## Curriculum Proposal

**CS 19-20 #14**

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<th>Packet Contents</th>
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<td>1.1 Summary</td>
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**Course Modification**

1.2 CS 4298/5298 Compiler Construction (3 credits); prerequisite change (Undergraduate change only)

1.4 CS 4390/5390 Social, Ethical, and Professional Issues in Computing (2 credits) to CS 4390 Social, Ethical, and Professional Issues in Computing (3 credits); description change

**Course Add**

1.7 CS 4410 Digital Image Processing (3 credits)

**Program Modifications**

1.12 Computer Information Systems, B.S. major

1.15 Computer Science, B.S. major

1.18 Computer Science minor

1.21 Signatures
**BSU Curriculum Forms**

**Form 1**

**Curriculum Modification Summary**

College: Business, Mathematics, and Science  
Department: Mathematics and Computer Science  
Program: Computer Science  
Proposers: Marty J. Wolf, François Neville, Baozhong Tian  
Proposers’ position: CS program faculty

Describe the modification(s) you propose, and how it (they) will work to students' advantage. (This description and explanation will be included in Curriculum Report packets forwarded to the Faculty Senate.):

We are proposing three changes:

1. Increase CS 4390, Social, Ethical, and Professional Issues in Computing, from 2 credits to 3 credits  
2. Add CS 4410, Digital Image Processing, to the curriculum  
3. Allow COMM 2100, Career and Professional Communication, as an option in the major  
4. Add a pre-requisite to CS 4298

Change 1 will help us better meet the student learning outcomes for the course and the program. Change 2 will give students access to the expertise our newest faculty member brings, diversifying the subfields of computer science they can learn about. Change 3 gives students more flexibility in meeting one of the requirements for the major. Change 4 will enhance the student learning experience and success in the course.

**Modifications proposed (specify number of each):**

- **2** Course Modification(s) (form 2)  
- **1** New Course(s) (form 3)  
- **1** Course Drop(s) (form 4)  
- **3** Program Modification(s) (form 5)  
- **1** New Program(s) (form 6)  
- **1** Program Drop(s) (form 7)

The modifications affect (check):

- Liberal Education  
- Undergraduate Curriculum  
- Graduate Curriculum  
- Teacher Licensure Program(s)
BSU Curriculum Forms

Form 2
Updated 9/19/15

Course Modification Form

Current Course Number(s):
  Undergraduate: CS 4298
  Graduate: CS 5298

Proposed Course Number(s), if different:
  Undergraduate:
  Graduate:

Current Course Title: Compiler Construction
Proposed Course Title, if different:

Current Course Description: The theory, design, and construction of a compiler.
Prerequisite: CS 3528. May not be offered every year.

Note: Change to undergraduate prerequisites only
Proposed Course Description, if different:
The theory, design, and construction of a compiler. Prerequisite(s): CS 2810 and CS 3528. May not be offered every year.

Current Credits: 3
Proposed Credits, if different:

Current Prerequisite(s):
  Undergraduate: CS 3528
  Graduate: CS 5528
Proposed Prerequisite(s), if different:
  Undergraduate: CS 2810, CS 3528
  Graduate: no change

1) Reason(s) for change(s): CS 2810 covers computer organization and assembly language programming. The compiler constructed by students generates assembly language. Students who have a solid understanding of assembly language are in a much better position to successfully build a compiler, the main focus of the course.

2) May this modified course replace the current course for students remaining in the old curriculum? Yes _____ No _____ If not, please drop the current course and submit a new course form for the modification.

3) Do these modifications change any of the following? For all Yes answers, please provide updated information on the next page.
   Student Learning Outcomes Yes _____ No ___X__
Major Content Areas:  
1. scanning and scanners  
2. grammars, including BNF and EBNF  
3. parsing and parsers including LL(1) grammars and recursive descent parsing  
4. semantic processing  
5. the design and writing of a compiler

Student Learning Outcomes:

1. articulate the major steps of compilation.  
2. build a compiler for a programming language they design.

4) Current Course fee(s) per student: $  
Proposed Course fee(s) per student, if different: $  

5) Service Areas:

This course is a requirement or an elective in the programs/areas listed below. To locate where this course appears please search the online catalog, as follows:

a) go to http://www.bemidjistate.edu/academics/catalog/ and choose the most recent catalog(s),
b) click on “Areas of Study, and Course Descriptions,”  
c) click on “PDF of Entire Catalog” in upper right,  
d) press Ctrl F, and enter the prefix and number of the course(s) from this form.

