NEW PROGRAM PROPOSAL FORM

Sponsoring Institution(s): Southeast Missouri State University

Program Title: Applied Computer Science

Degree/Certificate: Master of Science

Options: N/A

Delivery Site(s): Main Campus

CIP Classification: 11.01

*CIP code can be cross-referenced with programs offered in your region on MDHE's program inventory highered.mo.gov/ProgramInventory/search.jsp

Implementation Date: Fall 2017

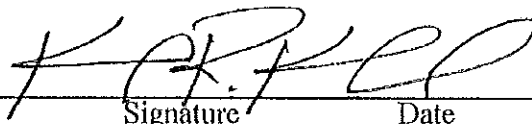Cooperative Partners: N/A

*If this is a collaborative program, form CL must be included with this proposal

AUTHORIZATION:

Dr. Karl Kunkel, Provost _____ 3/1/2017
Name/Title of Institutional Officer   Signature   Date

Dr. David Probst, Chair, Dept. of Computer Science   573-651-2388
Person to Contact for More Information   Telephone

STUDENT ENROLLMENT PROJECTIONS

Year	1 (2017-18)	2 (2018-19)	3 (2019-20)	4 (2020-21)	5 (2021-22)
Full Time	5	10	11	12	13
Part Time	3	6	10	14	16
Total	8	16	21	26	29

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

The following rationale is provided based on the following assumptions:
- The Master of Science in Applied Computer Science will enroll new students every fall semester.
- Full time students are students who will complete their master's program within 2 years.
- Part time students are students who will complete their master's program within 4 years.
- Currently, on average, the number of graduates from the Department of Computer Science is around 20 students per year. We anticipate that some of our current undergraduate students would continue their graduate studies at Southeast Missouri State University, but we also anticipate that a significant fraction of the students coming into the program would be graduates from other universities. We believe the program would be quite attractive to students abroad as well, as indicated in the support letter from Dr. Jai Dahiya, who was very involved in recruiting internationally for Southeast before he retired, and who currently works in that capacity for a university in Texas.

Based on interest expressed by students, local employers, software developers, etc. we anticipate slow but steady growth as we advertise our program.
- In year 1, we project to admit 5 new full time students and 3 new part time students. In year 1, we will have no graduates. So, total number of enrolled students is 8 students.
- In year 2, we project to admit 5 new full time students and 3 new part time students. We will have 8 continuing students from last year. In year 2, we will have no graduates. So, total number of enrolled students is 16 students.
- In year 3, we project to admit 6 new full time students and 4 new part time students. We will have 16 continuing students from last year. In year 3, we will have 5 full time students graduating. So, total number of enrolled students is 21 students.
- In year 4, we project to admit 6 new full time students and 4 new part time students. We will have 21 continuing students from last year. In year 4, we will have 5 full time students graduating. So, total number of enrolled students is 26 students.
- In year 5, we project to admit 7 new full time students and 5 new part time students. We will have 26 continuing students from last year. In year 5, we will have 6 full time students and 3 part time students graduating. So, total number of enrolled students is 29 students.

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

Local companies and undergraduate students are eager for the Department of Computer Science to develop a graduate program to satisfy the unfilled positions and the needs of local industry.

The exit surveys from students graduating spring 2016 show that of the 22 forms completed, 20 students think a master's program in Computer Science or Applied Computer Science at Southeast Missouri State University is a good idea, and 10 expressed some interest in pursuing it.

In September 2016, 90 students taking courses in the Department of Computer Science were surveyed to indicate to what extent they are interested in pursuing studies toward the Masters of Science in Applied Computer Science at Southeast Missouri State University or some other Graduate Degree. The students had to indicate if they are very interested, moderately interested, or not interested. The following table summarizes the findings:

Major of students surveyed	Total number of student surveyed	Number of students very interested	Number of students moderately interested	Number of students not interested
Computer Science	52	27	20	5
Cybersecurity	18	5	10	3
Computer Information systems	8	3	3	2
Others	12	4	3	5
Total	90	39	36	15

Around 83% of the surveyed students indicated some interest in pursuing a master's degree.

As indicated in one of the attached support letters from Dr. Sandipan Sen, Associate Professor of marketing at Southeast Missouri State University, "Southeast is located strategically between two very important cities, St. Louis and Memphis, that are seeing an unprecedented growth in the number of successful tech start-ups like Square and aisle411 thanks to encouragement and incentives from local governments and also support from tech-friendly organizations such as T-Rex, VentureSTL, EmergeMemphis, and Tecworks. The establishment and growth of these tech companies bring more opportunities for our computer science graduates in addition to that from already existing employers like Boeing, FedEx, Edward Jones, Scottrade, Budweiser, etc. In an age when just the possession of a computer, coding skills, and basic digital business expertise can lead to a business idea worth millions (FaceBook, DrawSomething, Square), it is important for the Computer Science Department at Southeast not only to maintain its strong undergraduate program, which is accredited by the Computing Accreditation Commission of ABET, but to move to the next level by launching a master's program. This will help its students continue on their journey of obtaining advanced Computer Science education in order to potentially create their own tech company in the future. With the establishment of two local incubators, Catapult

and Codefi, opportunities for Southeast's technical graduates has never been better since both of these organizations can provide support, infrastructure, and even funds in some instances to competing tech teams for their winning ideas that will not only generate revenue but also will create local employment opportunities. The addition of a new master's program to the Computer Science Department will also be great news for the current students enrolled in the undergraduate program since they will not have to look for a master's program at another university to continue their academic journey."

In addition, as indicated by the letter from Dr. Jai Dahiya, who has been involved in recruiting international students for many years, the demand among students abroad is quite strong.

