Program Approval

I. General Information

A. Institution University of Kansas

B. Program Identification

Degree Level:	Master's
Program Title:	Secondary STEM Education
Degree to be Offered:	Master of Science in Education in Secondary STEM Education
Responsible Department or Unit:	School of Education and Human Sciences
CIP Code:	13.1205
Modality:	Direct Assessment: Competency-Based Online
Proposed Implementation Date:	

Total Number of Competencies for the Degree: 24 (Competency-Based Online)

II. Clinical Sites: Does this program require the use of Clinical Sites? Yes

School partnerships are an essential aspect of educator preparation at the University of Kansas. We have created mutually beneficial relationships with school districts in Kansas that include placing teacher candidates in PK-12 classrooms for field experiences and student teaching/internship experiences. The Secondary STEM Education program will utilize existing agreements with school districts in Kansas and establish new agreements with school districts across the United States for online students who are living and working outside of Kansas. The Secondary STEM program leads to Kansas teacher licensure following two pathways; 1) initial teaching license and 2) restricted teaching license. Students in the program, referred to throughout as teacher candidates, pursuing an initial teaching license will be placed in a school district in their region of Kansas for early program field experiences that are aligned with program competencies and for their final student teaching/practicum experience. Teacher candidates enrolled in the program with a restricted teaching license will be employed by a Kansas school district while completing the program. The Kansas school district that employees the Secondary STEM program teacher candidate will serve as the placement site for both early field experiences and the supervised final teaching practicum. It is expected that in year 1 of implementation, the Secondary STEM program will utilize 15-20 school districts for clinical site placements. In year 2 of implementation, it is anticipated that the program will utilize 25-30 school districts for clinical site placements. The Deans of public universities in Kansas meet quarterly and discuss clinical site placements in Kansas school districts. They cooperate on sharing access to Kansas school districts for those placements.

III. Justification

The School of Education and Human Sciences proposes a new Master of Science in Education to provide an alternative pathway to secondary STEM teacher licensure in Kansas. The proposed program is designed for working professionals in STEM industries or in STEM education-related fields to change careers with the purpose of meeting the growing demand for licensed secondary STEM teachers in Kansas and beyond.

KU offers STEM teacher education programs at the undergraduate level, but not at the graduate level. The MSE degree in Secondary STEM Education is a new KU STEM teacher education degree at the graduate level. The MSE in Secondary STEM Education seeks to provide individuals who hold a Bachelor's degree in a STEM field an alternative pathway to teacher licensure based on the individual demonstrating competency of the knowledge and skills necessary to be a highly qualified teacher in one or more STEM fields. The program is aligned with the Kansas State Department of Education professional education standards and leads to licensure in biology grades 6-12, chemistry grades 6-12, earth and space science grades 6-12, physics grades 6-12, and mathematics grades 6-12.

The Secondary STEM Education program provides teacher candidates with a broad foundation of education theory and practice. The curriculum incorporates thematic problems of teaching practice. As teacher candidates progress through the program, solution requirements for problems of teaching practice increase in authenticity and complexity. Throughout the program, teacher candidates justify their choice of instructional, student assessment, and classroom strategies using the science of learning.

This competency-based program will be 100% online, asynchronous, with opportunities for synchronous support. The proposed program is particularly innovative in that teacher candidates make progress based on their demonstration of competencies, at their own pace, that they apply in secondary STEM classrooms. Faculty and staff will mentor students as they progress through self-paced learning and assessments of learning. Teacher candidates can build on their prior experiences in STEM fields to transition to careers in teaching.

IV. Program Demand

Market Analysis

Science and mathematics are among the top five areas in Kansas with vacancies in teaching assignment (Kansas State Department of Education [KSDE], 2022). The STEM teacher shortage is a national issue and it disproportionately affects students in low-income urban and rural communities (Moritz and Weiss, 2018). Across the country, the number of STEM teachers teaching on emergency permits and waivers has increased over the last decade (Fuller, 2023, Heubeck, 2022, Zalaznick, 2023).

In the state of the Kansas, this program will be the first competency-based STEM teacher education degree program to be offered. The competency-based approach allows teacher candidates to demonstrate mastery of competencies and progress through the program when they are ready to be assessed rather than on a traditional semester timeframe.

V. Projected Enrollment for the Initial Three Years of the Program

Competency Based Degree	
Year	Total Enroll Per Year
Implementation	10
Year 2	15
Year 3	25

VI. Employment

According to a Lightcast report (2024), openings in the six-state region of Kansas, Illinois, Ohio, Michigan, Missouri and Minnesota are plentiful. Top cities with openings are Chicago, Kansas City, Minneapolis, and Indianapolis. For the most recent one-year period, there were more than 5,000 unique openings for math teachers and more than 2,000 unique openings for science teachers.

