

*Building Missouri's future
by degrees*

NEW PROGRAM FORM

1. Submitted by: Missouri State University
2. Program Title: Computer Science
3. Degree/Certificate: Master of Science
4. Options: None
5. Delivery Site(s): Springfield, MO
6. CIP Classification: 11.0701
7. Implementation Date: Fall, 2017
8. Cooperative Partners: None

AUTHORIZATION

Dr. Frank Einhellig, Provost

Name/title of Institutional Officer

Frank Einhellig

Signature

2/16/17

Date

Dr. Julie Masterson, Associate Provost

Person to Contact for More Information

417-836-5335

Telephone Number

STUDENT ENROLLMENT PROJECTIONS (Form SE:)

	Year				
	1	2	3	4	5
Full Time	50	100	100	100	100
Part Time	5	5	5	5	5
Total	55	105	105	105	105

1. Please provide a rationale regarding how student enrollment projections were calculated
 Student enrollment was based on our analysis of market and societal demand (see below) and our institutional resources. Other institutions in the Midwest region have seen very large enrollments over the past few years in Computer Science MS programs. Interest is high from international students, and MSU international recruiters have indicated that we could easily fill a program with at least one hundred students.
 The evidence discussed in the following section documents that we will have sufficient student demand to enroll at least 50 new students per year, and our existing and new departmental resources (see Section 5) will allow us to support 100 graduate students while maintaining our quality, accredited undergraduate program.

2. Provide a rationale for proposing this program, including evidence of market demand and societal need supported by research (i.e., please cite sources for evidence used).

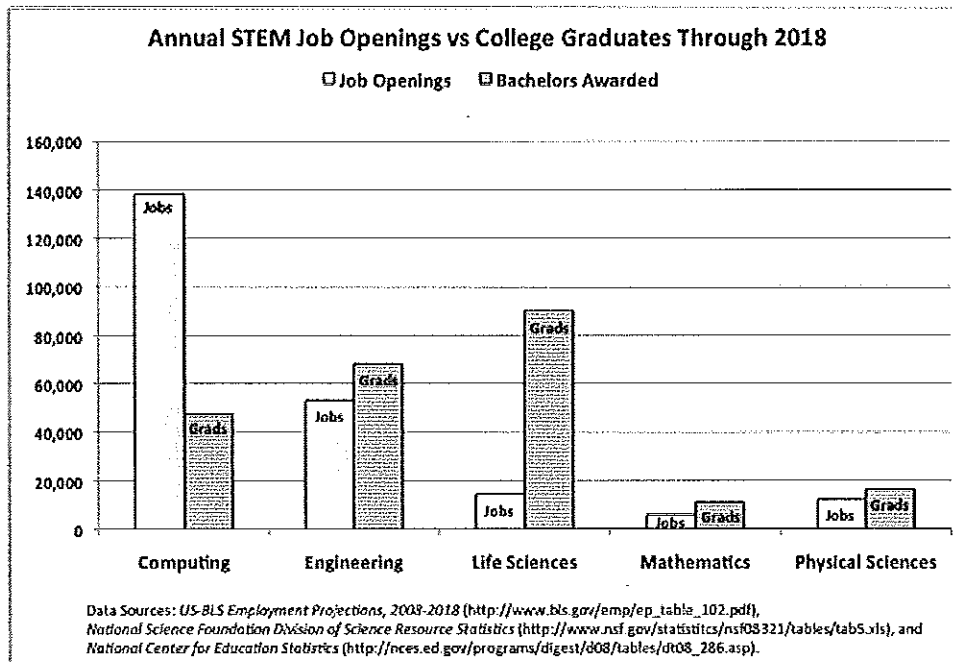
a. Market Demand:

Current data show that there are consistent, increasing demands for master’s degrees in Computer Science. For example:

“On a per-department basis, CS master’s degree production in U.S. Computer Science departments rose nearly 25% in 2014-15. . . Both public and private departments reported large increases. . . For departments at public institutions, this represents the fourth straight year of increases. This suggests further increased production of master’s degrees in the next couple of years.”Source: 2015 Taulbee Survey, p. 12-16.

“In 2012-13, American institutions conferred more than 751,000 [Master’s] degrees, according to the Department of Education. That was a 45-percent increase from the 2002-03 academic year. . . Math, computer science, engineering, and health sciences are doing well,with international students driving a lot of the growth.” Source: Master’s-Degree Programs Specialize to Keep Their Sheen, Chronicle of Higher Education, September 14, 2015.

