



NEW PROGRAM PROPOSAL FORM

Sponsoring Institution(s): University of Central Missouri

Program Title: Software Engineering

Degree/Certificate: Bachelor of Science

Options: None

Delivery Site(s): Main Campus in Warrensburg, Missouri and Central Summit Campus in Lee's Summit, Missouri

CIP Classification: 14.0903

Implementation Date: Fall 2017

Cooperative Partners: None

AUTHORIZATION:

Dr. Kim Andrews, Vice Provost for Academic Programs and Services

09/24/2016

Name/Title of Institutional Officer

Signature

Date

Dr. Xiaodong Yue, yue@ucmo.edu

660-543-4930

Person to Contact for More Information

Telephone

Rationale for the B.S. in Software Engineering Program

Over the past thirty years, the practices of everyday life have become increasingly infused with and mediated by software. The capacities and growing pervasiveness of software make it the lifeblood of today's emerging information society. Software is shaping our world from all aspects of our lives, from the launch of billion-dollar spacecraft to more mundane work such as measuring and displaying time, controlling traffic lights, and monitoring the washing of clothes. Indeed, whatever the task-domestic chores, paid work, shopping, traveling, communicating, governing, playing - software increasingly makes a difference as to how social and economic life takes place, and enables members of society to work more efficiently. To maintain a competitive edge, industry and commerce continue to make creative engineering advances as well as produce high quality products. More than ever, there is a demand for a highly prepared work force with Software Engineering training that is enabled to deliver quality software and innovation. The proposed B.S. in Software Engineering program will prepare our students in a much-needed area and is well aligned with the University of Central Missouri's mission of preparing students with the knowledge, skills and confidence to succeed and lead in the region, state, nation and world.



STUDENT ENROLLMENT PROJECTIONS

Year	1	2	3	4	5
Full Time	15	25	35	45	55
Part Time	5	5	5	5	5
Total	20	30	40	50	60

Please provide a rationale regarding how student enrollment projections were calculated:

Due to the high market demand in the region and an insufficient number of software engineers available to fill the open positions, the program is expected to grow and achieve the above projection. In addition, as shown in Table 6, the average enrollment of several ABET accredited Software Engineering programs from master level institutions is more than 100, we expect a similar enrollment for the proposed program. ABET is an internationally recognized accrediting body for colleges and universities programs in the disciplines of applied science, computing, engineering, and engineering technology.

Provide a rationale for proposing this program, including evidence of market demand and societal need supported by research:

Background

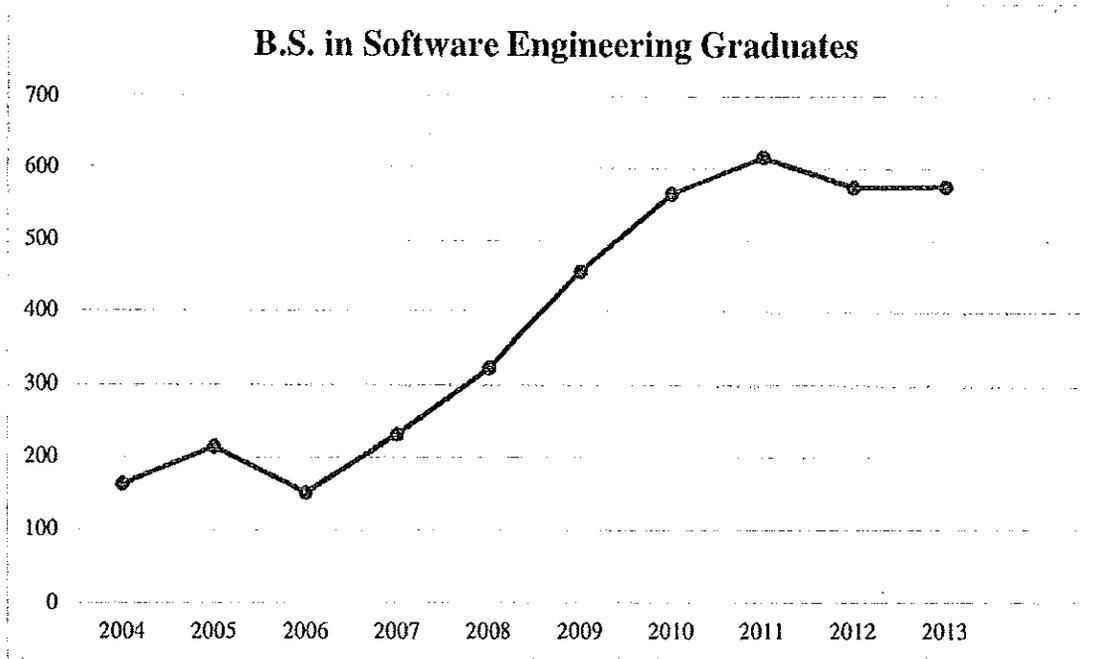
In the decades since the 1960s, Association of Computing Machinery (ACM), along with leading professional and scientific computing societies, has endeavored to tailor curriculum recommendations to the rapidly changing landscape of computer technology. Computing Curricula 2005: The Overview Report, published by ACM in 2005, provides undergraduate curriculum guidelines for five defined sub-disciplines of computing [1]. Table 1 lists the definitions for Computer Science and Software Engineering. While computer science (like other sciences) focuses on creating new knowledge, software engineering (like other engineering disciplines) focuses on rigorous methods for designing and building things that reliably do what they're supposed to do. In addition to its computer science foundations, software engineering also involves human processes that, by their nature, are harder to formalize than are the logical abstractions of computer science. Experience with software engineering courses within computer science curricula showed many that such courses can teach students about the field of software engineering but usually do not succeed at teaching them how to be software engineers [1].