VII. Admission and Curriculum

A. Admission Criteria

Students must apply to KU and be admitted by the School of Education and Human Sciences. The following are admission criteria for the program:

1. A bachelor's degree in a subject area in STEM, a related interdisciplinary field, and/or have extensive working experience in STEM areas.
2. A minimum GPA of 2.5 in the content area.
3. A passing score for the Praxis II content exam in the content area for admission.
4. One official transcript of all college records with at least a cumulative 3.0 GPA on a 4.0 basis.

B. Curriculum

Total Number of Competencies ……. 24

The following competencies of the Secondary STEM Education program focus on learning outcomes that teacher candidates enrolled in the program learn. Assessment of the learning outcomes centers on performance-based, observable outcomes.

Productive Instructional Strategies: Apply research-based instructional approaches in light of your specific learners' experiences, goals, and contexts.

Supportive Environments: Apply research-based approaches that develop conditions that provide learners a sense of safety and belonging and that foster trust and strong relationships.

Social and Emotional Learning: Apply research-based approaches that develop and support the social-emotional skills, habits, and mindsets that lead to confident, independent learners.

Multi-tiered Systems of Support: Apply research-based approaches that leverage the multi-disciplinary resources, support teams, and personnel within and beyond the formal learning environment in order to meet the needs of learners and address learning barriers.

Research-informed Practices: Identify and evaluate research on evidence-based instructional practices.

Defining Outcomes for Assessment: Articulate learning outcomes informed by your content knowledge, your values, external educational standards, and your understanding of student needs.

Assessing for Learning: Document your students' progress over time in ways that are relevant, actionable, and transparent.

Assessment of Learning: Analyze student assessment data to identify student strengths and areas for growth to inform future instruction to meet the learning needs of the student group as a whole.

Designing Outcomes-Driven Learning Experiences: Design learning experiences that are purpose-driven and practicable—that invite students to travel paths they can follow toward goals worth reaching.

Designing Systems for Learning: Create and maintain classroom environments that maximize opportunities for learning.

Designing for Disciplinary Learning: Create and maintain classroom environments that maximize opportunities for learning.

Relating to Students: Learn about and interact with your students in ways that enable you to respond to the unique genius, needs, and motivations of individual students.

Individualizing Learning: Develop strategies to build skills, understandings, and dispositions that enable a diverse range of students to engage deeply with the subject matter.

Individualizing Learning: Students with Special Needs: Work with special needs students in ways that comply with relevant regulations, and work with all your students in ways that enable them to engage with the most important aspects of the learning experience.

Individualizing Learning: Multilingual Learners: Apply research-informed linguistic strategies to facilitate linguistic skill development of multilingual learners so they can engage deeply with the subject matter.

Building a Community of Trust: Build safe, supportive, stable learning communities where every student knows they will be respected and valued.

Leading Collaborative Learning: Enable your students—through preparation in advance and facilitation in the moment—to learn with and from each other.

Partnering with Caregivers: Partner with people who play significant roles in the lives of your students to ensure that students flourish inside and outside of school.

Collaborating for Change: Create a strong professional network with colleagues to benefit both your peers and yourself, as well as the learners in the schools.

Thinking Like a Designer: Make deliberate, human-centered, design choices through an iterative process to solve the range of challenges you face.

Learning to Improve: Engage in intentional and iterative cycle where you seek new information, utilizing feedback, engaging in critical reflection. out new ideas from a range of sources and use them to better your students' learning.

Understanding Historical Context of Inequity in STEM: Identify ways that STEM disciplines throughout history have facilitated the creation of system of oppression and inequity.

Culturally Affirming Curriculum Analysis: Analyze whether a curriculum is culturally sustaining and affirming.

Disrupting Inequity in your classroom: Implement classroom practices & policies that disrupt, rather than reinforce, inequitable societal patterns.

