STEM Education Certificate of Proficiency
Annual Academic Assessment Report
2023-2024

Secondary STEM Education students have three program options:

1. Complete a Certificate of Proficiency in STEM Education — 9 credit hours
2. Complete a minor in STEM Education — 15 credit hours
3. Earn an Arkansas teaching license in Biology, Chemistry, Mathematics or Physics for grades 7-12 or Computer Science licensure in grades 4-12

Students who earn the Certificate in STEM Education can apply up to 9 hours toward the Minor in STEM Education. With the STEM Ed minor, students can apply up to 15 credit hours to the teacher licensure program for Math, Biology, Chemistry, Physics, or Computer Science if they decide to become teachers.

STEM Education Certificate of Proficiency

2023-24 Program Goals and Objectives

- To attract STEM majors to explore issues in STEM literacy and develop communication strategies from the field of education that will be beneficial to any STEM-related career.
- To increase the pool of potential teachers of STEM subjects to help address the critical shortage of teachers in math, science, and computer science at the secondary level.
- To increase enrollment in the STEM education courses to keep them viable and offered on a regular basis to ensure that the University of Arkansas will be able to continue to prepare math, science, and computer science teachers at the secondary level.

Learning Outcomes

- Students who earn this certificate in STEM Education will improve their ability to communicate STEM concepts from fields such as science, engineering, medical professions, mathematics
- Students who earn this certificate in STEM Education will be able to explain STEM topics in a way that engages a class or other audience, using research-based strategies.
- Students who earn this certificate in STEM Education will have a deeper understanding of how people learn math, science, and computer science.
- Students who earn this certificate in STEM Education will have an opportunity to explore their interests by choosing three elective courses relating to STEM education.

Results of Analysis of Assessment of Student Learning Outcomes

We realize that we need a better way to quantify student learning outcomes, or perhaps need to re-write the outcomes to match measurement. For now, students in the key classes for the STEM Ed CP (STEM 2003, STEM 1201, STEM 1212) had multiple opportunities to create and give presentations on STEM Topics, including some that were taught as lessons in local schools. In these classes, students engaged in many STEM-related group activities that model research-based ways for learning science and math in a way that deepens learning conceptually, and engage in discussions about STEM education and STEM literacy issues.

Process for Assessing each Student Learning Outcome

1. Timeline for assessment and analysis
    - Every May
2. Means of assessment and desired level of student achievement
    a. STEM Ed Certificate: students will complete 9 credit hours (from the approved course list) in order to receive the STEM Education Certificate
3. Reporting of results
    - CIED Head and Dean of COEHP

Any changes to the assessment process made or planned.

We realize that we need to better align our goals, learning outcomes, and assessment. Our goals are primarily focused on recruitment into the STEM 2003 course and enrollment into the CP. We need to do a better job of tracking the students who take our courses and keeping a record of which additional courses they are taking, to help monitor their progress toward the CP and the minor. We have given students google surveys to collect some of this information but need to revise surveys to collect the data in a way that is more comprehensive and retrievable.

Results of Analysis of Assessment of Program Goals

The main program goals for the 2023-24 academic year are listed below, with commentary on the meeting of those goals:

1. To attract STEM majors to explore issues in STEM literacy and develop communication strategies from the field of education that will be beneficial to any STEM-related career.

For 2024-25, we will tweak this goal to specify STEM 20003 enrollment, the one required course for the STEM ED CP. We offered 7 sections of this course instead of 6 sections the previous year and had approximately 200 students enroll.

2. To increase the pool of potential teachers of STEM subjects to help address the critical shortage of teachers in math, science, and computer science at the secondary level.

Six STEM Education students graduated with the STEM Education minor and teacher licensure in May 2024 compared to three who graduated in May 2023.

3. To increase enrollment in the STEM education courses to keep them viable and offered on a regular basis to ensure that the University of Arkansas will be able to continue to prepare math, science, and computer science teachers at the secondary level.

In summer, fall, and spring semesters, we have met with Fulbright support personnel Suzanne Wyatt and Michelle Pribbernow to coordinate ways to increase enrollment among Fulbright STEM majors. These efforts focus on course enrollment as well as declaring certificate, minor, and teacher licensure.

