

**Missouri State University**  
**Curricular Proposal – New Program**  
**(MAJOR, OPTION, MINOR, CERTIFICATE, OR CERTIFICATION)**

**RECEIVED**  
 SEP 14 2015  
 BY: \_\_\_\_\_

This form is to be used for internal Missouri State approval of any proposal for a new program involving two or more courses, including any new graduate program, new undergraduate major (whether comprehensive or non-comprehensive), new option within an existing program (whether graduate or undergraduate), new minor, new certificate, or new certification program.

New graduate programs, new undergraduate majors, and certificate programs involving more than 18 credit hours require approval by the CBHE as well as approval through the Missouri State curricular process. CBHE applications for such programs are processed through the Office of Institutional Research. All proposals for new programs requiring CBHE approval should progress through the Missouri State curricular process accompanied by a draft of the required CBHE documentation.

Department Computer Science

Date Aug. 25, 2015

Attach on separate sheets (1) statement of rationale and objectives, (2) estimated costs for first five years, and (3) complete catalog description (including new courses and course changes pending approval). [Note: For new programs requiring CBHE approval, CBHE forms NP, PS, and PG will satisfy #1 and CBHE form FP will satisfy #2.]

**PROPOSED PROGRAM** Create a second option to Computer Science degree, "Software Development"

Major  Comprehensive Major  Option X Minor  Certificate  Certification  Academic Rules  Other

Degree Applicability Bachelor of Science

General Education Courses Required ECO 165, PSY 121, ENG 321 *Note: The two options have different General Education requirements.* Total Hours 9

General Education Courses Recommended N/A Total Hours 0

Requirements (Including Admission) and Limitations for Specific Degree Not applicable

Courses Required in Department See attached sheet

Total Hours 38

Courses Required in Other Departments See attached sheet

Total Hours 22-26

Prerequisites for Required Courses MTH 215(3), MTH 261(5), MTH 280(5) *Note: The two options have different Prerequisites for Required Courses.*

Recommended Electives in Department None Total Hours 0

Recommended Electives in Other Departments None Total Hours 0

Limitations on Electives At most 6 hrs of CSC 399 may be counted. At most 3 hrs of CSC 596 may be counted

**DEPARTMENT** Route according to ART VI, SEC 3B(1-4) of Bylaws of the Faculty Senate. Attach New Program Resource Information form (FS-302a/06) and forward three typed, originally signed forms to one of the following (please mark all that apply). If the program needs to go through more than one committee/council, forward one additional form for each additional council/committee marked.

College Council (Send all new undergraduate programs through College Council as first step before forwarding either to PEC, CGEIP, or directly to Faculty Senate)

Professional Education Committee (All proposals affecting BS and MS in Education and Educational Specialist degrees)

Committee on General Education and Intercollegiate Programs (All general education and multi-college programs)

Graduate Council (All graduate programs)

Signature Kenneth Tollman  
 Department Head

Date 8/27/15

(Routing on Reverse Side)

ROUTING

1. COLLEGE COUNCIL (ART VI, SEC 3B)

✓ APPROVED

After dean review/comment, forward two signed copies of final action to the Secretary of the Faculty for disposition, or forward appropriate number of copies to next committee level for approval.

       DISAPPROVED Return one signed copy of final action to the appropriate Department Head.

Comment(s) \_\_\_\_\_

Signature Mark N. [Signature] Date 9-8-2015  
Chairperson

2. DEAN OF THE COLLEGE (ART VI, SEC 5)

✓ REVIEWED

Return to College Council Chair within ten days of receipt for disposition.

Comment(s) OK \_\_\_\_\_

Signature [Signature] Date 9/8/15  
Dean of the College

3. PROFESSIONAL EDUCATION COMMITTEE (ART III, SEC 9)

       APPROVED

Forward two signed copies of final action to the Secretary of the Faculty for disposition, or forward three signed copies to next committee level for approval.

       DISAPPROVED Return one signed copy of final action to the appropriate Department Head.

Comment(s) \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_  
Chairperson

4. COMMITTEE ON GENERAL EDUCATION AND INTERCOLLEGIATE PROGRAMS (ART IV, SEC 2)

       APPROVED

Forward two signed copies of final action to the Secretary of the Faculty for disposition, or forward three signed copies to next committee level for approval.

       DISAPPROVED Return one signed copy of final action to the appropriate Department Head.

Comment(s) \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_  
Chairperson

5. GRADUATE COUNCIL (ART V, SEC 3, OR ART VI, SEC 3B)

       APPROVED

Forward two signed copies of final action to the Secretary of the Faculty for disposition.