VIII. Core Faculty

Note: * Next to Faculty Name Denotes Director of the Program, if applicable
FTE: 1.0 FTE = Full-Time Equivalency Devoted to Program

Faculty Name	Rank	Highest Degree	Tenure Track Y/N	Academic Area of Specialization	FTE to Proposed Program
Imogen Herrick	Assistant Professor	PhD	Y	Science, Technology, Engineering, and Mathematics	.25
Connie Chow	Associate Research Senior	PhD	N	Science	.05

Douglas Huffman	Professor	PhD	Y	Science	.05
Carrie LaVoy	Teaching Professor	PhD	N	Mathematics	.25
Laurie Cleavinger	Teaching Professor	PhD	N	Science	.25
Massa Mafi	Postdoctoral Researcher	PhD	N	Science	.10

Number of graduate assistants assigned to this program **0**

IX. Expenditure and Funding Sources *[List amounts in dollars. Provide explanations as necessary. Please double-check the math.]*

A. EXPENDITURES	First FY	Second FY	Third FY
Personnel – Reassigned or Existing Positions			
Faculty	$65,000	$66,950	$68, 958
Administrators *(other than instruction time)*	$0	$0	$0
Graduate Assistants	$0	$0	$0
Support Staff for Administration (*e.g., secretarial*)	$0	$0	$0
Fringe Benefits *(total for all groups)*	$19,500	$20, 085	$20,687
Other Personnel Costs	$0	$0	$0
Total Existing Personnel Costs – Reassigned or Existing			
Personnel – New Positions			
Faculty	$0	$0	$0
Administrators *(other than instruction time)*	$0	$0	$0
Graduate Assistants	$0	$0	$0
Support Staff for Administration (*e.g., secretarial*)	$0	$0	$0
Fringe Benefits *(total for all groups)*	$0	$0	$0
Other Personnel Costs	$0	$0	$0
Total Existing Personnel Costs – New Positions			
Start-up Costs - One-Time Expenses			
Library/learning resources	$0	$0	$0
Equipment/Technology	$0	$0	$0
Physical Facilities: Construction or Renovation	$0	$0	$0
Other	$40,000	$0	$0
Total Start-up Costs	$40,000		
Operating Costs – Recurring Expenses			
Supplies/Expenses	$0	$0	$0

Library/learning resources	$0	$0	$0
Equipment/Technology	$0	$0	$0
Travel	$0	$0	$0
Other	$0	$0	$0
Total Operating Costs	$0	$0	$0
GRAND TOTAL COSTS	$124,500	$87,035	$89,645

B. FUNDING SOURCES *(projected as appropriate)*	Current	First FY (New)	Second FY (New)	Third FY (New)
Tuition / State Funds		$140,000	$350,000	$560,000
Student Fees		$0	$0	$0
Other Sources		$0	$0	$0
GRAND TOTAL FUNDING		$140,000	$350,000	$560,000
C. Projected Surplus/Deficit (+/-) (Grand Total Funding *minus* Grand Total Costs)		$15,500	$262,965	$470,355

X. Expenditures and Funding Sources Explanations

A. Expenditures
Personnel – Reassigned or Existing Positions

This program will be developed and be delivered by personnel in existing positions. Faculty in the School of Education and Human Sciences will provide instruction in the program. If student enrollment in the program grows beyond the workload capacity of existing personnel, new instructional faculty will be hired based on need and program revenue.

Personnel – New Positions
No new positions are anticipated during the first three years.

Start-up Costs – One-Time Expenses
Competency Based Expenditures: All of the competency-based curriculum must be developed and ready for enrollment before the first student begins the program. Due to this, the curriculum development, including creation of courses and competency assessments, will take place before the students begin the program. To support curriculum development, $40,000 has been designated for course and assessment development.

Operating Costs – Recurring Expenses
There are no anticipated additional operating costs associated with this program.

B. Revenue: Funding Sources
The MSE in Secondary STEM Education will be funded through tuition revenue. The tuition structure for

competency-based programs is based on a subscription rate model, where students pay a flat rate for a period of time and advance through as many program competencies as possible during that period of time. The subscription rate for a full-time student on this path is projected to be $14,000/year.

C. Projected Surplus/Deficit

It is expected that the program will generate a surplus during the first year of program delivery that will increase in years two and three. With the current enrollment estimates, the program is expected to have a revenue surplus. These funds will be utilized to support new faculty hires in years four and five as the program grows as well as to improve the program and the student experience.

XI. References

Fuller, E.J. (2023). The Decline Continues: The Dwindling Supply of Teachers from Pennsylvania Teacher Preparation Programs. University Park, PA. Penn State College of Education.

Heubeck, E. (2022). Emergency Certified Teachers: Are They a Viable Solution to Shortages? Education Week.

Kansas State Department of Education (KSDE, 2022). Teacher Vacancy and Supply. Updated to the Kansas Board of Education, October, 2022.

Lightcast™ (2024). Program Development & Review Secondary Education and Teaching (13.1205). Retrieved February 8, 2022.

Moritz, M. & Weiss, E. (2018). 4 Steps Toward Addressing the STEM Teacher Shortage. National Math + Science Initiative.

Zalaznick, M. (2023). Emergency Teaching License are Easing the Exodus, but What are the Risks? DA District Administration.