Table 1 Definition for Computer Science and Software Engineering - Computing Curricula 2005:
 The Overview Report [1]

Computer Science	Software Engineering
Computer Science spans a wide range, from its theoretical and algorithmic foundations to cutting-edge developments in robotics, computer vision, intelligent systems, bioinformatics, and other exciting areas.	Software Engineering is the discipline of developing and maintaining software systems that behave reliably and efficiently, are affordable to develop and maintain, and satisfy all the requirements that customers have defined for them.

The history of Software Engineering education is a story of academics struggling to fulfill industry needs with little support from computer science curriculum designers [2]. Most practicing software engineers do not have a degree in Software Engineering, but rather in Computer Science and some other related discipline. In the United States, degree programs in software engineering, designed to provide a more thorough foundation than can be provided within computer science curricula, began to emerge during the 1990s. The Department of Education published data regarding the number of students receiving a bachelor's degree in Software Engineering in the Digest of Education Statistics [3]. The report shows an upward trend (see Figure 1 below).

Figure 1 The Number of Students Receiving a Bachelor's Degree in Computer Software Engineering (source: Digest of Education Statistics).





While these statistics indicate solid growth in the number of bachelor's degrees granted, the number of Software Engineering graduates is still extremely small when compared with the number of software engineers needed in the workforce. Details regarding market demand are described in the next section.

In 2004, the Institute of Electrical and Electronics Engineers (IEEE) Computer Society published *The Guide to the Software Engineering Body of Knowledge (SWEBOK)* which describes generally accepted knowledge about software engineering, and continuously revised and updated to the most recent version SWEBOK 3.0 in 2014 to accompany the change of practices, body of knowledge, etc. [4]. In order to create curriculum recommendations in several computing disciplines including Software Engineering, the ACM Education Board and the IEEE Computer Society also prepared the undergraduate curriculum guidance on software engineering (SE2004 & SE2014) [5] for institutions of higher education.

Due to the high demands for software engineers, the School of Computer Science and Mathematics at the University of Central Missouri (UCM) is requesting approval for a new program, a B.S. in Software Engineering degree. The proposed addition is important to the UCM School of Computer Science and Mathematics' continuing efforts to enhance its contributions to prepare the 21st century technical workforce in a STEM field of national interest.

Market Demand

This program will be the first of its kind in Missouri to cater to the growing market demand of skilled software engineering professionals. A quick job search on June 26th on *indeed.com* for software engineer returned 332 open positions in Missouri, just for the month of June alone, many of which are in the St. Louis and Kansas City area [6].

The job outlook for software engineers is very positive. Growth will increase much faster than average compared to other U.S. occupations. The demand is expected to increase due to a large need for computer software used in industries like mobile technology and healthcare computer systems [7].

According to The Bureau of Labor Statistics [8], the overall employment of software engineers is projected to grow by 17 percent from 2014 to 2024. In particular, employment of applications software developers is projected to grow 19 percent, and employment of systems software developers is projected to grow 13 percent.