Non-licensure programs:  
Computer Science, B.S. major (ok as 2810 is a required course in major)

Teacher Licensure programs:

Liberal Education:

The above “service area” programs/departments were notified of this modification on _______ (date) by ___________________ (mail, email, or phone).

Please check one of the items below:

______ No comments were received from other programs or departments within one week of the notification.

______ Comments were received within one week of the notification, and are attached.
BSU Curriculum Forms

Form 2
Updated 9/19/15

Course Modification Form

Current Course Number(s):
  Undergraduate:  CS 4390
  Graduate:  CS5390

Proposed Course Number(s), if different:
  Undergraduate:  
  Graduate:  

Current Course Title: Social, Ethical, and Professional Issues in Computing
Proposed Course Title, if different:

Current Course Description:  Features topics related to standards for computing professionals. Prerequisites: At least one CS course numbered 3000 or higher. Might not be offered every year.
Proposed Course Description, if different: Features strategies for analyzing the social, ethical, and professional implications of issues and decisions that computing professionals might encounter. Those strategies are practiced and refined in a variety of areas of concern for computing. Prerequisite(s): At least one CS course numbered 3000 or higher.

Current Credits: 2
Proposed Credits, if different: 3

Current Prerequisite(s):
  Undergraduate:  At least one CS course numbered 3000 or higher.
  Graduate:  At least one 5000- or 6000-level CS course.
Proposed Prerequisite(s), if different:
  Undergraduate:  
  Graduate:  

1) Reason(s) for change(s): (1) As part of our assessment of student learning in this course we identified that students were not achieving the proficiency we desired in using the analytical methods. Changes to pedagogy resulted in students being less proficient in other student learning outcomes. We reasoned that a reasonable approach was to increase the amount of contact time in order to better practice those analytical techniques. (2) The current course description is not informative. The proposed description is informative and reflects the student learning outcomes and the material covered in the course.

2) May this modified course replace the current course for students remaining in the old curriculum? Yes. If not, please drop the current course and submit a new course form for the modification.
3) Do these modifications change any of the following? **For all Yes answers, please provide updated information on the next page.**

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>X</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student Learning Outcomes</td>
<td>Yes</td>
<td>X</td>
<td>No</td>
</tr>
<tr>
<td>Major Content Areas</td>
<td>Yes</td>
<td>X</td>
<td>No</td>
</tr>
<tr>
<td>Projected Maximum Class Size</td>
<td>No</td>
<td><em>X</em></td>
<td></td>
</tr>
</tbody>
</table>

Learning outcomes and major contents areas will be updated to:

**Major Content Areas:**
1. standard ethical theories
2. privacy
3. intellectual property
4. networking
5. network security
6. computer system reliability
7. professionalism
8. codes of ethics applicable to computing professionals
9. computing’s impact on aspects of society and the economy

**Student Learning Outcomes:**
1. understand their responsibilities as a computing professional.
2. apply standard ethical theories to computing related scenarios.
3. create, analyze, and critique arguments surrounding social and ethical aspects of computing.
4. develop strategies to discuss concerns about social and ethical aspects of computing.
5. develop strategies for ethical decision making for computing ethics issues.

4) Current Course fee(s) per student: $ 

for:

Proposed Course fee(s) per student, if different: $ 

for:

5) Service Areas:

This course is a requirement or an elective in the programs/areas listed below. To locate where this course appears please search the online catalog, as follows:

a) go to [http://www.bemidjistate.edu/academics/catalog/](http://www.bemidjistate.edu/academics/catalog/) and choose the most recent catalog(s),
b) click on “Areas of Study, and Course Descriptions,”
c) click on “PDF of Entire Catalog” in upper right,
d) press Ctrl F, and enter the prefix and number of the course(s) from this form.

Non-licensure programs:
- Computer Information Systems. B.S. major (would increase major by 1 cr)
- Computer Science, B.S. major (would increase the major by 1 credit)
- Computer Science minor (no credit change as is select 6 credits)
Teacher Licensure programs:

Liberal Education:

The above “service area” programs/departments were notified of this modification on 7 September 7, 2019 by email.

Please check one of the items below:

X No comments were received from other programs or departments within one week of the notification.

_____ Comments were received within one week of the notification, and are attached.
BSU Curriculum Forms

Form 3
Updated: 9.19.15

New Course Form

Course Number:
Undergraduate: CS 4410
Graduate:

Course Title: Digital Image Processing

Course Description: This course covers techniques for image acquisition, transformation, enhancement, restoration, compression, segmentation and recognition. A brief introduction to advanced topics such as motion detection, optical flow, etc., is also included. Prerequisite(s): CS2322 and either Math 1470 or MATH 2471

Credits: 3

Prerequisite(s):
Undergraduate: CS2322 Computer Science II and either Math 1470 Precalculus or MATH 2471 Calculus I
Graduate:

1. Reason(s) for creating this course: It aligns with faculty expertise and is consistent with programmatic student learning outcomes.

