

School of Engineering

A focus on STEM education has been building nationally, with recent emphasis on “design pedagogy,” which utilizes the Technology and Engineering components of STEM to engage students in a highly integrative, intra-disciplinary fashion with deeply authentic teaching and learning experiences. Recently, the Next Generation Science Standards (NGSS) recognized the value of the T&E of STEM and explicitly included engineering design into both their framework and detailed standards for PK-12 education. The School of Engineering at TCNJ, has substantial experiences and expertise in K-12 Technology and Engineering education, and integrative-STEM education. The School of Engineering’s Department of Technological Studies has had strong STEM-oriented education programs since approximately 1987, when a strong shift towards design (“design pedagogy”) occurred in the department’s teacher preparation curriculum. Also, the Technological Studies Department started likely the country’s first integrative-STEM teacher preparation program in 1998: the PK-6(8) “integrative-STEM Education (i-STEM)” program (originally named “Math/ Science/ Technology”). For the past several years, this integrative-STEM program has been the largest disciplinary content area for teacher education candidates at TCNJ. Additionally, TCNJ has been strongly involved nationally, serving on and for important national committees on PK-12 Technology and Engineering Education, has led the development of STEM teaching methods and has published substantially in the field.

Master of Arts in Teaching (M.A.T.)

The School of Engineering supports a MAT degree in Technology Education. The program description can be found under the School of Education graduate programs, under “STEM M.A.T. Programs.”

Program code: ETDTE_MAT01, Technology Education

Master of Education (M.Ed.) in Integrative-STEM Education STEM_MED01

The Department of Technological Studies.

Coordinator: Dr. Steve O’Brien, 609-771-2782, obriens@tcnj.edu

Program code: XXXXXX, integrative-STEM (i-STEM) Education

This program is designed for in-service (certified) teachers. The program offers an intellectually stimulating course of study that provides in-service teachers with integrative, design-centric teaching and learning methods applicable across PK-12 grade levels. Key components of the i-STEM M.Ed. program include:

- 1) Integrative: Substantial emphasis on Integrative (cross-curricular) methods, between STEM components but also, and as importantly, includes valuable connections with non-STEM content areas.
- 2) Design Pedagogies: Design pedagogies can be described as design-centric Problem/ Project Based Learning (PBL) methods, and are covered extensively. Design processes (the “T&E” of STEM) require higher levels of cognitive thinking, and importantly, often include highly contextualized frameworks.
- 3) Content Area Knowledge: Content in individual STEM areas are covered throughout the program, within both Methods and Content courses, yielding valuable content/context specific applicability. Additional NJ State content endorsements may be possible depending on individual’s backgrounds.

- 4) Practical Approach: Gives teachers practical skills & knowledge, including curricular writing, inclusive practices, and deep connections to educational standards (Next Generation Science Standards, Common Core, 21st Century skills, etc.). TCNJ college certificates or NJ State certification paths are possible [Ex.: (i) NJ State Supervisor certification, (ii) TCNJ i-STEM Methods certificate, (iii) TCNJ i-STEM Special Ed. Certificate, etc.]

Admission Requirements:

Bachelors degree with a valid teacher certification.

Graduate Record Exam (GRE)—For test waiver information, please visit <http://graduate.tcnj.edu/apply/>.

Submission of Graduate Application materials, including a Field Supplement Report. (See Graduate Studies website for more detailed descriptions of required application materials for matriculation and non-matriculation students.)

Graduation Requirements:

Cumulative grade point average of 3.0 in the i-STEM M.Ed. program
Completion of all program requirements/prerequisites

Required Courses:

I. Teaching & Learning Core 15 cr.

- STEM 510/Foundations in i-STEM
- STEM 520/i-STEM Pedagogy
- STEM 530/i-STEM Curriculum
- STEM 610/Emerging Trends & Issues in i-STEM Ed.
- STEM 660/Creativity & Systems/ Critical Thinking in Education;
- STEM 700/i-STEM Ed. Capstone

II. STEM Ed. Content & Research 9 cr.

- STEM 610/Math/ Statistics for i-STEM Education
- EDFN 508/Introduction to Education Research
- Any STEM Education Content course (student choice)

III. STEM Ed. Electives 12 cr.

Complete the four courses outlined in any of the following pathways

(A) Supervisor certification:

- SUPV 520/Supervisor & Instructor Leadership
- CURR 514/Curriculum: Theory & Practice
- EDAD 617/Advanced School Leadership: Supervision/ Administration
- ELEM/ CURR 555/Advanced Curriculum

(B) Design:

Any four of the STEM Ed. Content courses (listed at the end of this section)

(C) Research:

- STEM 680/STEM Ed. Research
- STEM 710/Thesis
- Any two STEM Content courses (listed at the end of this section)

(D) Inclusion/ Special Ed. [Three possible pathways]

i. Inclusive Practice: English Language Learners

- ESLM 577
- ESLM 579
- ESLM 587

Choose one of: EDUC 513, EDUC 614, or EDUC 501

i. Inclusive Practice: Students with Disabilities

- EDUC 513

EDUC 614
SPED 501

Choose one of: RDLG 579, SPED 624, or SPED 648

i. Inclusive Literacy Practices

RDLG 579 [note: Prereq. of a course in teaching reading(undergrad. or graduate level)]

RDLG 673 (Sp)

SPED 624 (F)

Choose one of: EDUC 513, EDUC 614, or SPED 624

(E) Middle School Math:

Pick any four of the following:

MATH 591/Number Theory & Systems

MATH 594/Patterns, Functions, Algebra

MATH 595/Geometry

MATH 597/Discrete Math

MATH 598/Calculus

STEM 635/Data Visualization

(F) Self-Defined: Four courses approved by the Program Coordinator.

STEM Education Content Courses*

STEM 631/Math/Statistics for i-STEM Education

STEM 635/Data Visualization & Analytical Information Design

STEM 641/Biotechnology Systems and Sustainable Design for Educators;

STEM 661/Architecture/Civil Technology Systems & Design for Educators

STEM 671/Mechanical Technology Systems and Design for Educators

STEM 681/Electronics Technology Systems and Design for Educators

* STEM Education content courses purposefully integrate Science, Math, Engineering and Technology [Ex. STEM 671 & 681 cover various physics topics, while STEM641 covers various biology & chemistry content.]