The following are the employment projections for different software developers [8]:

- Applications Software Developers: 2014 employment -- 718,400; projected 2024 employment – 853,700; 19% change from 2014-2024
- Systems Software Developers: 2014 employment – 395,600; projected 2024 employment– 447,000; 13% change from 2014-2024

Figure 2 Total U.S. STEM Jobs Through 2024, U.S. Bureau of Labor Statistics [9]

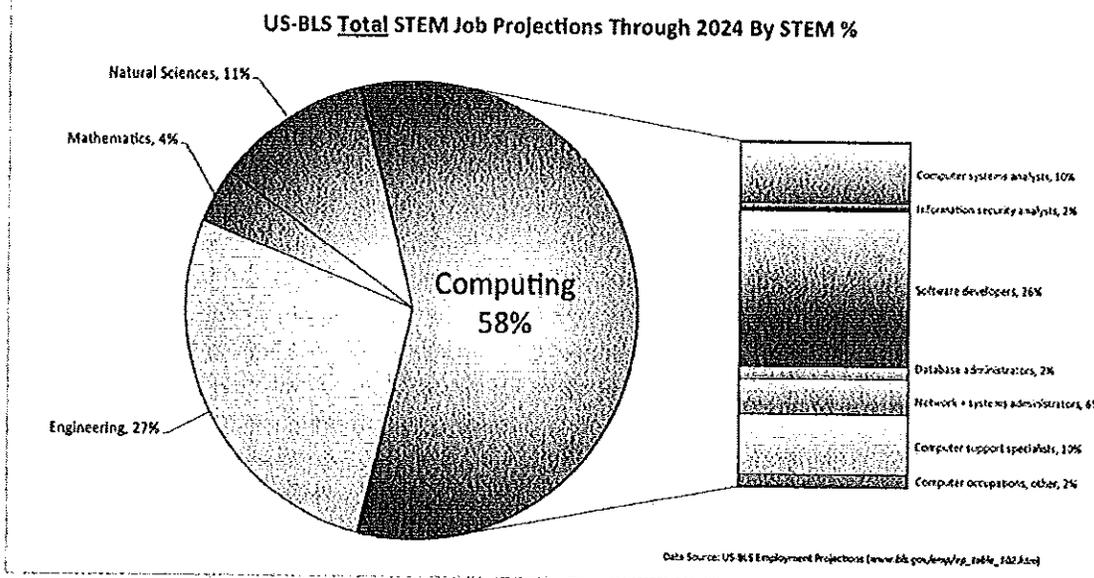


Figure 2 shows the distribution of total U.S. STEM jobs through 2024. 58% of total STEM jobs in U.S. are computing related. Among all computing jobs, 26% of the jobs are in software development. In other words, there will be nearly as many openings in software development as there will be in all the branches of traditional engineering combined [9]. Figure 3 shows the distribution of U.S. new STEM jobs through 2024. There is an expectation that 76% of new STEM jobs in U.S. will be computing related. As can be seen in the chart, the U.S. Bureau of Labor Statistics is predicting 31% of the new STEM jobs will be in software development (aka software engineering) alone as compared to 11% in the combined branches of traditional engineering.

Figure 3 U.S. New STEM Jobs Through 2024, U.S. Bureau of Labor Statistics [9]