2. How often will this course be offered? Every other year.

3. What are the student learning outcomes for the course (please precede each outcome with "Students will...")?

   Learning Outcomes: Upon completion of this course, students will:

   1. Understand the mathematical underpinnings of digital image processing.
   2. Develop image processing solutions such as image filters, histogram equalization, edge detection, etc., through computer projects and real image experiments, document with written reports.
   3. Develop an image processing system such as object tracking system, image editing system, etc., to meet a broad set of design specifications, working in teams, and presenting the results in formal reports.

4. What are the major content areas for the course?
   - Digital image fundamentals
   - Image enhancement in both spatial and frequency domain
5. Is this course repeatable for credit, and if so, what is the maximum number of credits that can be earned? This course is not repeatable

6. If this course is intended primarily for off-campus delivery (not offered on campus), what delivery mechanism will be used? The course is intended for on-campus delivery.

7. What is the projected maximum class size (cap)? 30

8. What qualified faculty will be available to teach this course? Baozhong Tian

NOTE WELL: Department and dean, in approving this proposal, attest both to the adequacy of the qualifications of faculty here named, and to their availability to teach the course at the frequency specified above, without excessive overload or disruption to other curriculum.

9. What additional library and other resources need or should be provided for this course, that are not already available? None.

10. What special personal property or service fee(s) would be charged to students taking this course? These charges would be for 1) items that are retained by the student and have an educational or personal value beyond the classroom, or 2) services that are on the student’s behalf (see MnSCU Board Policy 5.11).

No additional fee.

11. Attach a sample syllabus for the course. Note: if this course is double-numbered (u-grad/grad), the syllabus must include an additional component for graduate students.

See attached.
Bemidji State University
CS 4410: Digital Image Processing
3 credits

Instructor: Dr. Baozhong Tian Web site: http://cs.bemidjistate.edu/btian
Office: Sattgast Hall 207H
Email: baozhong.tian@bemidjistate.edu
Phone Number: (218)755-2495
Office hours: TBA

Class Times and Location: TBA


Course Description: This course covers techniques for image acquisition, transformation, enhancement, restoration, compression, segmentation and recognition. A brief introduction to advanced topics such as motion detection, optical flow, etc., is also included.

Prerequisite: CS2322 Computer Science II and either Math 1470 Precalculus or MATH 2471 Calculus I

Learning Outcomes: Upon completion of this course, students will:

1. Understand the mathematical underpinnings of digital image processing.
2. Develop image processing solutions such as image filters, histogram equalization, edge detection, etc., through computer projects and real image experiments, document with written reports.
3. Develop an image processing system such as object tracking system, image editing system, etc., to meet a broad set of design specifications, working in teams, and presenting the results in formal reports.

Evaluation Procedures and Criteria:

- Homework Assignments 20%
- Programming Assignments 40%
- Quizzes 5%
- Final Exam 30%
- Attendance, Participation 5%

Grades: A: 90-100%  B: 80-89%  C: 70-79%  D: 60-69%  F: < 60%

Makeups: Makeup exams will be given only if they are arranged in advance and there are extenuating circumstances.

Homeworks: All assignments must be submitted to D2L assignment folders. Please compress all files to be submitted into a single zip file before you submit it to D2L, so that when I extract the files, the file names are preserved instead of being changed by D2L system. Font-size no smaller than 10, no larger than 12, with line-spacing of 1.5 or 2 (double-spaced). Figures, graphs, etc., must be generated by graphing software and be embedded in your documents. Figures must always be labeled and captioned.
Late policy: Assignments are due by a specified date and time. In general, assignments turned in late will lose at least 10% per week for tardiness. No work will be accepted after two weeks beyond its due-date.

Attendance: You are strongly encouraged to attend classes and labs. If you miss one you are responsible for material covered in it. There may be occasional changes to dates or policies mentioned in class.