There is strong market demand as national, state, regional, and local assessments of labor needs indicate high demand for individuals with computing skills. Based on the U.S. Bureau of Labor Statistics (BLS) report in May 2014, employment of computer programmers is projected to grow 8 percent from 2012 to 2022, as fast as the average for all occupations. In addition, new applications will have to be developed for mobile technology, the healthcare industry, and the emerging Internet of Things as the number of connected devices explodes in the near future. Data Analytics, or so-called Big Data, is another emerging area for which computing professionals will be needed. And, of course cybersecurity is already and will continue to be a major concern. An increase in computer systems that are built into electronics and other non-computer products will result in job growth for computer programmers and software developers. Also, companies are bringing programming jobs back to the United States, which reverses the trend of recent years. Moreover, companies with small information technology operations may outsource computer programming to low-cost areas within the United States. According to the State of Missouri Occupation Outlook (2012-2018) and the Bureau of Labor Statistics (May 2014), the number of jobs in IT and Computer Science exceed 4000 in the Southeast Missouri region, Cape Girardeau, and its surrounding area. MERIC data indicate nearly 23,000 open positions in various related areas for people trained in computer science.

As a graduate, one can explore a number of possible occupations, including in the areas of military and national security; medical fields and pharmaceuticals; environmental monitoring, control, and remediation; forensics; university and federal lab research; programming; database management; systems administration; IT analyst, etc.

There is also Social Need. Students are realizing that knowledge of computers and computing can help them succeed in nearly any job. Students see programmers creating websites, games, mobile smartphone applications, etc. that make them millionaires, and they want to do the same. In addition, more employers are demanding graduates with computer and computing backgrounds as they are looking for quality employees. Such jobs are growing fast and pay well, and the students with good coding skills have access to the best paying and fastest growing jobs in the nation. In our region, our Master of Science in Applied Computer Science can contribute to preparing students for jobs in information and computer science. Every young person should have this career option, including women, students of color, and students from rural areas that are usually left out of computer science education.

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Form SE - Student Enrollment Projections

Summary

To summarize, our Master's program is necessary and distinct from those at other Missouri institutions for the following reasons:

- We are targeting students in Southeast Missouri as well as Saint Louis and surrounding areas that come to Southeast Missouri State University to pursue their undergraduate degree. Some of our undergraduate students are first generation and non-traditional students. We believe this program will be very attractive to international students as well.
- Few schools offer a Master of Science in Applied Computer Science in the State of Missouri. Only Northwest Missouri State University offers a similar program which attracts students from the North West region of Missouri. We offer this program for the southeast Missouri region so that IT, healthcare, and other professionals can enroll in our program and attend the classes with short commutes.
- The Masters' program can be an accelerated program for high achieving undergraduates.
- Students may choose to work on a variety of interesting topics/projects such as:
  - Artificial Intelligence Area: Artificial Intelligence, Information Retrieval, Machine Learning, Knowledge Representation, Natural Language Processing, Computational Linguistics, Human Robot Interaction, Human Computer Interaction, Search Engines, Robotics, Intelligent Robotics, Data Mining, Big Data, Social Networks Analysis, Intelligent Tutoring Systems, Educational Games, Student Modeling, e-Learning, the Internet of Things
  - Distributed Systems and Networking Area: Computer Networks and Mobile Systems, Distributed Systems, Cloud Computing, Data Intensive Computing, High Performance Computing
  - Image Processing: Graphics And Visualization, Computer Graphics
  - Biologically Inspired Computer Solutions
  - Database systems
  - Software Engineering Area: Software Engineering, User Interface Design, User Modeling
  - Security Systems Area: Computer Security, Cryptography, Cybersecurity, Information Assurance
- Some courses will be offered online.
- There is both domestic and international demand.

Please check:
(Appendix 1: Support Letters)
(Appendix 2: References)
(Appendix 3: Explanation of Financial Projections)
(Appendix 4: Short Biographies of Faculty)

PROGRAM STRUCTURE

A. Total credits required for graduation: _32_
B. Residency requirements, if any: _N/A_
C. General education: Total credits: _0_

Courses (specific courses OR distribution area and credits):

Course Number	Credits	Course Title
N/A		

D. Major requirements: Total credits: _32_

A student needs to complete 32 hours in the Master of Science in Applied Computer Science.

A student my choose plan A (Thesis option - 6 credit hours) or plan B (non-Thesis option - 0 credit hours).

Students may choose courses with the help of their advisor (from the elective courses, independent study, special topics, or internship course list). Students may take up to six credit hours from courses outside the Department. Such courses enable students to explore how different subject areas impact and are impacted by computer science. They may take courses in traditional areas such as Physics, Biology or Mathematics. Students will work closely with their advisor to select such courses.

Course Number	Credits	Course Title
Required Courses (20 hours)		
CS501	3	Distributed Cloud Computing
CS591	3	Advanced Artificial Intelligence
CS600	3	Research Methods
CS609	3	Advanced Programming Languages
CS630	3	Current Topics in Human Computer Interaction
CS695	1	Seminar I
CS696	1	Seminar II
CY501	3	Intro to Cyber Security
Plan A – Thesis (12 hours)		
CS691	3	Thesis Research I
CS692	3	Thesis Research II
GR699	0	Master's Oral Examination
Electives *	3	Choose courses with advisor
Electives *	3	Choose courses with advisor
Plan B – Non Thesis (12 hours)		
CS690	0	Graduate Project
GR698	0	Master's Final Comprehensive Examination
Electives *	3	Choose courses with advisor

Electives *	3	Choose courses with advisor
Electives *	3	Choose courses with advisor
Electives *	3	Choose courses with advisor
* Elective courses, independent study, special topic or internship course		
CS503	3	Data Mining
CS533	3	Mobile Computing
CS560 ·	3	Computer Architecture
CS575	3	Advanced Web Development
CS580	3	Advanced Robotics
CS581	3	Advanced Network Programming
CS631	3	Advanced Software Engineering
CS632	3	Emerging and Converging Technologies and Computing
CS633	3	Digital Signal and Image processing
CS634	3	Machine Learning
CS640	3	Advanced Database Systems
CS643	3	Independent Study
CS650	3	Theory of Computation
CS653	3	Special Topics
CS699	3	Internship
CY510	3	Info Security and Assurance
CY520	3	Info Security in System Admin
CY610	3	Web Application Security
CY620	3	Computer Forensics
5XX or 6XX	6	Any 5XX or 6XX relevant courses from other departments / colleges - not more than 6 credits