       DISAPPROVED Return one signed copy of final action to the appropriate Department Head.

Comment(s) \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_  
Chairperson

6. FACULTY SENATE (ART VI, SEC 9)

       APPROVED

       DISAPPROVED

Comment(s) \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_  
Chairperson

7. PROVOST (ART I, SEC 6; ART VI, SEC 9)

       RECOMMENDED TO PRESIDENT

       NOT RECOMMENDED TO PRESIDENT

Comment(s) \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_  
Provost

8. PRESIDENT

       APPROVED

       DISAPPROVED

Comment(s) \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_  
President

### NEW PROGRAM RESOURCE INFORMATION

Program Title and Degree: \_\_\_\_\_ Computer Science, Software Development Option \_\_\_\_\_

Department: \_\_\_\_\_ Computer Science \_\_\_\_\_

Attach on separate sheets (1) statement of rationale and objectives, (2) estimated costs for first five years, and (3) complete catalog description (including new courses and course changes pending approval).  
 [Note: For new programs requiring CBHE approval, CBHE forms NP, PS, and PG will satisfy #1 and CBHE form FP will satisfy #2.]

1. Is another program being deleted or altered? \_\_\_\_\_ Yes \_\_\_\_\_X\_\_\_\_\_ No

*Explanatory notes to the statement that no other program is being altered*

*Prior to this proposal, the Computer Science degree program had no options but simply one degree program. This proposal creates two options to the Computer Science degree program: one option is effectively a restatement of the existing degree as an "option," and the second option is the new option of this proposal.*

*With simultaneous effectivity to this "second CS option" proposal, we will revise the core portion of the Computer Science degree to incorporate new curricular material to meet recommendations of professional CS advisory groups.*

*This proposal ADDS three courses required for one or both degree options, totalling 8 credit hours that support the two-option degree plan and incorporate the new curricular material. (Add CSC 344(3), 338(2), 455(3) for a total of 8 hours).*

*Upon approval of this proposal, a follow-up proposal will DELETE existing but no-longer-necessary CSC courses. (Delete CSC 460(3), 320(4), reduce 333(4) to 333(2) for a total of 9 hours).*

*The overall result of this proposal and its follow-up proposals will be to create a two-option Computer Science degree program while REDUCING core required hours by 1 credit hour.*

2. If this program affects other departments or colleges, has a memo showing how it will affect them been attached to the proposal? \_\_\_\_\_ Yes \_\_\_\_\_ No

3. What justification is being provided to support this proposal? (Current research, accreditation, certification or licensing requirements, other.)

The existing Computer Science degree is accredited by the Computing Accreditation Commission of ABET. Minimal ABET requirements are Math courses that make a Math minor, so the existing degree contains little flexibility and high math content. As a result, students who are interested in Computer Science with a broader scope, or a different scope, are not served by the existing Computer Science degree program. Student retention rates are low in part because students seek a program with a wider scope. We believe that the proposed degree option will increase retention and graduation of existing students by providing a second path to Computer Science degree completion with a broader focus and reduced level of mathematics.

4. If your response to #3 refers to existing or potential student demand, please indicate the activities undertaken to estimate or verify the potential or existing demand for this new program.

Multiple news reports, studies, and employer interest in MSU CSC graduates demonstrate the demand for graduates in computer science fields. At the same time, an overwhelming number of student comments have been that they are interested in computer science and software development but are for many reasons not willing to complete the high extent of math required in our existing program. We have surveyed our Advisory Board, consisting of alumni and friends in management positions in the computer industry, and they have endorsed the creation of the Computer Science degree option with a broader focus and reduced level of mathematics as described here.

5. What are the present/future projected enrollments for this program?

1st year 25                      3rd year 80

In five years, how many students must be:

- a) declared minors to justify this new minors continuation \_\_\_\_\_  
b) declared majors to justify this new majors continuation 50

6. Which of the following would be needed to implement the proposed program? (Check all that apply.) Individuals responsible for specific areas outside of your college must be consulted.

- Additional library holdings?                       Yes  No  
Additional technology or other supplies?                       Yes  No  
Additional or remodeled facilities?                       Yes  No  
Additional travel funds?                       Yes  No  
Additional faculty?                       Yes  No  
Additional support staff?                       Yes  No  
Other additional expenses?                       Yes  No

7. Have the individuals responsible for allocation of these resources been contacted to ensure the availability of these resources by the time the program is implemented?  
 Yes  No  Yes, but cannot ensure availability

8. Referring to question 6, if additional faculty are not required, please provide a statement as to how faculty will be made available to teach proposed new courses, if any, or to manage increased enrollments in existing courses which are to be included in the proposed new program.