Time expectations:

<table>
<thead>
<tr>
<th>Instruction Delivery Mode</th>
<th>Hours of in class “Seat Time” per credit</th>
<th>Expected hours of course work outside of class per credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>1 hour/credit/week for 15 weeks</td>
<td>2 hours/credit/week for 15 weeks</td>
</tr>
<tr>
<td>Lab</td>
<td>2 hours/credit/week for 15 weeks</td>
<td>1 hours/credit/week for 15 weeks</td>
</tr>
<tr>
<td>Internships/Practicums</td>
<td>3 hours/credit/week for 15 weeks</td>
<td>As required</td>
</tr>
<tr>
<td>Online</td>
<td></td>
<td>3 hours/credit/week for 15 weeks</td>
</tr>
</tbody>
</table>

Academic Integrity:
BSU students are expected to practice the highest standards of ethics, honesty and integrity in all of their academic work. Any form of academic dishonesty (e.g., plagiarism, cheating and misrepresentation) may result in disciplinary action. Possible disciplinary actions may include failure for part or an entire course as well as suspension from the University. It is suggested that students review BSU’s statement on academic integrity found within the Student Code of Conduct.

Students with Special Needs:
If a student would like to request accommodations or other services, please contact the instructor as soon as possible. It is also possible to forward your request to Disability Services at Decker Hall 202. Phone: (218) 755-3883 or e-mail address: disabilityservices@bemidjistate.edu. This information is also available through Minnesota Relay Services at (800) 627-3529.

Mental Health and Counseling:
Students may experience mental health concerns or stressful events that may lead to diminished academic performance. The Student Center for Health & Counseling is available to assist you with concerns and can include stress relief services. They can be reached in Cedar Hall, First Floor. Phone: (218) 755-2053.

Additional Resources:
Tutoring: https://www.bemidjistate.edu/services/advising-success-center/services/tutoring/
It is your responsibility to use Starfish for requesting appointments, ask questions, and check for flags and kudos, and to follow up with actions if needed.

Supplemental Material:
Assignments may be made from the following readings. Note: these readings are not required unless they are explicitly mentioned in the notes or an assignment.
2. Digital Picture Processing - A. Rosenfeld and A.C. Kak
3. Object Recognition by Computer - W.E.L. Grimson

Tentative Schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
<th>Chapters</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction: Elements of Digital Image Processing Systems</td>
<td>DIP Chapter 1</td>
</tr>
<tr>
<td>2</td>
<td>Digital Image Fundamentals: Image model, sampling and quantization</td>
<td>DIP Chapter 2.1-2.4</td>
</tr>
<tr>
<td>3</td>
<td>Digital Image Fundamentals: Pixels and Geometry</td>
<td>DIP Chapter 2.4-2.6</td>
</tr>
<tr>
<td>4</td>
<td>Image Enhancement in the spatial domain: Gray level transformation, Histogram, Arithmetic/Logic Operations</td>
<td>DIP Chapter 3.1-3.4</td>
</tr>
<tr>
<td>5</td>
<td>Image Enhancement in the spatial domain: Spatial Filtering</td>
<td>DIP Chapter 3.5-3.8</td>
</tr>
<tr>
<td>6</td>
<td>Image Enhancement in the frequency domain: Introduction to FFT, smoothing filters, Sharpening filters, homomorphic filtering, implementation</td>
<td>DIP Chapter 4</td>
</tr>
<tr>
<td>7</td>
<td>Image Restoration</td>
<td>DIP Chapter 5</td>
</tr>
<tr>
<td>8</td>
<td>Color Image Processing</td>
<td>DIP Chapter 6</td>
</tr>
<tr>
<td>9</td>
<td>Spring break, no class</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Wavelet and Multi-resolution Processing</td>
<td>DIP Chapter 7</td>
</tr>
<tr>
<td>11</td>
<td>Image Compression</td>
<td>DIP Chapter 8</td>
</tr>
<tr>
<td>12</td>
<td>Image Compression</td>
<td>DIP Chapter 8</td>
</tr>
<tr>
<td>13</td>
<td>Image Segmentation: Edge detection, Thresholding</td>
<td>DIP Chapter 10.1-10.3</td>
</tr>
<tr>
<td>14</td>
<td>Image Segmentation: Region-based segmentation, use of motion</td>
<td>DIP Chapter 10.4-10.6</td>
</tr>
<tr>
<td>15</td>
<td>Object Recognition</td>
<td>DIP Chapter 12</td>
</tr>
<tr>
<td>16</td>
<td>Object Recognition</td>
<td>DIP Chapter 12</td>
</tr>
</tbody>
</table>

Final Exam: **TBA**
BSU Curriculum Forms

Form 5

Program Modification Form

Program to be modified: Computer Information Systems, B.S. Major

List all proposed change(s): Increase the total number of credits in the major by 1

Reason(s) for the change(s): CS 4390 is being changed from a 2-credit class to a 3-credit class to better address the learning outcomes for the course.