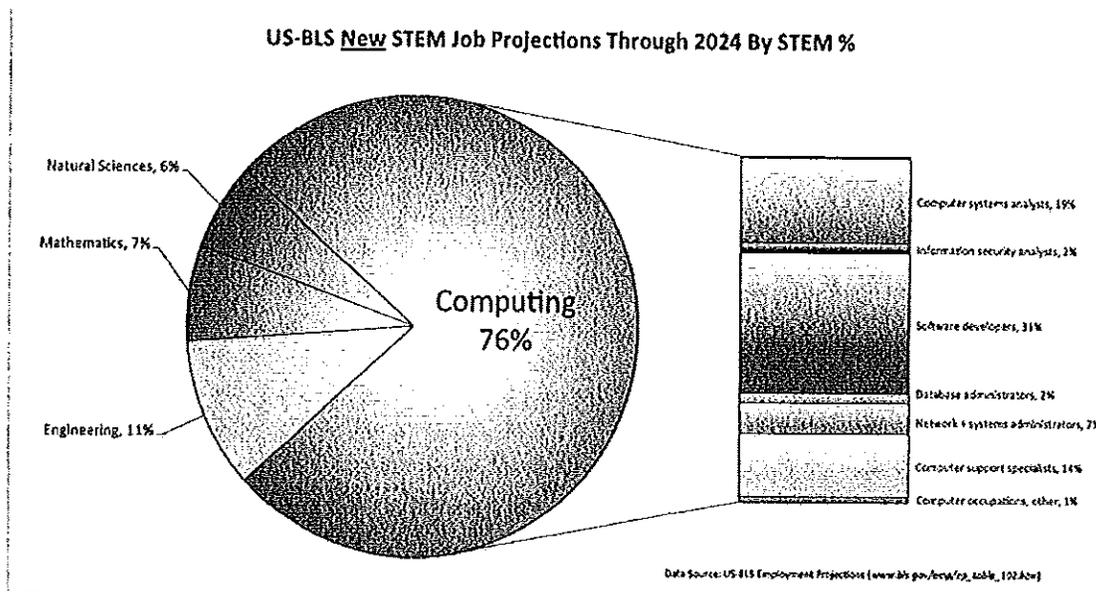




Table 2 lists the top 10 occupations in US with the most openings 2014-2024. Applications software developer is ranked No. 6. Similar to the national trend, applications software developer is ranked No. 8 in Missouri for the top 10 occupations with the most openings 2012-2022.

Table 2 Top 10 Occupations with the Most Openings in US, 2014-2024 (www.careerinfonet.org)

#	Occupation	Employment 2014	Projected Annual Job Openings
1	Registered Nurses	2,751,000	108,840
2	General and Operations Managers	2,124,100	68,880
3	Accountants and Auditors	1,332,700	49,800
4	Elementary School Teachers, Except Special Education	1,358,000	37,870
5	Secondary School Teachers, Except Special and Career/Technical Education	961,600	28,400
6	Software Developers, Applications	718,400	23,800
7	Management Analysts	758,000	20,850
8	Computer Systems Analysts	567,800	19,160
9	Middle School Teachers, Except Special and Career/Technical Education	627,500	17,550
10	Financial Managers	555,900	16,930

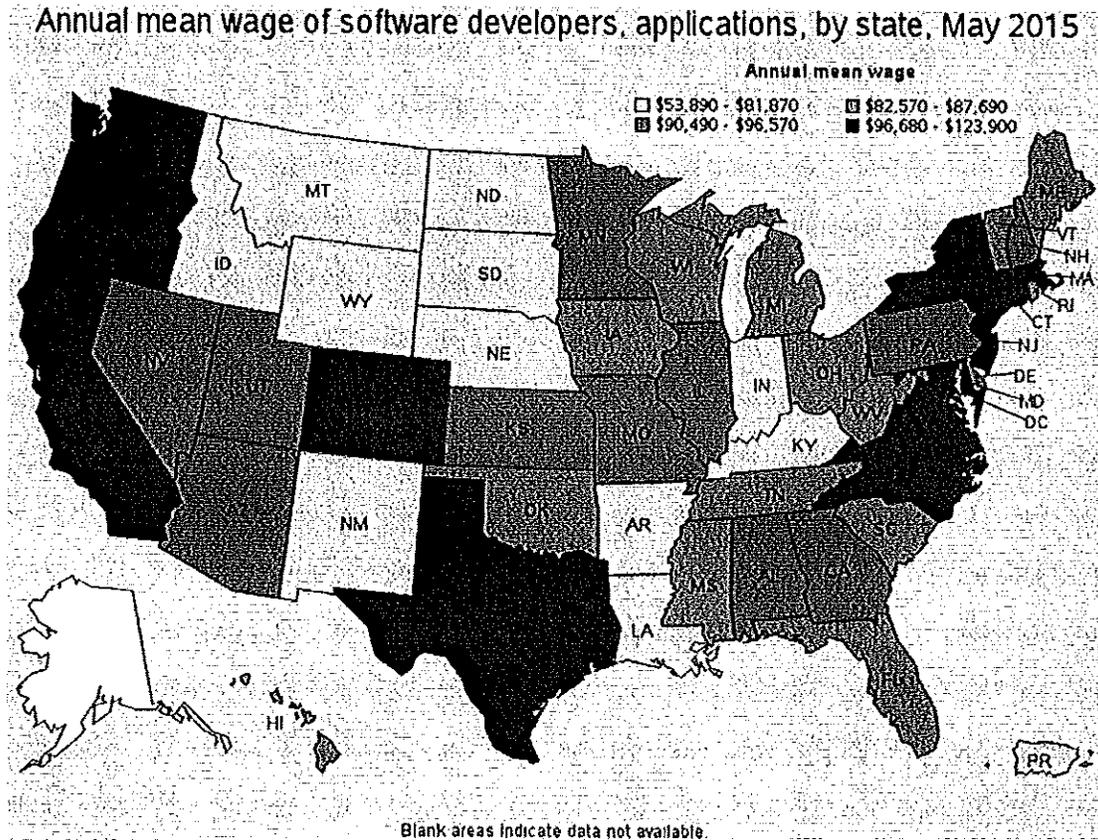
Table 3 Top 10 Occupations with the Most Openings in Missouri, 2012-2022 (www.careerinfonet.org)