Estimated costs for the first five years are minimal in that the course changes require no resources and cause a low extent of increase in teaching load (expected to be within the workload of existing faculty plus the faculty hired by a search authorized for 2015-2016).

- All but one course changes which accompany this proposal are curricular changes recommended by professional bodies. Those changes would have been necessary in any event to maintain ABET accreditation.
- The implementation of new curricular recommendations is a net **reduction** of 1 credit hour to the hours to complete the existing *Computer Science degree, Computer Science option*.
- The implementation of a new *Computer Science degree, Software Development option* adds one 3-hr course that is required for CS-SD option. That course is an elective to CS-CS option and is expected to additionally receive student registration from that demographic.

Teaching loads are expected to be within the normal workload of existing faculty plus the faculty hiring search which has already been authorized for 2015-2016.

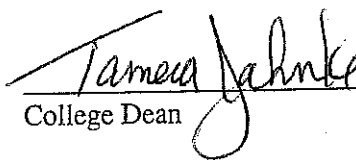
9. If the responses to question 1 and any parts of question 6 other than additional faculty are "no," please provide a statement as to how the department/school (or center or college) will manage the enrollment figures provided in question 5.

Not applicable

The signature of the individuals listed below ensures that the items above have been addressed and the resources needed will be made available when the program is implemented.



Department Head



College Dean

(Attachment to supplement cover sheet of this proposal)

Courses Required in Department CSC 130(3), 131(4), 232(4), 335(3), 338(2), 344(3), 365(3), 450(3), 482(1), CSC 455 (3),  
Nine hours of CSC elective courses

Total Hours 38

Courses Required in Other Departments

MTH 215(3) or 261(5)\*;

four hours from the following courses: BIO 121(4)\*; BMS 110(3)\* and 111(1)\*; GLG 110(4), GRY 135(4), GRY 142(4), CHM 160(4) and CHM 161(1);

General Education courses ECO 165 (3), PSY 121(3), ENG 321(3);

additional science courses to total at least seven hours from among the following courses: BIO 121(4)\*; BMS 110(3)\* and 111(1)\*; GLG 110(4), GRY 135(4), GRY 142(4), CHM 160(4) and CHM 161(1); and PHY 203(5); one of the following: MKT 350(3) or MGT 340(3) or COM 315(3) or PSY 305(3) or PSY 481(3).

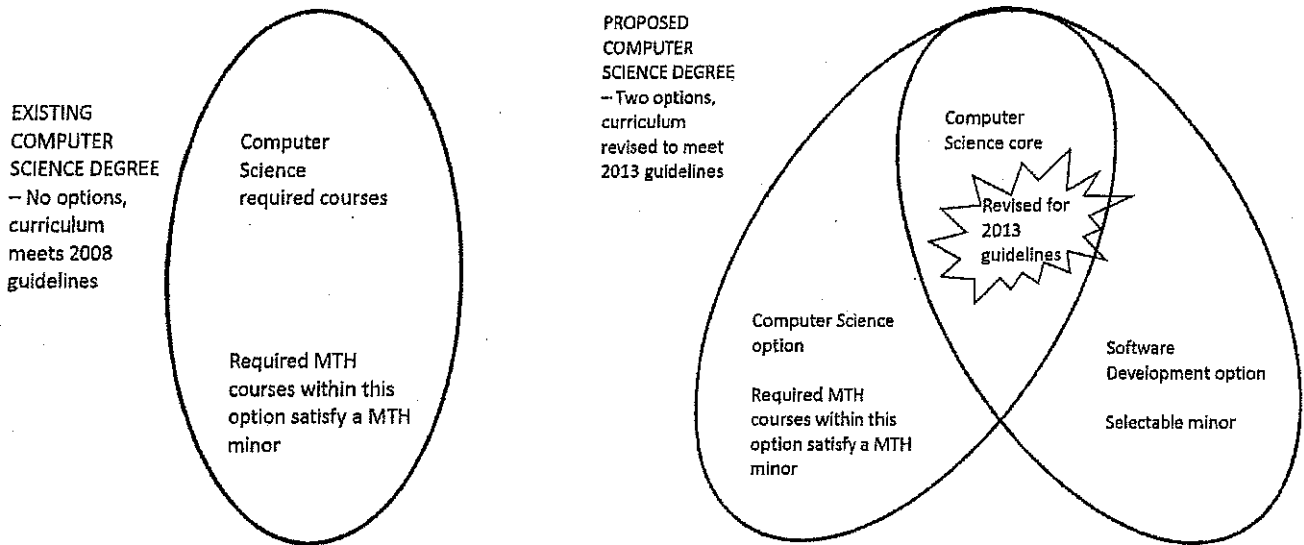
Select one of the following: MKT 350(3) or MGT 340(3) or COM 315(3) or PSY 305(3) or PSY 481(3). Other courses may be acceptable with department approval.