Note: In order to avoid hidden prerequisites, if a course is being dropped from this program (but not from the entire curriculum), please check for which remaining courses may include this dropped course as a prerequisite. Course prerequisites may be found in the online catalog (http://www.bemidjistate.edu/academics/catalog/). Remedies for hidden prerequisites may be found under Curriculum Forms at (http://www.bemidjistate.edu/faculty_staff/faculty_association/forms/).

Note: If a course from another department/program was either added to or dropped from this program, please notify the chair/coordinator of that course's department/program and indicate the following:
The course’s home department/program was notified of the addition or dropping of their course(s) on __________ (date) by _________________ (mail, email, or phone).

Please check one of the items below:

______   No comments were received from other programs or departments within one week of the notification.

______   Comments were received within one week of the notification, and are attached.

Note: If this is a joint program, the signatures of both department chairs (and both deans, if different colleges) must be provided.

Alert: Attach a copy of the current program showing the marked changes.

Please copy the current program from the online catalog (http://www.bemidjistate.edu/academics/catalog/) and paste it into Word. Then use either the Track Changes feature under Tools, or the underline and strikethrough Font feature under Format. (Please note that the Track Changes feature may be easily switched on and off by holding down the Ctrl+Shift+E keys.)
Computer Information Systems, B.S. major

Required Credits: 75
Required GPA: 2.25

I REQUIRED BASIC CORE COURSES

COMPLETE THE FOLLOWING COURSES:

- ACCT 2101 Principles of Accounting I (3 credits)
- ACCT 2102 Principles of Accounting II (3 credits)
- BUAD 2220 Legal Environment (3 credits)
- BUAD 2231 Business Statistics I (3 credits)
  or STAT 2610 Applied Statistics (4 credits)
- BUAD 2280 Computer Business Applications (3 credits)
- BUAD 3223 Operations Management (3 credits)
- BUAD 3351 Management (3 credits)
- BUAD 3361 Marketing (3 credits)
- BUAD 3381 Management Information Systems (3 credits)
- BUAD 3771 Financial Management (3 credits)
- BUAD 4559 Strategic Management (3 credits)
- BUAD 4600 Senior Seminar: Business Administration (1 credit)
- ECON 2000 Markets and Resource Allocation (3 credits)
- ECON 2100 Macroeconomics and the Business Cycle (3 credits)
- MATH 2210 Discrete Mathematics (4 credits)

II ADDITIONAL REQUIRED COURSES

COMPLETE THE FOLLOWING COURSES:

- BUAD 3382 Business Application Development (3 credits)
- BUAD 3384 Systems Analysis and Design (3 credits)
- BUAD 4385 Data Modeling and Design (3 credits)
- CS 1309 Problem Solving and Computation (3 credits)
- CS 2321 Computer Science I (4 credits)
- CS 2322 Computer Science II (4 credits)
- CS 4390 Social, Ethical, and Professional Issues in Computing (2-3 credits)

III REQUIRED ELECTIVES

SELECT THREE OF THE FOLLOWING: At least TWO courses must be from Group B

GROUP A.
- BUAD 3281 Decision Support Systems (3 credits)
- BUAD 3283 E-Commerce Web Development (3 credits)
- BUAD 3383 Data Communications (3 credits)
- BUAD 4386 Applied Software Development Project (3 credits)
- BUAD 4387 Strategic Information Management (3 credits)
  May include 3 credits of
- BUAD 4970 Internship (1-12 credits)

GROUP B.

- CS 2270 Introduction to Web Programming (3 credits)
- CS 3270 Advanced Web Programming (3 credits)
- CS 3350 Event-Driven Programming in a Windows Environment (3 credits)
- CS 3360 Object-Oriented Software Development (3 credits)
- CS 3370 Mobile Application Development (3 credits)
- CS 3380 Game Development (3 credits)
- CS 3507 Introduction to Databases (3 credits)
- CS 3528 Data Structures and Algorithms (4 credits)
- CS 3560 Data Communications and Networks (3 credits)
- CS 4360 Software Engineering (3 credits)
- CS 4970 Internship (3 credits)
BSU Curriculum Forms

Form 5

Program Modification Form

Program to be modified: Computer Science, B.S. major

List all proposed change(s):

1. Change CS 4390 from a 2-credit class to a 3-credit class
2. Add CS 4410 Digital Image Processing as a Group A option
3. The total number of credits in the major increases from 60 to 61
4. Add COMM 2100 as an option for the major

Reason(s) for the change(s):
CS 4390 is being changed to better address learning outcomes for the course/program
CS 4410 is being added due to expertise among the faculty.
COMM 2100 addresses the learning outcomes we have for the CS major and it gives
students a bit more flexibility in scheduling the course earlier in their studies.