We were able to offer an additional section of STEM 1212 each semester of 2023-24. Thus had about 120 students take the 1 and 2 credit hour intro courses this past year. Several students declared the certificate from this group and enrolled in STEM 20003 for the fall.

In December 2023, we submitted an Enrollment Growth Plan to Matt Ganio (copied at the end of this document.

Any changes to certificate made on the basis of the assessment and analysis

- Responding to the popularity of STEM 2003 and the fact that it qualifies as a social science elective, we increased the number of Fall sections from 3 to 4 in Fall 2023. We kept the number of spring sections at 3 for Spring 2024. Approximately 200 students enrolled in seven sections of STEM 2003.
- The new course STEM 3403 STEM Teaching Experience was approved beginning Fall 2024. This course was designed to increase support to students who have been hired by the College of Engineering to teach the summer engineering camps to middle school/junior high students, and increase the likelihood that Engineering majors can complete the STEM Education Certificate of Proficiency. 2 students enrolled in the course Summer 2023 and 4 students are enrolled in the course for Summer 2024.
- ARSC 1201 and 1212 courses had a course prefix change to STEM 1201 and 1212 as of Spring 2024 (in conjunction with the move of the STEM Education program from Fulbright to COEHP July 1, 2023.) These 2 courses are commonly taken as electives for students pursuing the STEM Ed CP.

Conclusion

We have increased enrollment in the required course for the STEM Ed CP (STEM 2003/20003) and other 'feeder' courses (such as STEM 1201/12001 and STEM 12/12/12102)

Although we have not yet kept accurate enough records on how many STEM 2003 students have declared the STEM Ed CP have taken additional courses toward it, we have a list below (removed for privacy) of those who have declared the CP as of June 1, 2024. We will work on better ways to track students and monitor their progress on the STEM Ed CP.

Enrollment Growth Plan (submitted to Matt Ganio December 2023)

Rationale for the STEM Education certificate:

- Provides an abbreviated course of study for STEM majors to explore communication strategies used in education. Businesses value a STEM employee who can communicate complex ideas well.

- Provides a worthwhile 'end goal' for students who take a STEM Education intro course but do not want to become teachers, rather than leaving after taking one course

- The 'carrot' of the certificate encourages students to take more courses. The more classes they take, the more they may consider becoming a math, science, or computer science teacher. (Courses in the certificate can be applied to the STEM Education teacher licensure program.)

In talking with students, STEM Education faculty hear that students are interested in taking courses to earn the STEM Education certificate. However, few students have actually declared the certificate. Furthermore, the first senior to potentially earn the certificate graduated in May 2023 having declared the certificate and taken the necessary courses, but must not have applied for it to go on the transcript because records indicate that no one has graduated with the certificate. Here is a plan to address these two concerns (some of this is already in the works):

1) In key classes (STEM 1201, 1212, 2003, 2103 and BIOL/CHEM/PHYS 3273), show students during class time how to declare the certificate and have them do it in class.

- Fulbright students: Guide them to Program Update Form on Fulbright Advising website

- College of Engineering students - students can not enroll directly. Contact Denise Rogers to find out best way to streamline this (e.g., generate a list of students)

- Find out the certificate declaring process for COEHP, and others

2) Add to STEM.uark.edu website: directions for declaring certificate and applying at graduation.

3) Continue to inform college advisors on certificate option and get their support in encouraging students to declare and to continue taking courses toward the certificate.

4) Track the course progress of students who have declared the certificate (name, email, phone, I.D. #, major, expected graduation date, courses recommended and taken). Divide up the certificate students among 3 STEM Ed faculty serving as mentors/advisors to support their progress through the program. Email suggestion of 'next course' at registration time. Email reminders to apply for certificate when applying for graduation.

5) Continue to advertise the STEM Education program options through emails to STEM major listserv, articles in Arkansas News. Improve messaging on website.

6) Ask students what barriers they have encountered in declaring and completing the certificate

STEM Education Program Goals		
Academic Year	**of Students who declare STEM Ed Certificate**	**f Students graduating with STEM Ed rtificate**
2024-25	10	At least 4
2025-26	10	At least 4
2026-27	10	At least 4