Total Hours 22-26

## 1. Statement of rationale and objectives

Prior to this proposal, the Computer Science degree program had no options but simply one degree program. This proposal creates two options to the Computer Science degree program: one option is effectively a restatement of the existing degree as an “option,” and the second option is the new option of this proposal.

With simultaneous effectivity to this “second CS option” proposal, we will revise the core portion of the Computer Science degree to incorporate new curricular material to meet recommendations of professional CS advisory groups.



The ACM/IEEE 2013 Curriculum at <https://www.acm.org/education/CS2013-final-report.pdf> has modified levels of coverage of topics in Computer Science. The new guidelines include substantial reductions in some long-standing and traditional CS curricular topics, and some new material. At the same time, we seek to serve students with a different career focus than those who are served by the existing Computer Science degree plan.

Both these changes are contained in this proposed change to the Computer Science B.S. degree program, which creates two options while incorporating the new curricular recommendations.

The implementation of new curricular recommendations is a net reduction to the existing Computer Science degree, Computer Science option of 1 credit hour. Although new courses are added, some have also been deleted.

The proposed changes maintain ABET compliance applicable to the existing Computer Science degree (which as a result of this proposal becomes the Computer Science degree -- Computer Science option).

The objectives are to update the Computer Science curriculum to the most recent professional recommendation, and to serve a broader spectrum of student interests through a second option to the Computer Science major.

Upon approval of this proposal, a follow-up proposal will DELETE existing but no-longer-necessary CSC courses. (Delete CSC 460(3), 320(4), reduce 333(4) to 333(2) for a total of 9 hours).

The overall result of this proposal and its follow-up proposals will be to create a two-option Computer Science degree program while REDUCING core required hours by 1 credit hour.

## 2. Estimated costs for the first five years

Estimated costs for the first five years are minimal in that the course changes require no resources and cause a low extent of increase in teaching load (expected to be within the workload of existing faculty plus the faculty hired by a search authorized for 2015-2016).

- All but one course changes which accompany this proposal are curricular changes recommended by professional bodies. Those changes would have been necessary in any event to maintain ABET accreditation.
- The implementation of new curricular recommendations is a net **reduction** of 1 credit hour to the hours to complete the existing *Computer Science degree, Computer Science option*.
- The implementation of a new *Computer Science degree, Software Development option* adds one 3-hr course that is required for CS-SD option. That course is an elective to CS-CS option and is expected to additionally receive student registration from that demographic.

Teaching loads are expected to be within the normal workload of existing faculty plus the faculty hiring search which has already been authorized for 2015-2016.

## 3. Complete catalog description

### Major(s)

#### Computer Science (Non-Comprehensive)

##### Bachelor of Science

	THESE COLUMNS ARE EXPLANATORY NOTES ----- NOT TO BE INCLUDED IN CATALOG!		
General Education Requirements - see <u>General Education Program and Requirements</u> section of catalog	Credit hours in the Computer Science option	Credit hours in the Applied Computing option	Notes
<b>Major Requirements</b>			
1. <u>CSC 130(3)</u> , <u>131(4)</u> , <u>232(4)</u> , <u>335(3)</u> , <u>338(2)</u> , <u>344(3)</u> , <u>365(3)</u> , <u>450(3)</u> , <u>482(1)</u>	26 hours	26 hours	42-44 cr hrs in the common part of the two degree options.
2. Select nine additional hours from CSC 399, MTH/CSC 421, or CSC courses numbered 500 or higher, with at least six hours from courses other than <u>CSC 399</u> and <u>CSC 596</u> .  <i>(The rule "six hours from courses other than CSC 399 and CSC 596" applies to this set of courses only.)</i>	9	9	
3. Related mathematics requirements: select at least one of <u>MTH 215(3)</u> or <u>261(5)*</u>	3-5	3-5	
4. Related science requirements: select at least four hours from the following courses: <u>BIO 121(4)*</u> ; <u>BMS 110(3)*</u> and <u>111(1)*</u> ; <u>GLG 110(4)</u> , <u>GRY 135(4)</u> , <u>GRY 142(4)</u> , <u>CHM 160(4)</u> and <u>CHM 161(1)</u> ; Other science or math courses may be acceptable with department approval.	4	4	
5. Public Affairs Capstone Experience will be fulfilled by completion of <u>CSC 335(3)</u> , <u>365(3)</u> , and <u>482(1)</u> .			
6. Select one of the following options:			
a. Computer Science			
1. <u>CSC 325(3)</u> , <u>333(2)</u> , <u>460(3)</u>	8		29-31 cr hrs in the unique part of the Computer Science option. The number of hours is
2. Related mathematics requirements: <u>MTH 215(3)</u> , <u>261(5)*</u> , <u>280(5)</u> , <u>MTH 345(3)</u> or <u>540(3)</u>  <i>(Note: These required MTH courses and credit hours automatically satisfy the requirements for a minor in</i>	11-13 more		