Note: In order to avoid hidden prerequisites, if a course is being dropped from this
program (but not from the entire curriculum), please check for which remaining courses
may include this dropped course as a prerequisite. Course prerequisites may be found in
the online catalog (http://www.bemidjistate.edu/academics/catalog/). Remedies for
hidden prerequisites may be found under Curriculum Forms at
(http://www.bemidjistate.edu/faculty_staff/faculty_association/forms/).

Note: If a course from another department/program was either added to or dropped from
this program, please notify the chair/coordinate of that course's department/program and
indicate the following:
The course’s home department/program was notified of the addition or dropping of their
course(s) on 6 September 2019 in person.

Please check one of the items below:

____X__ No comments were received from other programs or departments within one
week of the notification. Donna Pawlowski said this would be an acceptable change.

______ Comments were received within one week of the notification, and are attached.

Note: If this is a joint program, the signatures of both department chairs (and both deans,
if different colleges) must be provided.

Alert: Attach a copy of the current program showing the marked changes.
Please copy the current program from the online catalog
Computer Science, B.S. major

Required Credits: 61
Required GPA: 2.25

I REQUIRED CORE COURSES

Additional requirement: Successful completion of the degree requires students to earn 15 credits from areas I and II at the 3000/4000 level while in residence at BSU.

COMPLETE THE FOLLOWING COURSES:

- CS 1309 Problem Solving and Computation (3 credits)
- CS 2321 Computer Science I (4 credits)
- CS 2322 Computer Science II (4 credits)
- CS 2810 Computer Organization and Assembly Language Programming (3 credits)
- CS 3528 Data Structures and Algorithms (4 credits)
- CS 4390 Social, Ethical, and Professional Issues in Computing (3 credits)

II REQUIRED ELECTIVES

Select 21 credits from among the following courses, with at least 3 courses from Section A and 3 courses from Section B. Note: Courses may have prerequisites either not included or not required in this major.

A. Core Computer Science

- CS 3507 Introduction to Databases (3 credits)
- CS 3560 Data Communications and Networks (3 credits)
- CS 3752 Data Mining (3 credits)
- CS 4298 Compiler Construction (3 credits)
- CS 4410 Digital Image Processing (3 credits)
- CS 4627 Theory of Computation (3 credits)
- CS 4840 Operating Systems (3 credits)
- MATH 3720 Numerical Methods (3 credits)
B. Application Development Techniques

- CS 3270 Advanced Web Programming (3 credits)
- CS 3350 Event-Driven Programming in a Windows Environment (3 credits)
- CS 3360 Object-Oriented Software Development (3 credits)
- CS 3370 Mobile Application Development (3 credits)
- CS 3380 Game Development (3 credits)
- CS 4360 Software Engineering (3 credits)

III REQUIRED OUTSIDE COURSES

- COMM 1100 Public Speaking (3 credits)
  - or COMM 2100 Career and Professional Communication (3 credits)
- MATH 1470 Precalculus (5 credits)
  or MATH 2471 Calculus I (5 credits)
- MATH 2210 Discrete Mathematics (4 credits)
- MATH 3310 Linear Algebra (4 credits)
  or STAT 2610 Applied Statistics (4 credits)
  or STAT 3631 Probability And Statistics I (4 credits)

Select one of the following courses:

- ENGL 2150 Technical Writing (3 credits)
- ENGL 3150 Writing In The Disciplines (3 credits)
- ENGL 3155 Professional Writing (3 credits)
BSU Curriculum Forms

Form 5

Program Modification Form

Program to be modified: Computer Science minor

List all proposed change(s): CS 4390 changes from a 2-credit course to a 3-credit course

Reason(s) for the change(s): To better meet the student learning outcomes for CS 4390

Note: In order to avoid hidden prerequisites, if a course is being dropped from this program (but not from the entire curriculum), please check for which remaining courses may include this dropped course as a prerequisite. Course prerequisites may be found in the online catalog (http://www.bemidjistate.edu/academics/catalog/). Remedies for hidden prerequisites may be found under Curriculum Forms at (http://www.bemidjistate.edu/faculty_staff/faculty_association/forms/).

Note: If a course from another department/program was either added to or dropped from this program, please notify the chair/coordinator of that course's department/program and indicate the following:
The course’s home department/program was notified of the addition or dropping of their course(s) on ________ (date) by _________________ (mail, email, or phone).

Please check one of the items below:

_____ No comments were received from other programs or departments within one week of the notification.

_____ Comments were received within one week of the notification, and are attached.

Note: If this is a joint program, the signatures of both department chairs (and both deans, if different colleges) must be provided.