2 Year Plan

Fall Semester 1 (9 credit hours)	Spring Semester 1 (9 credit hours)
CS 609 Advanced Programming Languages (3) CS 501 Distributed Cloud Computing (3) CY 501 Intro to Cyber Security (3)	CS 630 Current topics in Human Computer Interaction (3) CS 591 Advanced Artificial Intelligence (3) Elective course/ independent study / special topic / internship (3)
Fall semester 2 (10 credit hours)	**Spring Semester 2 (4 credit hours)**
CS 600 Research Methods (3) CS 695 Seminar I (1) Elective course/ independent study / special topic / internship (3) Plan A: CS 691 Thesis Research I (3) Plan B: Elective course/ independent study / special topic / internship (3)	CS 696 Seminar II (1) Plan A: CS 692 Thesis Research II (3) GR 699 Master's Oral Examination (0) Plan B: CS 690 Graduate Project (0) GR698. Master's Final Comprehensive Examination(0) Elective course/ independent study / special topic / internship (3)

E. Free elective credits: (Sum of C, D, and E should equal A.)

N/A

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

Graduate students are required to complete a thesis or a graduate project (depending on their chosen plan). The thesis or project is completed under the supervision of a faculty member with a Ph.D. who will serve as the thesis or project committee chair selected by the student during the first graduate thesis or project course. One additional project thesis or project committee member is selected by the thesis or project committee chair and student from his/her practice or specialization area.

The independent study offers the student an opportunity for study in an area not addressed by the curriculum of a department. The student wishing to pursue an independent study is responsible for identifying and obtaining the approval of the faculty member under whom the study is to be done. To gain approval, the student should prepare an outline of the proposed study. When the outline is approved by the faculty member, an Independent Study Approval Form must be completed and presented to the department chairperson. The content of an independent study may not duplicate an existing course.

Internships offer the graduate student an opportunity to gain relevant knowledge, skills, and experience in the computing field. Students in the graduate program are encouraged to seek internships in their field of study to gain real life experience as they build their resume for a job after graduation or job advancement in a current field of employment.

G. Any unique features such as interdepartmental cooperation:

N/A

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Form PS – Program Structure

PROGRAM CHARACTERISTICS AND PERFORMANCE GOALS

Institution Name   Southeast Missouri State University
Program Name   Master of Science in Applied Computer Science
Date   Start 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.

In addition to Southeast Missouri State University's graduate program general admission requirements, the ideal applicant should have a Bachelor's Degree in Computer Science, Computer information Systems, or a related field. Acceptance will be decided by the Department's graduate program coordinator. If the student does not have adequate computing background (i.e. at least a minor in computer science, computer information systems or related field), he/she will be required to complete pre-requisite courses before enrolling in graduate courses. The student is encouraged to check with the Department's graduate program coordinator to determine what courses need to be completed.

Applicants with a bachelor degree in Computer Science or related field must have a minimum of 3.00/4.00 GPA in the last 32 semester hours of computer science or related area coursework. They should have completed at least six hours of university-level science and at least six hours of university-level mathematics in their undergraduate degree. Applications should also have a working knowledge of a high-level programming languages C++ and Java. Knowledge in other programming languages is a plus, such as: C, Python, MATLAB, LabVIEW, etc.

Applicants should provide 3 letters of reference (professional and/or academic). Applicants may be interviewed by a graduate committee member.

The Graduate admissions office may require the following: official college transcripts, graduate application fee, General GRE scores and TOFEL scores for International students.

In addition to Southeast Missouri State University's accelerated master's program general admission requirements, a student majoring in the Department of Computer Science or who has taken required undergraduate Computer Science courses at Southeast Missouri State University may take some pre-selected courses that will be dual-credited with their B.S. degree. Southeast Missouri State University undergraduate students taking dual-credited course(s) and wanting to

use the credit hours toward the master's program should make sure to be dual-registered for both the undergraduate and graduate program, clearly specifying that the dual-credited course(s) is(are) for their graduate degree.

Accelerated program requirements:
- Junior Standing with at least 75 credit hours completed
- Limit of 12 hours (500 level)
- Minimum grade point average of 3.25 overall and minimum grade point average of 3.25 in the discipline.
- Submit an application to the department for the accelerated master's program
- Submit to the School of Graduate Studies an application for graduate school

Accelerated Program notes:
- Tuition will be charged at the undergraduate rate.
- Course will be initially recorded as undergraduate class at the end of the semester.
- After grades are submitted at the end of the semester, the courses will be added to the graduate course list for graduate credit.
- Students must be enrolled in the accelerated program prior to taking courses used for the accelerated master's program.

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

While we are not primarily targeting a specific population, we expect to enroll students with the following backgrounds:
- Students from the Southeast Missouri region with a bachelor's degree in Computer Science, Computer Information Systems, Cybersecurity or a related field who are interested in pursuing a master's degree in Applied Computer Science.
- Students with a minor in Computer Science or any related field that are willing to complete the pre-requisite courses.
- Students studying Computer Science or Computer Information Systems at Southeast Missouri State University desiring to complete a master's degree, traditionally or in the accelerated program.
- International students.
- Nontraditional students.

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

Faculty members teaching in the master's program must have a doctoral degree. In special cases, professionally qualified instructors with a master's degree can also teach. (Appendix 4: Short Biographies of 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 faculty members in our department are full time faculty. A faculty member will teach one graduate course per semester in the master's program. The department will offer at least three graduate courses per semester. The department currently employs five doctoral faculty members and one faculty member with a master's degree. Two additional faculty members with doctoral degrees will join the department in Fall 2018 and Fall 2019.