#	Occupation	Employment 2012	Projected Annual Job Openings
1	Registered Nurses	66,970	2,100
2	General and Operations Managers	53,130	1,500
3	Accountants and Auditors	25,850	1,090
4	Elementary School Teachers, Except Special Education	23,150	750
5	Secondary School Teachers, Except Special and Career/Technical Education	19,970	610
6	Middle School Teachers, Except Special and Career/Technical Education	13,910	450
7	Computer Systems Analysts	10,950	390
8	Software Developers, Applications	11,750	320
9	Cost Estimators	5,010	280

10	Coaches and Scouts	6,830	270
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Figure 4 shows the most recent annual mean wage of applications software developers by state published by the U.S. Bureau of Labor Statistics. The mean salary in Missouri is \$90,490-\$96,570.

Figure 4 Annual Mean Wage of Applications Software Developers, by State, May 2015, US Bureau of Labor Statistics (<http://www.bls.gov/oes/current/oes151132.htm>)



Career website Glassdoor cross-referenced its salary data with official cost of living figures from the federal government to see where tech industry salaries go the furthest [10]. Table 4 below ranks each city by their salary, which takes into account the cost of living. Software Engineers earn a higher salary compared with some other jobs in similar areas. Two cities in Missouri, St. Louis and Kansas City, ranked No. 6 and No. 28 among the best cities in the US to be a software engineer.

Moreover, the information technology industry in Missouri continues to grow. As a matter of fact, software is one of Missouri's information technology industry's three niches [11]. Specifically, the Kansas City area has many IT related companies. For example, Cerner anticipates a large expansion of its Kansas City workforce over the next 10 years that will involve hiring thousands of software engineers [12] [13]. According to the most recent (December 2015) Information Technology Industry Real Time Labor Market Summary published by the Missouri's



Economic Research and Information Center [14], there were 2,011 job postings in the Information Technology Industry for the previous 6 month period in Missouri. The top occupation was Applications Software Developers.

Table 4 Salary Data with Official Cost of Living Rank

Metro Area	Cost of Living Index	"Real" Soft. Eng. Salary	Rank	"Real" Prog. Analyst Salary	Rank	"Real" Sys. Admin. Salary	Rank
Seattle, WA	107.0	107,540	1	79,945	6	72,639	10
San Jose, CA	122.0	107,121	2	73,367	14	84,530	1
Raleigh, NC	95.2	102,950	3	87,131	2	71,758	12
Portland, OR	100.5	101,592	4	72,697	18	70,635	16
San Francisco, CA	121.3	101,006	5	78,439	7	81,162	2
St. Louis, MO	88.9	97,621	6	83,585	3	80,271	3
Denver, CO	104.3	97,442	7	93,783	1	72,893	9
Atlanta, GA	95.6	96,519	8	73,222	15	77,797	5
Austin, TX	98.5	95,362	9	72,710	17	62,509	27
Boston, MA	111.6	94,717	10	69,256	26	72,275	11
Dallas, TX	101.0	94,417	11	74,505	12	75,817	6
Phoenix, AZ	99.7	93,649	12	77,056	9	70,729	15
Pittsburgh, PA	93.4	92,981	13	74,116	13	70,752	14
San Diego, CA	119.0	90,739	14	64,813	28	62,511	28
Columbus, OH	93.8	90,618	15	81,636	5	74,017	8
New York, NY	122.2	90,543	16	70,286	23	66,841	21
Los Angeles, CA	118.2	90,421	17	69,914	24	67,948	18
Chicago, IL	106.6	89,027	18	72,094	19	67,387	20
Tampa, FL	99.4	88,658	19	77,594	8	63,684	25
Miami, FL	105.0	88,487	20	71,734	22	64,099	23
Houston, TX	100.7	88,450	21	73,067	16	61,878	28
Minneapolis, MN	103.0	87,998	22	69,316	25	64,717	22
Baltimore, MD	109.4	87,667	23	65,380	27	71,396	13
Philadelphia, PA	109.0	87,030	24	71,828	20	70,252	17
Orlando, FL	98.0	86,735	25	74,851	11	63,896	24
Detroit, MI	97.8	86,578	26	75,435	10	74,530	7
Washington, DC	120.4	84,801	27	71,779	21	67,841	19
Kansas City, MO	92.7	79,585	28	82,163	4	77,923	4

Source: Glassdoor Economic Research; U.S. Bureau of Economic Analysis. Salaries are inflation-adjusted median total compensation reported on Glassdoor from 2010 to June, 2015 [15].

