# Proposal Summary and Routing Form

**Proposal Title:** Minor Revision of Computer Science  
**Initiating Individual:** Jim Nystrom  
**Initiating Department or Unit:** Mathematics  
**Contact Person's Name:** Jim Nystrom  
**Email:** nystrom@ferris.edu  
**Phone:** x5864

- [ ] Group I-A – New Degree, major, concentration, minor, or redirection of a current offering
- [ ] Group I-B – Deletion of a degree, major, concentration, or minor
- [ ] Group II-A – New Course, modification of a course, deletion of a course
- [X] Group II-B – Minor Curriculum Clean-up
- [ ] Group III – Certificate (☐ College Credit ☐ Non-credit ☐ New Certificate)
- [ ] Group IV – Other site location (☐ College Credit ☐ Non-credit)

<table>
<thead>
<tr>
<th>PLEASE PRINT AND SIGN YOUR NAME</th>
<th>DATE</th>
<th>VOTE/ACTION * Number Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Representative **</td>
<td></td>
<td></td>
</tr>
<tr>
<td>James Nystrom</td>
<td>2/17/16</td>
<td>Support 1</td>
</tr>
<tr>
<td>Department/School/Faculty Representative Vote **</td>
<td></td>
<td></td>
</tr>
<tr>
<td>James Nystrom</td>
<td>3/16/16</td>
<td>Support with Concerns 4, Not Support 0, Abstain 4</td>
</tr>
<tr>
<td>Department/School Administrator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>James Nystrom</td>
<td>3/16/16</td>
<td>Support with Concerns 4, Not Support 0, Abstain 4</td>
</tr>
<tr>
<td>College Curriculum Committee/Faculty</td>
<td>4/19-16</td>
<td>Support with Concerns 4, Not Support 0, Abstain 4</td>
</tr>
<tr>
<td>John Scott Gray</td>
<td></td>
<td></td>
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<tr>
<td>UCC Representative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trini Williams</td>
<td>4/19/16</td>
<td>Support 4, Hold 0, Not Support 0, Abstain 0</td>
</tr>
<tr>
<td>Dean</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Olukemi Fedayiz</td>
<td>4/20/16</td>
<td>Support 0, Hold 0, Not Support 0, Abstain 0</td>
</tr>
<tr>
<td>University Curriculum Committee **</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senator **</td>
<td></td>
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<tr>
<td>Academic Affairs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Support with Concerns or Not Support must include identification of specific concern with appropriate rationale.

** Number Count must be given for all members present and/or voting.

To be completed by Academic Affairs

<table>
<thead>
<tr>
<th>Date of Implementation: Click here to enter text.</th>
</tr>
</thead>
<tbody>
<tr>
<td>President (Date Approved)</td>
</tr>
<tr>
<td>Board of Trustees (Date Approved)</td>
</tr>
<tr>
<td>Academic Officers of MI (Date Approved)</td>
</tr>
</tbody>
</table>
1. Proposal Summary: (Summary is generally less than one page. Briefly state what is proposed with a summary of rationale and highlights)

We are updating the Applied Mathematics Computer Science Concentration (AMCS) degree so that it contains the same Applied Mathematics Core as the other two degrees offered through the Department of Mathematics (i.e., the Applied Mathematics degree and the Actuarial Science degree). The main effect of this change is that it adds Math 330 (Differential Equations) to the degree requirements. This is an appropriate addition given the mathematical focus of this particular computer science degree program. With the proposed changes, the AMCS degree will still allow completion of a minor (which is typically chosen from Computer Information Systems, Computer Networking, or Information Security & Intelligence).

We are also updating the Computer Science Minor. Here we have removed the CPSC 130 course from the list of required courses, and added CPSC 340 (Computer Organization) and Math 328 (Discrete Mathematics) as required courses. This latter change reflects the importance of the material in both CPSC 340 and Math 328 as part of a well-rounded computer science minor education. There is now just one elective required from the remaining list of courses (instead of three electives required in the previous version of the minor), but the overall credit load for students pursuing the minor has not been effectively changed.