Employment data from a variety of sources (US Bureau of Labor Statistics, 2015; Executive Office of the President of the United States, 2012) indicate a major increase in the demand for Computer Science professionals.



In Missouri, two of the three occupations with the highest number of 2015 job postings were related to software development, as were the six STEM occupations with the highest projected number of 2012-2022 openings. Source: Missouri Economic Research and Information Center (MERIC), "2015 Missouri Economic Report," "STEM Occupations Top Openings, 2012-2022."

In the Ozark region, professional, scientific, and technical services accounted for the majority of new businesses established. Many new businesses focused on computer system design services and management as well as technical consulting services. Source: 2015 Missouri Economic Report, from Missouri Economic Research and Information Center (MERIC), Missouri Department of Economic Development.
https://www.missourieconomy.org/pdfs/2015_mo_economic_report.pdf

b. Societal Demand (i.e., factors other than employment indicating need for degree)

In addition to the positive outlook for employment, positions in Computer Science pay extremely well, providing opportunities for Missouri and U.S. workers to embark on dynamic careers, enjoy a good standard of living, and contribute to the innovation that drives the country's economic growth

PROGRAM STRUCTURE (FORM PS):

1. Total credits required for graduation: 30 credit hours
2. Residency requirements, if any: The Graduate College limits transfer credit to no more than 30% of the required hours for the degree. There are no current plans to offer online courses, so residency and in-person attendance are implicitly required.
3. General education: Total credits: Not applicable
4. Degree requirements (includes required, electives, thesis, capstone, internship): Total credits: 30 credit hours. List of classes that contribute to this total:

Course ID	Course Title	Credits
CSC 611	Algorithms and Advanced Data Structures	3
CSC 612	Advanced Database System Concepts	3
CSC 613	Computer Systems Fundamentals	3
CSC 615	Advanced Internet Programming	3
CSC 621	Compiler Construction	3
CSC 625	Computer Graphics	3
CSC 626	Methods of Optimization	3
CSC 635	Data Mining	3
CSC 640	Introduction to Artificial Intelligence	3
CSC 645	Computer Speech Music and Images	3
CSC 655	Software Quality Assurance and Project Management	3
CSC 665	Computer Networks	3
CSC 667	Mobile Computing Applications	3
CSC 687	Computing for Bioinformatics	3
CSC 690	Advanced Topics in Computer Science	3
CSC 696	Special Readings	3
CSC 701	Seminar I	1
CSC 702	Seminar II	2
CSC 735	Data Analytics	3
CSC 742	Evolutionary Computing	3
CSC 745	Advanced Multimedia Programming	3
CSC 746	Human Computer Interaction	3
CSC 747	Multimedia Communications	3
CSC 765	Ubiquitous Computing and Internet of Things	3
CSC 796	Science Internship	1-6
CSC 798	Research in Computer Science	1-4
CSC 799	Thesis	1-6

Thesis track, total 30 credit hours. At least 15 credit hours must be at the 700-level.

3 credit hours	Required courses CSC 701(1), 702(2)
21 credit hours	Elective courses, such that at least 12 credit hours are at the 700-level, and that a maximum of 9 credit hours are in CSC 796, 798, and 799 combined. (Note: Up to 6 credit hours of coursework from other departments may be allowed in these electives if approved by the Computer Science Dept.)
6 credit hours	CSC 799 Thesis

Project track, total 30 credit hours. At least 15 credit hours must be at the 700-level.

3 credit hours	Required courses CSC 701(1), 702(2)
24 credit hours	Elective courses, such that at least 12 credit hours are at the 700-level, and that a maximum of 9 credit hours are in CSC 796, 798, and 799 combined. (Note: Up to 6 credit hours of coursework from other departments may be allowed in these electives if approved by the Computer Science Dept.)
3 credit hours	CSC 798 Project

Course-only track (non-thesis), total 30 credit hours. At least 15 credit hours must be at the 700-level.

3 credit hours	Required courses CSC 701(1), 702(2)
27 credit hours	Elective courses, such that at least 12 credit hours are at the 700-level, and that a maximum of 9 credit hours are in CSC 796, 798, and 799 combined. (Note: Up to 6 credit hours of coursework from other departments may be allowed in these electives if approved by the Computer Science Dept.)

5. Any unique features such as interdepartmental cooperation:
None required. However, up to 6 credit hours of coursework from other departments may be allowed as electives is approved by the Computer Science Department.