In addition, Software Engineer is ranked No. 8 among the best jobs of 2015 [16], and has a high growth outlook. Software engineers are in high demand. Skilled software engineers are well paid and rarely have trouble finding work. The unemployment rate for this career is consistently below the national average [17]. According to the Best Computer Careers Reviews in 2016 [17],



software engineer is ranked No. 1 among top ten computer careers. The detailed comparison is shown in Table 5.

Table 5 Software Engineer Ranked No. 1 Among Top Ten Computer Careers

Career	Overall Rating	Salary	Opportunity	Education	Work Environment
Software Engineer	10.00/10	10.00/10	10.00/10	10.00/10	10.00/10
Systems Analyst	9.40/10	9.38/10	8.75/10	10.00/10	10.00/10
Network Security Specialist	8.73/10	9.38/10	8.75/10	8.75/10	9.38/10
Network Architect	8.53/10	10.00/10	6.88/10	8.13/10	9.38/10
Database Administrator	8.07/10	8.75/10	6.25/10	8.75/10	9.38/10
Network Administrator	7.95/10	8.75/10	5.88/10	8.75/10	9.38/10
Web Developer	7.82/10	8.13/10	6.50/10	8.13/10	10.00/10
Computer Tech Support	6.60/10	7.50/10	7.50/10	3.13/10	9.38/10

Student Demand

Currently there are approximately 60 undergraduate software engineering programs in the United States [18]. The number of programs is growing steadily (compared with about 40 undergraduate software engineering programs in 2011). The enrollments and graduates are growing steadily, too [19]. The following table lists the enrollment of several ABET accredited Software Engineering programs from master level institutions. Considering the overall student population for each institution, the software engineering enrollment is strong in all those institutions. It is also worth mentioning that all those institutions also offer a BS in Computer Science. These figures demonstrate that Software Engineering is a viable undergraduate program in the US which has a strong, consistent and increasing student demand.



Considering that there is no existing undergraduate software engineering program in Missouri and Kansas while the demand for software engineers is very high, we anticipate there will be strong student demand for such a program.

Table 6 Enrollment of Several ABET Accredited Software Engineering Program from Master Level Institutions

Institution Name	Enrollment
California Polytechnic State University, San Luis Obispo	180
Clarkson University	34
Embry-Riddle Aeronautical University - Daytona Beach	53
Kennesaw State University	207
Milwaukee School of Engineering	214
Monmouth University	70
Pennsylvania State University, Behrend College	55
Rochester Institute of Technology	492
Rose-Hulman Institute of Technology	133
University of Michigan - Dearborn	134
University of Wisconsin - Platteville	183

Societal Need

Over the past thirty years, the practices of everyday life have become increasingly infused with and mediated by software. The capacities and growing pervasiveness of software make it the lifeblood of today's emerging information society. Software is shaping our world from all aspects of our lives, from the launch of billion-dollar spacecraft to more mundane work such as measuring and displaying time, controlling traffic lights, and monitoring the washing of clothes. Indeed, whatever the task- domestic chores, paid work, shopping, traveling, communicating, governing, playing - software increasingly makes a difference to how social and economic life takes place, and enables members of society to work more efficiently [20]. To maintain a competitive edge, industry and commerce continue to make creative engineering advances as well as produce high quality products. More than ever, there is a demand for a highly prepared work force with Software Engineering training that is enabled to deliver quality software and innovation.



According to the US Bureau of Census [21], the average poverty rate for the UCM service area is above the state figure, and the average median household income is significantly below the state figure. At the same time, a clear majority of UCM students are from our 21 service counties according to the most recent report released by the UCM Office of Institutional Research. As a comprehensive regional university with a statewide mission in professional applied sciences and technology programs, it is our mission to provide Missouri citizens in our own service region and/or beyond the access to affordable undergraduate study in Software Engineering with reasonable cost and driving distance.

Table 7 Average Percent of Poverty and Average Median Household Income

Area	Average Percent of Poverty (2010-2014)	Average Median Household Income (2010-2014)
UCM service area (21 counties)	16.4%	\$44,162
State of Missouri	15.5%	\$47,764

Source: US Bureau of Census

Duplication and Collaboration: If similar programs currently exist in Missouri, what makes the proposed program necessary and/or distinct from the others at public institutions, area vocational technical schools, and private career schools?