We are also changing the course caps for CPSC 200, CPSC 300, and CPSC 320 (to 25) for pedagogical reasons. The smaller class size allows for more individual attention to students who require help with programming projects, and makes the programming project(s) grading load more manageable.

AMCS (Current)
Core
MATH 220
MATH 230
MATH 251
MATH 320
MATH 322

Concentration
CPSC 130
CPSC 200
CPSC 300
CPSC 330
CPSC 340
MATH 328
MATH 340
Elective (from CPSC 320, CPSC 326, CPSC 390, CPSC 442, ECNS 323)

AMCS (Changes)
Core
MATH 220 → no change
MATH 230 → no change
MATH 251 → no change
MATH 320 → no change
MATH 322 → no change
MATH 330 → add to core

Concentration
CPSC 130 → move to core
CPSC 200 → move to core
CPSC 300 → no change
CPSC 330 → change to elective
CPSC 340 → no change
MATH 328 → no change
MATH 340 → move to core
Elective → change course choices
Elective → add
AMCS (REVISED) (movements from Core to Concentration, or vice-versa) in italics; changes in bold

Core
CPSC 130
CPSC 200
MATH 220
MATH 230
MATH 251
MATH 320
MATH 322
MATH 330
MATH 340

Concentration
CPSC 300
CPSC 340
MATH 328

Elective 1 (from CPSC 320, CPSC 330, or CPSC 442)
Elective 2 (from CPSC 320, CPSC 326, CPSC 330, CPSC 442, MATH 360, MATH 440, or ECNS 323)

Computer Science Minor (Current)
CPSC 130
CPSC 200
CPSC 300
Directed Elective 1
Directed Elective 2
Directed Elective 3

Computer Science Minor (Changes)
CPSC 130 → drop
CPSC 200 → no change
CPSC 300 → no change
Directed Elective 1 → no change
Directed Elective 2 → drop
Directed Elective 3 → drop
CPSC 340 → add
MATH 328 → add

Computer Science Minor (REVISED)
CPSC 200
CPSC 300
CPSC 340
MATH 328
Elective (from CPSC 320, CPSC 326, CPSC 330, CPSC 442, or ECNS 323)

2. Summary of Curricular Action (Check all that apply to this proposal)

□ Degree  □ Major  ☒ Minor  ☒ Concentration  □ Certificate  ☒ Course
□ New  ☒ Modification  □ Deletion

Name of Degree, Major, etc.: AMCS (Applied Mathematics Computer Science Concentration); Computer Science Minor
3. Summary of All Course Action Required: Click here to enter text.

A. Newly Created Courses to be Added to the Catalog
   NONE

B. Courses to be Deleted from FSU Catalog
   NONE

C. Existing Courses to be Modified
   (changes to course caps and/or semester offered)
   Prefix Number Title
   CPSC  200 Object Oriented Programming
   CPSC  300 Data Structures and Algorithms
   CPSC  320 Computer Simulation
   CPSC  330 Parallel Programming

D. Addition of existing FSU courses to program
   FOR AMCS
   Prefix Number Title
   MATH  330 Differential Equations

   FOR Computer Science Minor
   CPSC  340 Computer Organization
   MATH  328 Discrete Mathematics

E. Removal of existing FSU courses from program
   FOR Computer Science Minor
   CPSC  130 Programming and problem Solving

4. Summary of All Consultations
   Form Sent (B or C) Date Sent Responding Department Date Received & By Whom
   B 2/15/2015 EET & CNS (CET)
   B 2/15/2015 Accountancy, Finance, and Information Systems

5. Will External Accreditation be sought? (For new programs or certificates only)
   ☐ Yes  ☑ No
   If yes, name the organization involved with accreditation for this program. Click here to enter text.

6. Is a PCAF required?  ☐ Yes  ☑ No Is the PCAF approved?  ☐ Yes ☑ No (If yes, supply link on Academic Affairs website where PCAF is posted.)