Final decisions and assignments regarding workload are made by the department chair.

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

Faculty members have extensive experience teaching computer science courses. Each faculty member has presented at numerous national and international conferences, has published work in peer reviewed journals and conferences, and has on-going research projects. All are members of professional societies. Our faculty members are also involved in developing new courses, upgrading curriculum, attending seminars, consulting, applying professional skills in community services, etc.

Faculty will have contact with students in class, outside consultation, seminars, etc.

All faculty members attend short and/or major workshops related to teaching/learning innovations.

3. Enrollment Projections
- **Student FTE majoring in program by the end of five years.**

According to [https://nces.ed.gov/ipeds/glossary/index.asp?id=854], we calculate FTE as follows:
13 full time students + (16 part time students x 0.361702) = 18.79

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

50% full time and 50% part time.

4. Student and Program Outcomes
- **Number of graduates per annum at three and five years after implementation.**

Department anticipates graduating 5 students at third year and 9 students at fifth year.

- **Special skills specific to the program.**

Students enrolling in this master's program will be able to choose their course of study with the help of their advisor to match their long-term goals. This includes the choice of a thesis or non-thesis track. They can also take up to six credit hours outside the department in order to strengthen their knowledge of the application of computing in various fields.

- 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.

Based on Southeast Missouri State University Graduate Bulletin, students must complete all required courses in addition they must complete a final master's examination:
- The department offers thesis or non-thesis degree options. Each candidate who elects the thesis option will be required to pass an oral examination during the final semester (or earlier by permission of the Department's graduate program coordinator).
- Each candidate who elects the non-thesis option will be required during the final semester (or earlier by permission of the Department's graduate program coordinator) to satisfactorily complete a course-embedded capstone or summative requirement and pass a written comprehensive examination.

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

N/A

- 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.

At this point we are not seeking accreditation for our Master of Science in Applied Computer Science degree because based on our knowledge and observing other schools in the region and nationally, there is no specific accreditation for such a master's degree.

6. Alumni and Employer Survey

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

Our department meets annually with our external advisory committee, which consists of alumni and employers. This committee is a great source for relevant feedback for our programs. We will also conduct surveys for the master's program graduates on a regular basis similar to what we do with graduates of our bachelor's programs.

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

We anticipate that employers who hire our undergraduate students will also employ our graduate students. We also anticipate that new national and international employers will hire our graduates. Usually, our students are guaranteed a job or have offers by their last semester of study. Yearly, we will ask for feedback from our external advisory committee. We will also ask for feedback from employers employing our graduates which may be in the form of online questionnaires.

7. Institutional Characteristics

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

Southeast Missouri State University strives to make higher education accessible to both traditional and nontraditional students and to both full-time and part-time students. The University offers a variety of programs leading both to baccalaureate and master's degrees. This academic year, Southeast will serve more than 12,000 full-time and part-time students. Southeast is committed to offering professional and pre-professional degree programs. The University is situated in a medical hub for region. Also there are a variety of high-tech companies that employ graduates of our bachelor's programs.

The Computer Science Department operates four computer laboratories, three of which are closed laboratories that are open only in conjunction with a course's lab time. The fourth is an open laboratory accessible only to students enrolled in courses offered by the Department of Computer Science. In addition, students are aware that most of the instructional software that is used in the Department of Computer Science is also available in the open laboratories around campus operated by Computer Services which makes it convenient for them to work elsewhere.

Students in the Department of Computer Science have access to a number of software resources through Microsoft Developers Network Academic Associates MSDNAA (also known as DreamSpark). All students currently enrolled in courses offered by the Computer Science Department will be enrolled in the MSDNAA/Dreamspark by instructors. In addition, students will be able to purchase products like Visual Studio.NET and Windows operating systems at substantial discounts.

Faculty currently teaching in the Department of Computer Science have experience teaching, are talented, motivated, and are currently engaged and working with students outside classrooms.

To: Dr. David Probst, Chair, Department of Computer Science

From: Pat Willingham, Department of Computer Science liaison, Kent Library
        Barbara Glackin, Dean, Kent Library

Date: December 21, 2016

RE: Library resources review / Master of Science, Applied Computer Science

CC: Dr. Chris McGowan, Dean, College of Science, Technology & Agriculture
        Dr. Karl Kunkel, Provost and Chair, University Academic Council
        Dr. Allen Gathman, Dean and Chair, Graduate Council

Conclusion:
Kent Library has a comprehensive collection of online and physical resources on computer science, artificial intelligence, cloud computing, programming languages, cybersecurity, human computer interactions, data mining, robotics, network programming, software development, database systems, system administration, web applications and mobile computing to support the teaching, learning and research needs of the new Master of Science in Applied Computer Science.

Background: The Department of Computer Sciences, Master of Science in Applied Computer Science is designed to meet local and regional employment needs in technology. Graduates will be high-level information technology personnel, able to work in entrepreneurial and managerial positions across multiple industries and fields. Kent Library has reviewed its resources for depth and breadth and its ability to support teaching, learning and research in this program. Due to the rapid evolution of this field, scholarly and technical journals are of primary importance and are highlighted in the review.

Resource summary*:
1) Databases: Kent Library subscribes to multiple databases that support the new program.
   - *Computing* is a comprehensive, easy-to-use platform. The database indexes 350 journals—250 full-text titles. Indexed content covers a broad range foundational and subject-specific information technology topics.
   - *IEEE Xplore* provides full-text access to resources in computer science, electronics, and electrical engineering. This is a valuable resource for current information. The database includes scholarly journals, technical magazines and transactions back to 1998 and the *Bell Labs Technical Journal* from 1922 to current.
   - *ACM (Association for Computing Machinery) Digital Library* is focused solely on computer science and incorporates the areas defined for study in this degree. This database contains a mix of material types; including journals, conference proceedings, technical magazines, and books.
   - *Homeland Security Digital Library* is sponsored by the U.S. Department of Homeland Security's National Preparedness Directorate, the Federal Emergency Management Agency, and the Naval Postgraduate School Center for Homeland Defense and Security. Resources cover a wide range of homeland security topics; such as cybersecurity, networking, and others. Content is selected from federal, state, and local governments, international governments and institutions, nonprofit organizations and private sector entities, think tanks, research centers, colleges and

universities. A Kent Library librarian is authorized to provide Southeast's students and faculty access to the database's restricted content.