PROGRAM CHARACTERISTICS AND PERFORMANCE GOALS (FORM PG):

Institution Name: Missouri State University
Program Name: Master of Science in Computer Science
Date: Projected start date: Fall, 2017

(Although all of the following guidelines may not be applicable to the proposed program, please carefully consider the elements in each area and respond as completely as possible in the format below. Quantification of performance goals should be included wherever possible.)

1. Student Preparation

- a) Any special admissions procedures or student qualifications required for this program which exceed regular university admissions, standards, e.g., ACT score, completion of core curriculum, portfolio, personal interview, etc. Please note if no special preparation will be required. *The admissions GPA criteria for this program are not unusual and do not exceed typical university admissions standards, but since they are specific values they are listed here.*

Admissions criteria:

1. Accelerated program

The Accelerated Master's Program option provides an opportunity for outstanding undergraduate students to begin their graduate course work during their senior year. To be eligible to apply for admission to this program, an MSU undergraduate student must be pursuing a BS in Computer Science or closely related field such as Math or Physics, have completed CSC 232 and MTH 215, and have a GPA of 3.5 or higher in all courses required for the undergraduate major. An eligible student may apply for admission during the second semester of the junior year.

If accepted into the accelerated program, up to a maximum of 9 hours of 600/700 level CSC courses taken after admission into the program may be given credit for both undergraduate and graduate programs.

A student is fully admitted to the Graduate College upon completion of the requirements for the baccalaureate degree. All requirements for the master's program must be met for graduation from the master's program.

Before enrolling in a course to be counted as both undergraduate and graduate credit and to count the course toward the master's degree, an undergraduate student must be accepted into the accelerated program and receive prior approval from the graduate program advisor, department head of the undergraduate program, and the dean of the Graduate college. Acceptance into the program and all approvals must be completed prior to the end of the Change of Schedule Period for the course(s). See the Graduate College for further information.

2. Standard program

An applicant will be considered for standard admission with a BS in Computer Science or closely related field (e.g., Computer Engineering, Math, Electrical Engineering, Software Engineering) and undergraduate-level courses equivalent to MSU CSC 232 and MTH 215 from an accredited university.

GPA and test score requirements for admission:

- *Undergraduate GPA of 3.0 on a 4.0 scale, or 3.0/4.0 in the most recent 60 credit hours*

- *GRE: a combined score of 305 on the verbal and quantitative sections of the Graduate Record Examination.*
- *Proof of English Proficiency: International applicants whose native language is not English and do not have a U.S. degree are required to have a score on the TOEFL of 79 or higher (internet-based test) or an IELTS score of 6.0 or higher. The requirement for a TOEFL or IELTS score may be waived for applicants who meet one of the following: (i) are native English speakers or (ii) have completed a minimum of 60 semester credit hours from an accredited college or university in the U.S.*

b) Characteristics of a specific population to be served, if applicable.
Not applicable

2. Faculty Characteristics

a) Any special requirements (degree status, training, etc.) for assignment of teaching for this degree/certificate.

The Department of Computer Science accepts the criteria, as determined by the Graduate Council, for appointment to the Graduate Faculty:

- Terminal degree in Computer Science or a related field (PhD or equivalent)
- Minimum of three scholarly publications (or equivalent) in hand
- Approval by majority vote of the Department of Computer Science Graduate Faculty

The department further recognizes that, in the rapidly changing field of computer science, conferences have become an accepted primary means of disseminating knowledge. Therefore, the department makes no distinction between peer-reviewed papers published in conference proceedings and journal publications.

- b) Estimated percentage of credit hours that will be assigned to full time faculty. Please use the term "full time faculty" (and not FTE) in your descriptions here.
We estimate that all of MS CS graduate program credit hours will be assigned to full time faculty; however, adjunct faculty with appropriate credentials may occasionally offer courses
- c) Expectations for professional activities, special student contact, teaching/learning innovation.

Each faculty member is expected to allocate time and effort to a wide range of teaching, research/scholarship, and service obligations that promote the mission and goals of the University, college, and department. These expectations are fully described in the Computer Science Dept. Promotion and Tenure Plan.

Teaching effectiveness by faculty is vital to the development and enhancement of the intellectual quality and academic integrity of the University. Teaching activities include high quality instruction at the Undergraduate and Graduate level, Instructional Development, attendance at conferences and workshops or other professional development activities, innovations in the effective use and development of instructional technology and resources to promote active student learning, academic advising services, guidance and supervision of student projects, theses, internships, or co-operative work experiences, involvement in student organizations and activities promoting faculty-student interaction, involvement in activities to promote departmental programs and services to prospective students, and other pedagogical activities that contribute to effective teaching.

