

Proposed Title: Master of Science in Computer Science

Proposed Effective Date: Fall 2020

I. Justification/Need

The Arkansas Tech Department of Computer and Information Science is proposing to phase out the Master of Science in Information Technology (MS.IT) in favor of a Master of Science in Computer Science (MS.CS). The proposed changes will update the current master's program without requiring additional resources. The proposed MS.CS will allow students three options: the MS.CS with no track selected, MS.CS Data Science track, and MS.CS Information Technology track:

- **MS.CS (no track selected).** Graduates are grounded in the principles of Computer Science and are adept at building large-scale software using modern tools and techniques of software engineering.
- **MS.CS Data Science.** Graduates are capable of applying statistical and scientific methods to derive, analyze, and interpret information inferred from diverse sets of data.
- **MS.CS Information Technology.** Graduates are capable of defining, maintaining and administrating computer-based systems, especially in the areas of networking, database, and web administration.

The MS.CS degree will enable students to extend their technical undergraduate degree with further specialization. The benefit and demand for the MS.CS degree are described in the following sections.

Economic Benefit to the State of Arkansas

Computer scientists are in demand and provide a strong economic benefit to the state of Arkansas. In the 2018 report entitled "Estimating the Employment, Wage, and Tax Impacts of

Engineering and Computer Science Professionals in Arkansas and the Returns to Investing in Engineering and Computer Science Graduates”, it is estimated that 690 engineering and computer science jobs need to be filled in Arkansas each year. Further, in 2016 there were 11,075 computer scientists employed in the state of Arkansas with an average wage of \$74,010. This report concludes investing in producing additional computer scientists in the state of Arkansas would have a significantly favorable cost-benefit ratio.

Employer Interest

The Bureau of Labor Statistics suggests "Computer and Information Technology Occupations" are projected to grow 12% from 2014 to 2024, faster than the average for all occupations. These occupations are expected to add about 488,500 new jobs, from about 3.9 million jobs to about 4.4 million jobs from 2014 to 2024, in part due to a greater emphasis on cloud computing, the collection and storage of big data, the Internet of things, and the continued demand for mobile computing. Further, the median annual wage for Computer and Information Technology occupations was \$81,430 in May 2015, which was higher than the median annual wage of all occupations of \$36,200. Specifically for Arkansas, the Bureau of Labor Statistics indicates that nearly 20% of the workforce in Arkansas work in the area of "Computer and Mathematical Operations" and that is likely to increase.

The report entitled "Program Opportunity Analysis for Arkansas Tech University" delivered by the EAB consulting firm to Arkansas Tech University identified three areas of development for new master's programs, one of which was a Master of Science in Computer Science. It indicates that in October 2015-September 2016 that the demand for Computer Science professionals spans industries and there were over 4,000 job postings for graduates with master's degrees in Computer Science.

As of March 6, 2019 LinkedIn lists over 1,000 jobs that reference Computer Science in Arkansas. Graduates with MS.CS degrees would be prime candidates for many of these positions.

Student Interest

Analysis of recent applications to our current graduate program in Information Technology reveals that the majority of applicants are actually interested in a graduate degree in Computer Science. This is especially true among international applicants. Further, current undergraduate and graduate students in our program are largely in favor of these changes.

II. Curriculum

The MS.CS degree will consist of a required 10 courses (30 hours), regardless of whether a track is selected or not. The following three subsections detail the curriculum for the MS.CS (no track selected), the MS.CS Data Science track, and the MS.CS Information Technology track.

a. MS.CS (No Track)

Operating Systems (CS 5703)

Research Methods (CS 6003)

Software Engineering (CS 6103)

Database Development (CS 6203)

Parallel Processing (CS 6703)

2 Sequence Capstone (project or thesis)

3 electives

b. MS.CS Data Science Track

Introduction to Data Science (CS 5023)

Research Methods (CS 6003)

Data Mining (CS 6023)

Software Engineering (CS 6103)

Database Development (CS 6203)

2 Sequence Capstone (project or thesis)

3 electives

c. MS.CS Information Technology Track

The UNIX Operating System (CS 5503)

Research Methods (CS 6003)

Database Development (CS 6203)

Database Administration (CS 6213)

Network Administration (CS 6703)

2 Sequence Capstone (project or thesis)

3 electives

Each student must complete a two course capstone thesis or project:

- Capstone: Thesis I (CS 5993) and Thesis II (CS 6993) or Project I (CS 5893) and Project II (CS 6893)

Electives include:

- Courses from track(s) not selected by the student
- Systems Analysis and Design (CS 5033)
- IT Project Administration (CS 5063)
- UNIX Administration (CS 5813)
- Special Topics I (CS 5983)
- Information Systems Analysis and Design (CS 6403)
- Cyber Security (CS 6713)
- Internship (CS 6803)

- Special Topics II (CS 6903)

III. Cost

There are no anticipated additional costs with starting this program. Currently we offer approximately seven graduate courses in the department per semester and we will continue to do so with the new proposal. The resources for the current MS.IT program will be used to implement the proposed degree. The current degree will be phased out within two years of beginning the new program to allow currently matriculated students to complete their degree or to switch to the new degree. Numerous courses offered in the new MS.CS program will substitute for courses in the current MS.IT program to allow a minimum impact to students during the transition.

IV. Enrollment

Conservatively, the new program should draw at least as many students as the current MS.IT degree. However, there is an expectation that the “Computer Science” title, flexibility of the areas of concentration, and the reduction from 36 to 30 hours, will increase enrollment.