2) Journals: Kent Library has full-text access to hundreds of scholarly journals across the computer science spectrum that will support the Applied Computer Science degree. Titles include: *ACM Journal on Emerging Technologies and Computing Systems* (2005—); *ACM Transactions on Computer-Human Interactions* (1994—); *ACM Transactions on the Web* (2007—); *Data Mining and Knowledge Discovery* (1997—); *European Journal of Information Systems* (1991—); *IEEE Transactions on Big Data* (2015—); *IEEE Transactions on Cognitive Communications and Networking* (2015—); *IEEE Transactions on Cloud Computing* (2013—); *IEEE Transactions on Computational Intelligence and AI in Games* (2009—); *IEEE Transactions on Computational Social Systems* (2014—); *IEEE Transactions on Signal and Information Processing over Networks* (2015—); *IEEE Transactions on Smart Grid* (2010—); *International Journal of Information Security* (2001—); *International Journal of Intelligent Unmanned Systems* (2013—); *Journal of Management Information and Decision Sciences* (2006—); *Journal of the ACM* (1954—); *Medical and Biological Engineering and Computing* (1997—); *Robotica* (2001—); and *Security Journal* (2007—). Coverage dates beginning in 2000+ indicate new journal titles, published to support new subject topics and new sub disciplines within the field.

Note: For Kent Library users, while indexing is current, some journals may have one year embargoes on full-text access within the databases. Interlibrary loan make current year articles available within a day or two.

3) Books & eBooks:
The Kent Library collections house both eBooks and print titles in support of faculty and student teaching, learning and research. All books are discoverable by searching the Kent Library catalog. eBooks can also be found by searching the Ebsco eBook platform directly. eBooks can be accessed by currently enrolled students both on- and off-campus. Print books are found by searching the library catalog. Students and faculty may place a hold/request on available titles which means library staff will pull titles from the collections and make them available for pick-up at the circulation desk.

eBooks (Ebsco collection)

Subject search	Total titles	Titles published 2011 →
Cloud computing	266	226
Cybersecurity	32 since 2002	16
Artificial intelligence	1,359 since 1970	381
Data mining	548 since 2000	260
Network programming	9 since 2003	2
Human computer interaction	470 since 1990	195

Print Books

Subject search	Total titles	Titles published 2011 →
Cloud computing	70	60
Cybersecurity	9	7
Cyber security (two words)	24	12
Artificial intelligence	384	43
Data mining	106	35
Network programming	73	10
Human computer interaction	87	25

Kent Library is a member of the MOBIUS library consortium, with a union catalog of more than 27 million items. A courier service delivers materials to member libraries every week day. The Library also participates in the Illiad Interlibrary Loan program where more than 10,000 libraries internationally share resources. Both services are free to enrolled students and faculty. The Kent Library document delivery service provides PDF copies of print journal articles to students and faculty.

4) Streaming Videos: The Library provides access to educational and documentary films through online platforms. The two largest platforms are Kanopy and Films on Demand. Subject searching these databases finds streaming videos that support teaching and learning, either in or out of the classroom:

Subject search	Kanopy titles	Films on Demand titles
Artificial intelligence	24	58
Computer architecture	24	3
Computer software	4	7
Cybersecurity	20	11
Cloud computing	16	5
Computers	1,334	209

5) Kent Library provides research and reference assistance to students. In person assistance, appointments, email, phone, and chat are all ways for students to obtain research assistance. Consultations can occur in-person, by telephone, or virtually. Chat reference assistance is also available 24x7. Graduate students are encouraged to schedule an individual research consultation with a librarian.

Kent Library appreciates the opportunity to serve the College of Science, Technology & Agriculture. If, as the curriculum evolves, the Computer Sciences Department identifies library resources or collections weaknesses, we respectfully request to be informed so resolutions may be made.

*Full Kent Library resources review is provided separately.

Appendix 1: Support Letters

Letters of Support

11/24/15

Dr. David Probst, PhD, Chair Person
Southeast Missouri State University
Dept. of Computer Science
One University Plaza, MS 5950
Cape Girardeau, 63701 MO

Dear Dr. Probst:

I am writing this letter to express my support of the MS Program being submitted to the Missouri Department of Higher Education by Department of Computer Science at Southeast Missouri State University.

Southeast is located strategically between two very important cities, St. Louis and Memphis that are seeing an unprecedented growth in the number of successful tech start-ups like Square, aisle411 thanks to encouragement and incentives from the local governments and also support from tech-friendly organizations such as T-Rex, VentureSTL, EmergeMemphis, Tecworks. The establishment and growth of this tech companies bring more opportunities for our computer science graduates in addition to that from already existing employers like Boeing, FedEx, Edward Jones, Scottrade, Budweiser etc. In an age when just the possession of a computer, coding skills and basic digital business expertise can lead to a business idea worth millions (FaceBook, DrawSomething,Square), it is thus important for a time tested program like the Computer Science division at Southeast to continue to not only revise and update their existing undergraduate program but also move to the next level and introduce a Master's program for its students in order to help them continue in their journey of obtaining advanced Computer Science education to hopefully create their own tech company in the future. With the establishment of two local incubators, Catapult and Codefy, opportunities for SEMO tech graduate has never been better since both of these organizations can provide support, infrastructure and even funds in some instances to competing tech teams for their winning ideas that will not only generate revenues but also will create local employment opportunities. The addition of a new Master's program to the Computer Science department will also be great news for the current students enrolled in the undergraduate program since they will not have to look for a Master's program in another university to continue their academic journey.