Alert: Attach a copy of the current program showing the marked changes. Please copy the current program from the online catalog (http://www.bemidjistate.edu/academics/catalog/) and paste it into Word. Then use either the Track Changes feature under Tools, or the underline and strikethrough Font feature under Format. (Please note that the Track Changes feature may be easily switched on and off by holding down the Ctrl+Shift+E keys.)
Computer Science minor

Required Credits: 15-20
Required GPA: 2.00

*******************************************************************
COMPUTER SCIENCE MINOR REQUIREMENTS WEB EMPHASIS: MUST COMPLETE ALL AREAS WITH A TOTAL OF AT LEAST 15 SEMESTER CREDITS AND A 2.00 GPA

Additional requirement: Successful completion of the minor requires at least one Computer Science course at the 3000/4000 level taken while in residence at BSU.

I REQUIRED COURSES

COMPLETE THE FOLLOWING COURSE:

- CS 1309 Problem Solving and Computation (3 credits)

II REQUIRED EMPHASIS - WEB EMPHASIS

COMPLETE THE FOLLOWING COURSES:

- CS 2270 Introduction to Web Programming (3 credits)
- CS 3270 Advanced Web Programming (3 credits)

SELECT 6 SEMESTER CREDITS FROM THE FOLLOWING COURSES:

- CS 2321 Computer Science I (4 credits)
- CS 2322 Computer Science II (4 credits)
- CS 2810 Computer Organization and Assembly Language Programming (3 credits)
- CS 3370 Mobile Application Development (3 credits)
- CS 4390 Social, Ethical, and Professional Issues in Computing (2-3 credits)

MAY INCLUDE 1:

- GEOG 4275 Advanced Geographic Information Systems (3 credits)
- or ENGL 3179 Elements of Digital Rhetoric (3 credits)
- or TADD 3549 Interactive Design (4 credits)

*******************************************************************
COMPUTER SCIENCE MINOR REQUIREMENTS PROFESSIONAL EMPHASIS: MUST COMPLETE ALL AREAS WITH A TOTAL OF AT LEAST 20 SEMESTER CREDITS AND A 2.00 GPA
Additional requirement: Successful completion of the minor requires at least one Computer Science course at the 3000/4000 level taken while in residence at BSU.

I REQUIRED COURSES

COMPLETE THE FOLLOWING COURSE:

- CS 1309 Problem Solving and Computation (3 credits)

II REQUIRED EMPHASIS-PROFESSIONAL EMPHASIS

COMPLETE THE FOLLOWING COURSES:

- CS 2321 Computer Science I (4 credits)
- CS 2322 Computer Science II (4 credits)

SELECT 9 SEMESTER CREDITS FROM THE FOLLOWING COURSES:

- CS 2810 Computer Organization and Assembly Language Programming (3 credits)
- PHYS 2500 Electronics I (4 credits)
- COMPUTER SCIENCE COURSES AT THE 3000 AND 4000 LEVELS
BSU Curriculum Forms

Form 8
Updated: 09.18.15

Signatures

__Marty Wolf / Professor of Computer Science / 9.19.19____________________
Proposer / Title / Date

__Marty Wolf / Computer Science / 9.19.19____________________

__Young Seob Son / Business Administration / 12.17.19____________________
Chair or Director / Department or Program / Date

Note: "All departmental recommendations [on curriculum] must be reviewed and approved by the department's faculty." --IFO/MnSCU Master Agreement 2009-2011, 20.A.3 (p. 80).

At this point, packet goes to Records Office/Curriculum Coordinator to be logged in to the Curriculum Proposal Progress Grid.

__Marilyn Yoder / Business, Mathematics and Sciences / 9.19.19____________________
Dean / College / Date

Note: If proposal is sent back to the Proposer, please notify the Curriculum Coordinator. If approved, packet goes to Academic Affairs Office.
Allen,

With this change a CS major with be at 61 credits, 42 of which are CS credits. The CIS major will be at 76 credits, 20 of which are CS credits.

Regards,
MJ

On Fri, 25 Oct 2019, Bedford, Allen J wrote:

Hi Marty,

Thanks. That makes sense.

What is the total credit load of the CS major?