Research activities in the MSU Computer Science Department are expected to contribute to the theory or practice in the broadly-defined field of computer science through four recognized forms of scholarship: discovery, integration, application and teaching. We believe that students benefit from knowledge of areas of current topics of research. Whenever possible, faculty members should offer students an opportunity to participate in their research activities.

The department defines service as performance of departmental, college, university, and professional activities which fall into three domains: involvement in the University's shared governance, professional expertise shared with the internal and external community, and contributions to a faculty member's profession.

3. Enrollment Projections

- a) Student FTE majoring in program by the end of five years.
We estimate 105 student FTE by the end of 5 years.
- b) Percent of full time and part time enrollment by the end of five years.
95% of the students will be full time and up to 5% may be part time.

4. Student and Program Outcomes

- a) Number of graduates per annum at three and five years after implementation.
We project 50 graduates per annum at Year 3 and Year 5.
- b) Special skills specific to the program.
The Student Outcomes of the MS CS degree program are that graduates are expected to be able to:
 - Design algorithms to solve specific problems
 - Present technical information to an audience
 - Apply techniques from CS research to develop software solutions
 - Conduct research in computer science
- c) Proportion of students who will achieve licensing, certification, or registration.
Licensing, certification, or registration are not common for software development professionals. The estimated number of students is zero.
- e) Performance on national and/or local assessments, e.g., percent of students scoring above the 50th percentile on normed tests; percent of students achieving minimal cut-scores on criterion-referenced tests. Include expected results on assessments of general education and on exit assessments in a particular discipline as well as the name of any nationally recognized assessments used.
Not applicable
- f) Placement rates in related fields, in other fields, unemployed.
Demand for computer software professionals is high, as job demand in CS far exceeds the number of graduates. The estimated placement rate in CS-related fields is 95%, in other fields 5%, unemployed 0% (See Demand Section above).
- g) Transfer rates, continuous study.
Transfer rates are expected to be low because of the relatively short time to completion of the MS degree program.

5. Program Accreditation

- a. Institutional plans for accreditation, if applicable, including accrediting agency and timeline. If there are no plans to seek specialized accreditation, please provide reasons.

The MSU Computer Science undergraduate program has been accredited by the Computing Commission of ABET, www.abet.org, since 1989 (including accretor mergers).

ABET does not offer an accreditation process for MS degrees, and we do not expect to seek other accreditation for the MS CS degree. Nonetheless, we expect to use the same practices in development, delivery, and assessment of the graduate degree program

6. Alumni and Employer Survey

- a) Expected satisfaction rates for alumni, including timing and method of surveys.

Similar to the methods used in our ABET-accredited undergraduate program, we will set an initial goal for satisfaction rate outcomes, collect assessment data at regular intervals, analyze the data, and take appropriate action in order to seek continuous improvement.

Initially, we will set goals of 80% satisfaction rates for alumni of this MS program and 80% satisfaction rates for employers of graduates. Our existing process for continuous improvement is a two-year assessment cycle, allowing sufficient time between surveys for changes to take effect. We will conduct biannual online surveys of graduates and employers to obtain outcome satisfaction data.

- b) Expected satisfaction rates for employers, including timing and method of surveys.
See previous response.

7. Institutional Characteristics

- a. Characteristics demonstrating why your institution is particularly well-equipped to support the program.

Missouri State University is a comprehensive institution offering undergraduate and graduate programs, and has a statewide legislative mandate in public affairs.

Missouri State University has recently completed a Long Range Plan 2016-2021, which includes the following statements:

- *Missouri State University will provide students with choices from an array of academic programs, research options and opportunities to connect in meaningful ways, all of which will help them succeed and fulfill their dreams.*
- *Missouri State is committed to initiating new academic programs to meet societal needs, embracing new delivery systems to respond to student desires and addressing requirements of employers — all without compromising academic rigor and integrity.*
- *Goal: Expand graduate programs to serve distinctive regional, national and international needs.*

MSU Computer Science undergraduate program has been accredited by the Computing Commission of ABET, www.abet.org, since 1989 (including accretor mergers). Although ABET does not offer an accreditation process for MS degrees, we expect to use the same practices in development, delivery, and assessment of the graduate degree program.

The proposed MS Computer Science program has the support of Missouri State University administration and faculty, and supports the university goals.

The region of southwest Missouri has a developing number of companies and businesses with a primary focus or reliance upon software development. Springfield is the third-largest city in the state, and there is no existing MS-level CS program to support the career development and further-education needs of area CS professionals.