I am a tenured Marketing faculty at Southeast and am equally invested in the growth and future of the university as a whole and not just my own department. I also possess an undergraduate degree in Electronics and Computer Science and come from India, a country

that has emerged as a global power in the last 15 years just by handling the global back office processes by the virtue of her soft-skills talent and thus understand very well how harnessing the power of a computer with smart business plan can change the fortunes of a city, region, state and even country. In a time when there is a shortage of STEM graduates/ experts in our country, proactive steps need to be taken to attract, train and employ the best of the best and adding the Master's program to the department would be step in that direction. A successful and active Computer Science department can not only attract a steady inflow of students (high enrollment!) but also will see its successful graduates playing key role in the local tech community and giving back to the university. National giants like UC-Berkley, Stanford and even local players like Missouri S&T are glowing examples of the possibilities that I had described in my previous sentence. In the age of competition from other local universities, threat of low enrollment and increasing online college options for students, Southeast cannot afford to lag behind by not having a Master's option in the Computer Science department.

In conclusion, I fully support the efforts of the Dept. of Computer Science as they pursue to establish Master program. Any programs that can help our students to have better opportunity in their career or future endeavors will benefit our students, campus, and the community at large.

Sincerely,

Dr. Sandipan Sen, PhD.
Associate Professor of Marketing,
Department of Management and Marketing,
Donald L. Harrison College of Business,
Southeast Missouri State University,
Dempster Hall 220, MS 5875
One University Plaza
Cape Girardeau, MO 63701
Email: ssen@semo.edu
Phone (O): 573-651-2194
Fax (O): 573-651-2909

ACCRETIVE HEALTH
results providers trust
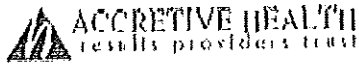
Letters of Support

10/14/2015

Dr. David Probst, PhD, Chair Person
Southeast Missouri State University
Dept. of Computer Science
One University Plaza, MS 5950
Cape Girardeau, 63701 MO

Dear Dr. Probst, Chair of Dept. of Computer Science

As one of the largest employers in Cape Girardeau area, I am pleased that, MS Program is being submitted to the Missouri Department of Higher Education by Department of Computer Science at Southeast Missouri State University.

Historically so far we have been relying on the Department of Computer Since to provide skillful talented resources and we were successfully able to harvest some of the most talented minds, primarily due to the department's effort to develop programs to meet the needs of our industry.

As you are aware the Health Care Industry is going through various phases of change from ICD10 to Population health etc. This ever changing Healthcare Industry in our space of Revenue Integrity and variance analysis, Analytics requires building advanced computing and predictive models.

It is more than ever there is a great need of higher academic programs like MS in Computer Science, to feed the needs of this market space.

In conclusion, I fully support the efforts of the Dept. of Computer Science as they pursue to establish Master program. Any programs that can help our students to have better opportunity in their career or future endeavors will benefit our students, campus, and the community at large.

Sincerely,

Rakesh Krishna Bhatt
Director Information Technology and Technology Development
Accretive Health

BIG RIVER
COMMUNICATIONS

To State of Missouri Department of Higher Education:

Please consider this letter as an endorsement of Southeast Missouri State University adding to it degree curriculum, the Master of Science in Applied Computer Science. Being a graduate of the Computer Science program at Southeast Missouri State, I have been impressed with the quality of growth in the technology sector as it relates to Southeast keeping their coursework relevant. As a local employer of many graduates from Southeast's Computer Science, Telecommunications, and Cybersecurity programs, it's my belief that the Master of Science in Applied Computer Science, would add another step in the right direction in producing graduates that would be ready to go directly into the workforce at a managerial level and not just at an entry level.

Sincerely,

Chris Foeste
General Manager
Big River Communications

Letter of Support
11/11/15

Dr. David Probst, PhD, Chair Person
Southeast Missouri State University
Dept. of Computer Science
One University Plaza, MS 5950
Cape Girardeau, 63701 MO

Dear Dr. Probst, Chair of Dept. of Computer Science

It is my pleasure to write a letter in support of the MS Program being submitted to the Missouri Department of Higher Education, by Department of Computer Science at Southeast Missouri State University.

I graduated with a degree in Computer Science, from Southeast Missouri State University, in the year 2012. The department consist of highly educated professors that strive for student success. This program is very important in today's technological world, and I think a Master's program will be of great benefit to the students at Southeast. After working at various private companies, I am back at the university as an LMS administrator. During my work experience, I have learned the importance of the computer science degree, and the impact good programmers can make in this world. Our department is always looking out for talented developers who are capable of designing effective software to enhance student learning. I am sure other private companies in the area are looking for skilled graduates who can be a part of their team. I think a Master's degree will help students gain an expertise in the field that will benefit the community.

In conclusion, I fully support the efforts of the Dept. of Computer Science as they pursue to establish Master program. Any programs that can help our students to have better opportunity in their career or future endeavors will benefit our students, campus, and the community at large.

Sincerely,
Kumar G. Kashyap
LMS administrator
Office of Instructional Technology
Southeast Missouri State University

November 7, 2015

Dr. David Probst, PhD, Chair Person
Southeast Missouri State University
Dept. of Computer Science
One University Plaza, MS 5950
Cape Girardeau, 63701 MO

Dear Dr. Probst, Chair of Dept. of Computer Science

It is my pleasure to write a letter in support of the master's program being submitted to the Missouri Department of Higher Education by Department of Computer Science at Southeast Missouri State University.

I received a Bachelor's degree in Computer Science from Southeast Missouri State University in 2010. I also received a master's degree in Computer Science from Southern Illinois University Carbondale in 2012. I am currently the technical director for the software company Vintage Software, based just outside of Cape Girardeau, Missouri.