By searching the program inventory provided by Missouri Department of Higher Education (<http://collegesearch.mo.gov/>) using the CIP code 14.0903 designated for the proposed program, no institution in Missouri offers a BS in Software Engineering program. As a result, there is no duplication issue. Given that the University of Central Missouri's statewide mission in professional applied sciences and technology programs, UCM is a natural home for the proposed B.S. in Software Engineering program. A clear majority of UCM students are from our traditional 21 service counties and are tied to this area by jobs and/or family responsibilities. Many of the students have circumstances making attendance at another university or college difficult or impossible. The options available to them are largely determined by the options provided at UCM. As a comprehensive regional university with a statewide mission in professional applied sciences and technology programs, it is our goal to provide Missouri citizens in our service region and/or beyond more access to affordable undergraduate study in software engineering within reasonable driving distance.

Does delivery of the program involve a collaborative effort with any external institution or organization? If yes, please complete Form CL.

No. The current Computer Science faculty members at UCM are qualified and sufficient to handle the new program. Delivering the program will not involve collaborative efforts with any external institution or organization.



References:

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PROGRAM STRUCTURE

A. Total credits required for graduation: 120

B. Residency requirements, if any: minimum 30 credit hours at UCM

C. General education: 44

Course Number	Credits	Course Title
CS 1000	3	Computers and Modern Society
COMM 1000/1050	3	Public Speaking/Foundation of Oral Communication Competency
MATH 1151	5	Calculus & Analytic Geometry I
Areas/Category	Credits	Notes
Writing I	3	
Writing II	3	
Managing Info.	2	
Literature	3	
Fine Arts	3	
Another Course for Knowledge Area I	3	Choose one additional course from Literature/Fine Arts or Languages/Humanities
Science with Lab	4	
Another Course for Knowledge Area II	3	Choose one additional course from Science or Mathematics
History	3	
Social/Behavioral Sciences	3	
Additional Courses for Knowledge Area III	3	Choose one additional course from History or Social/Behavioral Sciences

D. Major requirements: 73

Core Courses (50 credits):

Course Number	Credits	Course Title
CS 1100	3	Computer Programming I
CS 1110	3	Computer Programming II



CS 2300	3	Data Structures
CS 2400	3	Discrete Structures
CS 3130	3	Secure Programming
CS 3900	3	Software Requirements Engineering
CS 3910	3	Software Engineering
CS 4300	3	Algorithms Design and Analysis
CS 4600	3	Database Theory and Applications
CS 4920	3	Senior Project
CS 4930	3	Software Testing & Quality Assurance
CS 4940	3	Software Design and Architecture
CS 4950	3	Secure Software Engineering
MATH 1152	5	Calculus & Analytic Geometry II
ACST 3311	3	Introduction to Mathematical Statistics
INDM 4250	3	Project Management

Computer Science Electives (9 credits):

Course Number	Credits	Course Title
CS 3100	3	Programming Languages
CS 3110	3	App Prog. With C# and .NET
CS 3120	3	Client Side Web Programming
CS 3200	3	Computer Organization & Architecture
CS 3300	3	Intro. to Cryptography
CS 3500	3	C and UNIX Environment
CS 3800	3	Apps. Development with VB,NET
CS 3810	3	Intro. To Game Design
CS 4000	3	Special Problems in CS
CS 4110	3	Mobile App. Prog. With Android
CS 4120	3	Advanced App. Prog. In Java
CS 4130	3	Server Side Web Programming
CS 4140	3	Web Applications Security
CS 4500	3	Operating Systems



CS 4510	3	Intro. to Distributed Systems
CS 4610	3	Intro to Cloud Computing
CS 4620	3	Big Data Systems
CS 4630	3	Data Mining
CS 4700	3	Artificial Intelligence
CS 4710	3	Machine Learning
CS 4800	3	Computer Networking
CS 4810	3	Computer Graphics
CS 4820	3	Intro. to Information Assurance

Math and Science Electives (14 credits):

*Minimum 8 credit hours science, from Elective Group II & III, must be selected in the electives. Total math and science, from the following lists, combined must be at least 14 credit hours.

