: Readings in Technology Education (1SH)

#### **Graduate Certificate**

- 12 SH (EDCI 5804, 5814, and 2 more courses from EDCI 5824, 5834, 5854, or 5964,

#### **Graduate Degrees**

- Masters of Education (MAEd)
- Education Specialist (EdS)
- Doctor of Education (EdD)\*
- Doctor of Philosophy (PhD)\*

\*See Graduate Catalog for Residency Requirement

### **Application / Registration Options**

**For Application Deadlines, Fees, etc., see <http://www.grads.vt.edu/admissions/applying/index.html>**

#### **Option 1: “Graduate Certificate, MAEd, EdS, EdD, or PhD**

Select “Apply Online” from <http://www.grads.vt.edu/admissions/applying/index.html>. On pg. 1 Do this: **Degree Objective: Graduate Certificate**. Select Program: Graduate Certificate Program (Integrative STEM Educ) OR Degree Objective: Masters, EdS, Doctorate / Select a Program: Education, Curric & Instruct. (Integrative STEM Ed)

#### **Option 2: Commonwealth Campus** (works for up to 12 semester hours)

Follow the procedures above, selecting the “Commonwealth Campus” option in the application.

#### **Option 3: Expedited Paper Application** (works for 1 semester only)

Select “Paper Applications” from <http://www.grads.vt.edu/admissions/applying/index.html>. In the “Enrollment Info” section (pg. 3), under “Degree Level,” select “Graduate Certificate” or the desired degree. On the “General Supplemental Form,” in the Degree Program section (pg. 5) write “Education-Curriculum & Instruction; Integrative STEM Education Graduate Certificate” (or MAEd, EdS, EdD, PhD)

### **For More Information**

Mark Sanders, Integrative STEM Ed (540) 231-8173 <[msanders@vt.edu](mailto:msanders@vt.edu)> <http://TechEd.vt.edu/TE/STEM.html>

*Invent the Future*

# CORE COURSES: *INTEGRATIVE STEM EDUCATION*

## **EDCI 5804: STEM EDUCATION FOUNDATIONS**

**DESCRIPTION:** An introduction to the educational, political, economic, and socio-cultural foundations of the STEM and STEM education disciplines. The course opens with an introduction to the nature of each of the STEM and STEM education disciplines, and follows with investigation of related political, economic, and socio-cultural foundations. This course provides students with a framework for constructing personal perspectives and philosophies of integrative STEM education.

## **EDCI 5814: STEM EDUCATION PEDAGOGY**

**DESCRIPTION:** Through careful analysis, both individual and collaborative, of readings and case studies students in this course will explore the signature pedagogies unique to the fields of science, technology, engineering, and mathematics (STEM) education. In this exploration we will reveal both strengths and limitations associated with signature pedagogies, and gain insights into pedagogical strategies that can serve to enhance practices within our chosen STEM fields. The overarching goal is to better understand the distinct pedagogical approaches to teaching and learning that cross both professional and liberal education lines.

## **EDCI 5824: STEM EDUCATION TRENDS AND ISSUES**

**DESCRIPTION:** An introduction to contemporary K-16 STEM education trends and issues, including both integrative and within-discipline trends/issues. Topics such as STEM literacy, integrative STEM teaching / learning, purposeful design and inquiry, legislative initiatives, and change theory are among those addressed in this course.

## **EDCI 5834: STEM EDUCATION RESEARCH**

**DESCRIPTION:** Designed to survey the educational research practices of STEM disciplines, this course investigates the approaches used in studying the teaching/learning processes within the context of each discipline. Individually and collaboratively students will discover similarities, distinctions and overlaps among questions posed, research designs, and investigations into best practices with respect to improving teaching and learning among STEM disciplines.

## **EDCI 5844: STEM EDUCATION SEMINAR**

**DESCRIPTION:** This course is designed as a general exploration into the issues surrounding the development of a STEM literate populace through education. This exploration will be facilitated by a blend of readings, discussions, and personal reflections. Course instruction will follow a seminar format appropriate for such a graduate level course.

## **EDCI 5854: BIOTECHNOLOGY LITERACY BY DESIGN**

**DESCRIPTION:** Addresses the field of biotechnology through technological design as a core curricular requirement reflective of the national Standards for Technological Literacy (STL) (ITEA, 2000). Using problem/project/design-based instruction, students develop a level of general STEM education literacy necessary to teach about biotechnology from a technological/engineering design approach.

## **EDCI 5964: FIELD STUDIES IN [STEM] EDUCATION (Variable Credit; P/F only)**

**DESCRIPTION:** Applied study in one or more educational institutions. Research, evaluation, curricular, and instructional projects are examples of appropriate areas of study.

## **EDCI 5774: READINGS IN TECHNOLOGY EDUCATION**

**DESCRIPTION:** Historical & philosophical foundations, contemporary trends & issues, research, etc.

## **FOR MORE INFORMATION**

Mark Sanders, Integrative STEM Ed (540) 231-8173 <[msanders@vt.edu](mailto:msanders@vt.edu)> <http://TechEd.vt.edu/TE/STEM.html>