Over the last several years, I have worked very closely with the Department of Computer Science at SEMO. We have sponsored several senior projects and have interviewed and hired many SEMO students. Currently, eight of our software developers are SEMO graduates from the Department of Computer Science.

There is a growing need for Computer Science graduates in the southeast Missouri area, specifically in and around Cape Girardeau. Currently, students are forced to leave the area if they wish to pursue a master's degree in computer science. The nearest university to offer a master's degree in computer science is out of state in Carbondale, IL. For this reason, there is pressure on computer science students and businesses to leave the Cape Girardeau area. In fact, Vintage Software was forced to open a new office in St. Louis, Missouri and relocate several employees in an effort to find potential employees with a higher level of education.

In conclusion, I fully support the efforts of the Department of Computer Science as they pursue to establish a master's program. Any programs that can help students have better opportunities in their career or future endeavors will benefit the students, campus, and the community at large.

Sincerely,

Steven Haar
Technical Director
Vintage Software, LLC
100 South High St.
Jackson, MO 63755

element74

September 23, 2016

Dr. David K. Probst, Ph.D., P.E.
Chairperson, Department of Physics and Engineering Physics
Chairperson, Department of Computer Science
Southeast Missouri State University
Cape Girardeau, MO 63701

RE: Southeast Missouri State University Proposed Master of Science in Applied Computer Science

Dear Dr. Probst,

I am writing on behalf of the Element 74 leadership team to express our sincere support for the proposed Applied Computer Science MS degree program at Southeast Missouri State University. Element 74 is a leading digital production company located in Cape Girardeau. Our company was founded in 2000 and provides a wide range of comprehensive digital services, including website implementation and custom software development. We foster a collaborative environment that maintains cutting-edge standards in strategic design and intelligence while producing innovative solutions. Over half of our talented employees completed their undergraduate work at Southeast and were hired for the education and cutting edge skill sets they gained while studying there.

By creating different paths of specialized education, Southeast will strengthen both the business sector and the students who wish to pursue a career path in computer science-associated enrollments. Degrees, together with accompanied programs that specialize in these industries, would best prepare the graduates with essential relevant experience and information. Courses such as *Distributed Cloud Computing, Advanced Artificial Intelligence, Mobile Computing, Advanced Robotics* and *Emerging and Converging Technologies and Computing* prepare students to face the future of technology with competence, confidence and enthusiasm.

Chris Edmonds, our founder and president, understands the fast innovation of our industry and is passionate about attracting and recruiting the most diverse and skilled talent that Southeast has produced. Element 74 continues to evolve as new grads work alongside experienced programmers, front end developers and technical project managers. This shared knowledge ensures we will remain ahead of new technology and maintain growth and viability in the market through expertise. With Southeast's dominating presence in the education of these talented graduates and the desire to further that education with this program, we see a bright future. Our experience has been nothing less than exceptional, and we embrace further opportunities to facilitate collaboration with the University to foster the growth of our business model and our region's economy.

Please accept this letter as an endorsement from Element 74, and let it bear testimony to the great level of commitment, dedication and quality of education provided by Southeast. If you have any questions, please feel free to contact us at (573) 332-7474.

Sincerely,

Dharshaka Dias
General Manager / COO

NewellRubbermaid

Brands That Matter

Dear Dr. Probst,

I am writing to express the need for highly qualified Computer Science Professionals in industry. Data collection from manufacturing processes is becoming more crucial to the continuous improvement methods manufacturers implement. Collecting data requires machine programming, software integration, data management and analysis skills. Technology constantly changes to meet the needs of industry. Having continuing and advanced educational opportunities is a key element for industries in maintaining personnel that have relevant skills to the marketplace.

Some of the critical skills needed include the ability to gather data from various PLC platforms, programming and interfacing with robots and storing data in databases that are either developed internally or purchased. Coinciding with these skills is being able to present the data in usable and accessible formats. The formats being used today included local network drives, SharePoints, clouds and World Wide Web sites. With data being stored on networks and SharePoints that are accessible via the internet, data security is also vital to industry. I am pleased to see the proposed program meets these needs.

Just as academia has increased its use of computer and networked technologies in delivering, distributing and enhancing educational opportunities, industry is taking the same steps to maintain competitiveness in the marketplace. It is encouraging to see Southeast take steps to maintain relevancy and provide opportunities to earn an advanced degree in such a crucial discipline as Computer Science.

Sincerely,

Scott Seabaugh
Manager, PIC and Quality – Newell Brands
Jackson, MO

From: Dahiya, Jai
Sent: Tuesday, September 20, 2016 10:58
AM
To: Probst, David
Subject: Greetings

Good morning Dave,

It was very nice to visit with you a couple of weeks ago at the Physics & Engineering Physics Department at Southeast Missouri State University. I really appreciate you giving me some time to visit with the Advanced Physics Lab which I thoroughly enjoyed during my tenure in that department. As usual I really enjoy visiting with you and thanks a lot for the coffee.

As I mentioned to you during our conversation, every time I went to India while working at Southeast Missouri State University to recruit students, I saw a huge demand for a MS Program in Computer Science. As a matter of fact close to 50% of the students I met every time wanted to get admission in the MS program and since Southeast did not have the program, that was a huge disappointment for me turning those students away.

Right now I am working as the Director of International Programs at Our Lady of the Lake University in San Antonio, Texas. I have been to India twice during this role and even this time the demand for the MS in Computer Science or even Cyber Security was huge. I just cannot tell you how many smart students you can get from India and Sri Lanka to study MS in Computer Science and Cyber Security.

Therefore, it will be an extremely important step for Southeast to have an MS program in Computer Science. Even I will be able to get large number of students from India for that program.

Kind

regards,

Jai

Jai N. Dahiya, Ph.D.
Director International
Programs
Our Lady of the Lake
University
San Antonio, Texas

The Department of Computer Science is allocated money yearly to support equipment and departmental needs that can be used to support the master's program. In addition, beginning this fiscal year, additional funding has been allocated by the State to support the Cybersecurity program. Therefore, current department funding is adequate to support the addition of this proposed Master of Science in Applied Computer Science.