<i>Mathematics.</i>				
3.	PHY 203 (5).	5		deceptively high
4.	Select additional science or math courses other than to total at least fourteen hours among the following courses: <u>BIO 121(4)*</u> ; <u>BMS 110(3)*</u> and <u>111(1)*</u> ; <u>GLG 110(4)</u> , <u>GRY 135(4)</u> , <u>GRY 142(4)</u> ; <u>CHM 160(4)</u> and <u>CHM 161(1)</u> ; <u>PHY 204(5)</u> ; and MTH courses numbered 400 or higher. Other science or math courses may be acceptable with department approval.	5 more		because it includes 16 hrs which complete a math minor.
b. Software Development				
1.	CSC 455 (3).		3	12-14 or hrs in the unique part of the Software Development option
2.	Select three additional hours from eligible CSC courses numbered 500 or higher excluding 596. At most 6 hrs of CSC 399 may be counted.  <i>(The rule "At most 6 hrs of CSC 399 may be counted." applies to this degree option, not all degree options.)</i>		3	
3.	ECO 165 (3), PSY 121(3), ENG 321(3). Each of these courses may also count toward or satisfy General Education requirements.		(no additional required hours because these are GenEd courses.)	
4.	Select additional science courses to total at least seven hours from among the following courses: <u>BIO 121(4)*</u> ; <u>BMS 110(3)*</u> and <u>111(1)*</u> ; <u>GLG 110(4)</u> , <u>GRY 135(4)</u> , <u>GRY 142(4)</u> , <u>CHM 160(4)</u> and <u>CHM 161(1)</u> ; and <u>PHY 203(5)</u> . Other science or math courses may be acceptable with department approval.		3-5 more	
5.	Select one of the following: <u>MKT 350(3)</u> or <u>MGT 340(3)</u> or <u>COM 315(3)</u> or <u>PSY 305(3)</u> or <u>PSY 481(3)</u> . Other courses may be acceptable with department approval.		3	
7.	Minor Required  <i>The "Computer Science" option contains required courses that satisfy a Math minor.</i>	No further hours are included here because MTH minor is met within required courses	Number of hours varies with choice of minor. 17-22?	
8.	General Baccalaureate Degree Requirements - see <u>General Baccalaureate Degree Requirements</u> section of catalog			
		TOTAL Credit hours in the Computer Science option 71-75	TOTAL Credit hours in the Applied Computing option 71-80	

\* May also count toward General Education requirements

(Attachment for new course pending approval)

### **CSC 338 Parallel And Distributed Computing**

Prerequisite: "C" or better in CSC 232; and CSC 344 or concurrent enrollment.

Introduction to parallel and distributed computing through algorithms, strategies for problem decomposition, system architecture, implementation strategies, and performance analysis.

Credit hours: 2

Lecture contact hours: 2

Lab contact hours: 0

Typically offered: Fall, Spring

### **CSC 344 Computer Systems Fundamentals**

Catalog description:

Prerequisite: CSC 232

An integrated introduction to computer systems fundamentals. Topics include computer architecture and major components, operating system concepts and implementation techniques (processes, threads, memory management, and distributed systems), and network theory, concepts and techniques.

Credit hours: 3

Lecture contact hours: 3

Lab contact hours: 0

Typically offered: Fall, Spring

### **CSC 455 Software Quality Assurance and Project Management**

**Pre-requisite:** CSC 232

**Credit Hours:** 3

**Periodicity:** Fall

**Catalog Description:**

A broad coverage of software quality and testing including quality assurance, inspections and reviews, software validation and verification, various testing techniques, and related tools. Other topics are essential software project planning steps, cost estimation, productivity metrics, release and configuration management concepts. May be taught concurrently with CSC 655. Cannot receive credit for both CSC 455 and CSC 655.

Credit hours: 3

Lecture contact hours: 3

Lab contact hours: 0

Typically offered: Fall