- **Elective Group I (0-6 credits):**

Course Number	Credits	Course Title
MATH 2153	3	Calculus & Analytic Geometry III
MATH 2221	3	Foundations of Geometry
MATH 3151	3	Differential Equations
MATH 3710	3	Linear Algebra
MATH 4450	3	Introduction to Graph Theory

- **Elective Group II (0-3 credits):**

Course Number	Credits	Course Title
BIOL 1110	3	Principles of Biology
BIOL 2010	3	Human Biology
BIOL 2510	3	Basic Genetics
BIOL 4102	3	Evolution
EASC 3010	3	Environment Geology
EASC 3112	3	Astronomy

- **Elective Group III (8-14 credits):**



Course Number	Credits	Course Title
PHYS 1101/2121	4/5	College Physics I or University Physics I
PHYS 1102/2122	4/5	College Physics II or University Physics II
BIOL 1111	4	Plant Biology
BIOL 1112	4	Animal Biology
CHEM 1131	5	General Chemistry I
CHEM 1132	5	General Chemistry II
EASC 1004	4	Intro. to Geology
EASC 1114	4	Weather and Climate
EASC 2100	4	Engineering Geology
EASC 2200	4	Historical Geology
EASC 4300	4	Earth Resources

E. Free elective credits: 3

(Sum of C, D, and E should be larger or equal to A.)

F. Requirements for thesis, internship or other capstone experience:

CS 4920 Senior Project serves as a capstone course for the program which is required.

G. Any unique features such as interdepartmental cooperation:

N/A



PROGRAM CHARACTERISTICS AND PERFORMANCE GOALS

Institution Name: University of Central Missouri
Program Name: Bachelor of Science in Software Engineering
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

- 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.

No special admission procedures or student qualifications required. The proposed program will adopt the same admission criteria for undergraduate students at UCM.

- Characteristics of a specific population to be served, if applicable.

N/A

2. Faculty Characteristics

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

Ph.D. in Computer Science, Software Engineering or a closely related area required for tenure track faculty. M.S. in Computer Science, Software Engineering or a closely related area required for non-tenure track faculty.

- 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.

All courses will be taught by full-time faculty.

- Expectations for professional activities, special student contact, teaching/learning innovation.

Faculty teaching in this program will be expected to be professionally active, as evidenced by peer reviewed publications and/or externally funded grants. Faculty will also be expected to attend and/or present at professional meetings, participate in workshops/seminars in areas related to their specialties and be involved in other related professional activities. Faculty are expected to continue improving their teaching by keeping up to date on material or pedagogy.

3. Enrollment Projections



- Student FTE majoring in program by the end of five years.

60 students

- Percent of full time and part time enrollment by the end of five years.

91.5% full time, 8.5% part time

4. Student and Program Outcomes

- Number of graduates per annum at three and five years after implementation.

Three years-5, Five years-12

- Special skills specific to the program.

Graduates with a Bachelor of Science degree in Software Engineering will demonstrate the following specific student outcomes:

- *An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics*
- *An ability to apply both analysis and synthesis in the engineering design process, resulting in designs that meet desired needs.*
- *An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.*
- *An ability to communicate effectively with a range of audiences.*
- *An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.*
- *An ability to recognize the ongoing need for additional knowledge and locate, evaluate, integrate, and apply this knowledge appropriately.*
- *An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty.*

- Proportion of students who will achieve licensing, certification, or registration.

N/A

- 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.

None available.

- Placement rates in related fields, in other fields, unemployed.



95% in Software Engineering related fields, 5% in other fields, 0% unemployed

- Transfer rates, continuous study.

N/A

5. Program Accreditation

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

The program will seek ABET accreditation.

6. Alumni and Employer Survey

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

There is an expected satisfaction rate of around 90%. A survey will be sent to graduates at periods of one and three years after their graduation to gauge how the program has prepared them for their careers. Data from the survey will be compiled and analyzed to improve the quality of the program.

- Expected satisfaction rates for employers, including timing and method of surveys.

There is an expected satisfaction rate of around 90%. A survey will be sent to employer(s) every three years requesting their input on quality of the program and its graduates. Data from the survey will be compiled and analyzed to improve the quality of the program. The UCM Software Engineering Advisory Board, which meets once per year and consists of representatives from industry, alumni, and students, will also provide input.

7. Institutional Characteristics

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

Founded as a teacher's college in 1871, the University of Central Missouri has maintained its commitment to excellent teaching. UCM has a statewide mission in applied sciences and technology programs. Our average undergraduate class size is 24. UCM's six-month job-placement rate for undergraduates is 92 percent, and, reflecting our excellent financial support packages, our students benefit from one of the lowest student-debt ratios in the state. Publicly supported, richly diverse in our people and programs, UCM offers a remarkable educational experience.