Appendix 2: References

- United State Bureau of Labor Statistics (BLS) Web Site. Occupational Employment Statistics (OES) Survey Bureau of Labor Statistics, Department of Labor website: http:/stat.bls.gov/oes/home.htm (accessed November 2015)
- BLS Occupation Outlook Handbook and Missouri Economic Outlook 2012-2018. Missouri Employment Outlook, 2018-2018: website: https://www.missourieconomy.org/pdfs/mo_empl_outlook.pdf (accessed November 2015)
- Analysis: The exploding demand for computer science education, and why America needs to keep up. TAYLOR SOPER on June 6, 2014 http://www.geekwire.com/2014/analysis-examining-computer-science-education-explosion/ (accessed November 2015)

Appendix 3: Explanation of Financial Projections

<u>Recurring Expenditures – other</u>
- Requesting to cover the expenses of 2 Graduate teaching assistants

- The following are approximates:

- Tuition for one hour: $260.80 + $20.00 program fee = $280.80

- Total tuition (graduate course work) for 24 hours (one year including fall, spring and summer) = $6739.20

- General fees: 303.30

- Stipend for one year: 8467.20

- Total for One graduate assistant = $15,509.70

- Total for Two graduate assistants = $31019.40

<u>Revenue – tuitions and fees (projection – actual will vary)</u>
- Projected Number of students
- Estimated Tuitions and fees for full time student (Missouri State Resident): 9 hours x $280.80 = 2527.20 + other common fees $215.00 = $2742.20
- Estimated Tuitions and fees for part time student (Missouri State Resident): 6 hours x $280.80 = $1684.80 + other common fees $215.00 = $1899.80

Year		1	2	3	4	5
Full Time	# students	5	10	11	12	13
	Estimated tuition	$27422.00	$54844.00	$60328.40	$65812.80	$71297.20
Part Time	# students	3	6	10	14	16
	Estimated tuition	$11398.80	$22797.60	$37996.00	$53194.40	$60793.60
Total	# students	8	16	21	26	29
	Estimated tuition	$38820.80	$77641.60	$98324.40	$119007.20	$132090.80

Appendix 4: Short Biographies of Faculty

Amer, Suhair H., Ph.D.: Dr. Amer is an Associate Professor in the Department of Computer Science at Southeast Missouri State University. She received her Ph.D. degree in Computer Science and Software Engineering from Auburn University in 2008, a Master of Science in Computer Science from The American University in Cairo and Bachelor of Science in Computer Science from The American University in Cairo. Her Ph.D. dissertation topic: Danger Theory Based Host-Based Intrusion Detection. Her Thesis Topic: Image Compression of Facial Photographs based on BTC/TSVQ Local Processing. Her Capstone Experience topic: Introducing Kernel Level Threads to Linux operating System version 2.x.Her research interests include biologically inspired computer and security systems, human computer interaction, , image processing, simulation, and e-learning. She is the faculty adviser of the ACM and ACMW student chapters at Southeast Missouri State University. She is currently the past-president of the Phi Kappa Phi chapter 260.

Anand, Vijay, Ph.D.: Dr. Vijay Anand received a Bachelor's of Engineering (B.E) in Electrical Engineering from Utkal University (India) in 1999 and Masters of Science (M.S) in Computer Engineering from Illinois Institute of Technology (IIT, Chicago) in 2001. After finishing qualifiers of the Doctorate in Philosophy (PhD) program in 2004 at Illinois Institute of Technology he worked in industry in various capacities as Embedded Security Architect at Motorola, Senior Security Engineer at PALM Inc. and, Security Research Engineer in Computation Institute. In 2011 he received a PhD Degree (Thesis Title: Security Policy Management, Threat Alleviation and Secure Digital Commercial Services for Embedded Computing Systems) in Computer Engineering from Illinois Institute of Technology (IIT, Chicago). His interests include real-time adaptability of Trusted Platform Modules (TPM) to evolving threats, process institutionalization and improvements of security frameworks, intrusion detection techniques, secure data transfer, and human interaction aspect of using a security technology and, security and privacy concerns of digital assets in trustworthy computing. Dr. Anand is currently working as an Assistant Professor at Southeast Missouri State University from Fall 2011. He teaches courses in Cybersecurity and Networking programs and is the faculty advisor of the Cyber Defense Club at Southeast. He is also the state director of Missouri for Collegiate Cyber Defense Competition.

Liu, Ziping, Ph.D.: Dr. Liu is a Professor in the Department of Computer Science at Southeast Missouri State University. She joined the faculty of Southeast Missouri State University in 2001. During 2000 – 2001, she worked in industry as software engineer at Motorola. She received her PhD of Engineering Science from Southern Illinois University at Carbondale in 1999. Her research interests include data communication and computer networking, wireless ad hoc network/sensor network, modeling and simulation of wireless network, distributed computing, wireless network security, game development and game AI, application software development.

Naugler, David, Ph.D.: Dr. Naugler is a Professor of Computer Science at Southeast Missouri State University. He received his Ph.D. in 1975 from Dalhousie University in Canada. He taught at Mount Saint Vincent University from 1975 until 1981 when he joined the Computer Science Department at Southeast. He has a wide range of interests including functional programming and HPC.
Zhang, Xuesong, Ph.D.: Dr. Zhang is a professor in the Department of Computer Science at Southeast Missouri State University. He Received his Ph.D. in Molecular Science in Physics Department at Southern Illinois University in 1991, a Master of Science in Physics at Southern Illinois University in 1989, a Master in Science in Computer Applications at Northeast Normal University in 1986, and a Bachelor in Computer and Electric Engineering in 1975. Some of his past and current research interests are in the following areas: Instrumentation in Physics and Engineering, Semiconductor Physics, Computer Architectures, Artificial Intelligence, Robotics.