Thanks,
Allen

From: Marty J. Wolf <mjwolf@cs.bemidjistate.edu>
Sent: Friday, October 25, 2019 11:24:21 AM
To: Bedford, Allen J <allen.bedford@bemidjistate.edu>
Cc: Wolf, Marty J <Marty.Wolf@bemidjistate.edu>; Neville, Francois <Francois.Neville@bemidjistate.edu>; Tian, Baozhong <Baozhong.Tian@bemidjistate.edu>; Peffer, Tony <Tony.Peffer@bemidjistate.edu>; Gullickson, Robin S <Robin.Gullickson@bemidjistate.edu>; Backer, Diane M <Diane.Backer@bemidjistate.edu>
Subject: Re: Curriculum proposal--increasing credit for CS 4390 (14_CS_19-20)

Allen,

The answer really depends on the individual student. At least five of the courses in the CS major and at least two (that come from our department--there may be others from other departments) for the CIS major can be used in liberal education. But since of the five, three are present in the same goal area in liberal education, only three of those potential eleven credits typically get used by a given student. I would guess that an analysis of recent CS graduate transcripts would show that most students have a six-credit overlap between the CS major and their general education requirements.

Regards,
MJ

On Fri, 25 Oct 2019, Bedford, Allen J wrote:

Thank you, Marty. That additional information may suffice.
On the credit question, is there a count of total credits required by the major and the number of those credits that may apply toward meeting gen ed requirements?

Thanks,
Allen

From: Marty J. Wolf <mjwolf@cs.bemidjistate.edu>
Sent: Friday, October 25, 2019 9:33:46 AM
To: Bedford, Allen J <allen.bedford@bemidjistate.edu>
Cc: Wolf, Marty J <Marty.Wolf@bemidjistate.edu>; Neville, Francois <Francois.Neville@bemidjistate.edu>; Tian, Baozhong <Baozhong.Tian@bemidjistate.edu>; Peffer, Tony <Tony.Peffer@bemidjistate.edu>; Gullickson, Robin S <Robin.Gullickson@bemidjistate.edu>; Backer, Diane M <Diane.Backer@bemidjistate.edu>
Subject: Re: Curriculum proposal--increasing credit for CS 4390 (14_CS_19-20)

Allen,

I am not quite sure what the first question is asking. After the change from 2 to 3 credits for CS 4390, both the CS and the CIS degree can be completed along with all other university requirements in less than 120 credits. Any CS major taking CS 4298 must also take CS 2810 during their course of study, so it has zero impact on the total number of credits required for the degree. Let me know if there is further clarification needed here.

WRT the second question: We will continue to assess student learning in the same manner as we have in the past. That assessment technique led to the discovery of the gap in achieving learning outcomes this change intends to address.

For CS 4410:
I would rather not have "or higher" included after Math 1470, because it is technically not true. There are some Math Education courses that are at the 3000-level that do NOT require Math 1470 as a pre-requisite. I don't expect there to be any Math Ed majors wanting to take CS 4410, but adding "or higher" adds a (very limited) potential for confusion among some students with very little upside--unless there is something I am missing. We can easily handle those students who have taken Calculus in advising situations as the course is exclusively for CS majors. However, if there is some advantage we are not aware of, please let me know.

I am more concerned that adding "or higher" to the CS 2322 pre-requisite will actually harm students. We offer a course CS 3270 that does not have a CS 2322 pre-requisite and CS 3270 is often taken by CS minors who do not have one of us as an advisor. Students taking CS 3270 would be mislead
into believing that they have sufficient background to be successful in CS 4410 should we add the "or higher" designation.

Regards,

MJ

On Fri, 25 Oct 2019, Bedford, Allen J wrote:

Hello Marty, Baozhong, and Francois,

Thank you for developing the four curricular modifications in computer science. All four seem appropriate, but before moving forward Tony would like you to clarify a few points.

For the proposed increase in credits for 4390 from 2 to 3 and he would like you to address the following two questions:

1. What is the impact of the 1 credit increase on the 120 credit threshold? (Similar question for the credit increase impact on adding the prerequisite to CS4298.)
2. What is the plan for assessing whether the increase in credit achieves the desired impact on learning? (This assessment is suggested but not specified in the rationale for the change.)

For the prerequisites, would it be fair to add “or higher” to and of the lists? For example, are the prerequisites for CS 4410 fulfilled only by CS2322 and Math 1470? Could a math higher than precalculus also satisfy the math prerequisite?

Tony made some notes on the form and I would be happy to send it back to you if that would be helpful.

Thanks,

Allen

Allen J. Bedford, Ph.D.
Associate Vice President for Academic Affairs
307 Deputy Hall
1500 Birchmont Drive NE #3
Bemidji, MN 56601-2699
(218) 755-2016 / (218) 755-3999

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Marty J. Wolf, Ph.D. mjwolf@acm.org
Chair, Math & Comp Sci Dept mjwolf@cs.bemidjistate.edu
Bemidji State University Office: 1-218-755-2825
1500 Birchmont Drive, # 27 Fax: 1-218-755-2822
Bemidji MN 56601 Twitter: @martyjwolf he/him/his