STEM Education Graduate Certificate

The interdisciplinary Science, Technology, Engineering and Mathematics (STEM) education graduate certificate is designed for STEM educators, and graduate students interested in designing and/or delivering an interdisciplinary STEM curriculum.

Objectives:

1. To develop reflective and collaborative professionals bridging theory and practice in integrated, interdisciplinary STEM education.
2. To improve instructional and curricular effectiveness and expertise of individuals who work in STEM education and/or prepare students for careers in STEM education fields.
3. To provide a pathway for current and prospective educators to earn the credential for teaching and developing interdisciplinary STEM education courses through a combination of academic coursework and work based field experience.

Figure 1. Student’s Individualized Pathway in the Interdisciplinary STEM Education Graduate certificate.

Students in the program will build interdisciplinary academic skills in context with an emphasis on real world problem solving, critical thinking, and career readiness. The curriculum is developed in a way that facilitates key features to effective interdisciplinary STEM curriculum preparation, induction, and implementation including models and characteristics that guarantee quality curricula. The certificate comprises 18 credit hours in the following way: (1) Entry course (3CH), Selected STEM courses for an individualized pathway (12CH), and Exit/Capstone course (3CH) (Figure 1.).

Graduate Coordinator: Dr. Mara Alagic

STEM Education faculty: SoonChun Lee
CI 866 Interdisciplinary STEM Education*

Interdisciplinary STEM Curriculum Model:

- **Research & Reflection**
  Asking questions, seeking & defining problems. Planning & carrying investigation.

- **Discovery & Design**
  Developing and using models, analyzing and interpreting data, using STEM-grounded thinking in constructing explanations.

- **Application & Communication**
  Designing/testing solutions, engaging in argument from evidence, evaluating & communicating information.

The course comprises a comprehensive overview of the theories of and instructional strategies for integrated STEM education to identify, develop, deliver, and evaluate interdisciplinary STEM activities with models of project-based learning. By the end of the course, students will have various opportunities to evaluate curricula that have been developed for integrated STEM education as well as the procedures for developing a new STEM curriculum.

Sample Course Topics:

1) Understanding project-based integrated STEM curricula: The significance of integrated STEM project-based learning.
2) Examples of STEM project-based activities (e.g., we need a submarine, a green house, a bridge, an air cannon, a solar car, etc.) including designing, building, testing and delivering.
3) Role of each STEM discipline in integrated STEM education?
4) Real-life related problems and challenges for integrated STEM education. Practical reasoning and learning theories supporting STEM content concepts and skills.
5) Project based learning: applying research based instructional strategies to problem-posing, problem-solving, and project-based for integrated STEM activities.
6) Considerations for Teaching Integrated STEM Education: Learning processes involving modeling, inquiry and engineering design using material and technological resources:
7) Instructional materials to support integrated STEM curriculum with engineering practice and project based learning.

---

* This is the entry course for Graduate Certificate in Integrated STEM Education