7. Program Checksheets affected by this proposal (Check all that apply to this proposal)
   ☑ Add Course  ☑ Delete Course  ☑ Modify Course  ☑ Change Prerequisite
   ☐ Move from elective to required  ☐ Change Outcomes and Assessment Plan  ☐ Change Credit hours

8. List all Checksheets affected by this proposal:
   College  Department  Program
   CAS  Mathematics  AMCS
   CAS  Mathematics  Computer Science Minor
CURRICULUM CONSULTATION FORM

To be completed by each department affected by the proposed change, addition, or deletion. Potential duplication of coursework is reason for consultation.

1. This completed form must be forwarded with the proposal to the administrator of the department to be consulted.

2. The department must respond within 10 business days of receipt of this form to ensure inclusion in the final proposal. The completed original is returned to the Academic Senate Office to be inserted into the proposal and a copy is returned to the initiator.

   The department must acknowledge receipt of this form and the proposal in writing to the initiator.

   **Failure to respond by 10 business days of receipt of this form is interpreted as support for the proposal.**

3. The Proposing Department must address any concerns raised by the consulted department. This response must be in writing and will be included in the proposal following the original consultation form.

RE: Proposal Title  Minor Revision of Computer Science

Initiator(s): Jim Nystrom

Proposal Contact: Jim Nystrom  Date Sent: 2/15/2015

Department: Mathematics  Campus Address: ASC 2056
(Please type)

Responding Department: Accountancy, Finance, and Information Systems

Administrator: Larry Bajor  Date Received: Click here to enter text.  Date Returned: Click here to enter text.

Based upon department faculty review on Click here to enter text. (Date) we:

☐ Support the above proposal.
☐ Support the above proposal with the modifications and concerns listed below.
☐ Do not support the proposal for the reasons listed below.

Comment regarding the impact this proposal has on current curriculum including prerequisites, scheduling, room assignments, and/or faculty load for your department. Use additional pages, if necessary. Click here to enter text.
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RE: Proposal Title  Minor Revision of Computer Science

Initiator(s): Jim Nystrom

Proposal Contact: Jim Nystrom  Date Sent: 2/15/2015

Department: Mathematics  Campus Address: ASC 2056
(Please type)

Responding Department: EET & CNS

Administrator: Debbie Dawson  Date Received: Click here to enter text.  Date Returned: Click here to enter text.

Based upon department faculty review on Click here to enter text. (Date) we:

☐ Support the above proposal.

☐ Support the above proposal with the modifications and concerns listed below.

☐ Do not support the proposal for the reasons listed below.

Comment regarding the impact this proposal has on current curriculum including prerequisites, scheduling, room assignments, and/or faculty load for your department. Use additional pages, if necessary. Click here to enter text.
# COMPUTER SCIENCE

**BACHELOR OF SCIENCE IN APPLIED MATHEMATICS**

**FERRIS STATE UNIVERSITY**

**PROGRAM COORDINATOR:** Dr. James Nystrom  
**PHONE:** (231) 591-5864  
**OFFICE:** ASC 2056  
**E-MAIL:** nystroj@ferris.edu

Admission requirements: First year student admission is open to high school graduates (or equivalent) who demonstrate appropriate academic preparedness, maturity and seriousness of purpose. High school courses and grade point average, ACT composite score, and ACT Mathematics and Reading sub scores will be considered in the admission and course placement process. Transfer students must have at least 12 credits at the time of application with a minimum 2.0 overall GPA including an English and mathematics course or they will be considered as first year students.

Graduation Requirements AMCS-BS-AS:
1. Minimum 2.0 CUMULATIVE grade point average in all courses
2. 2.5 grade point average for all MATH and CPSC course work in major
3. 120 minimum semester credits including general education requirements
4. Residency requirement: 30 minimum FSU semester credits
5. Minimum of 40 credits numbered 300 or higher
6. Students may earn only one B.S. degree in Mathematics from Ferris State University.

Number of 300+ Credits: __________

## Program requirements: for students entering Computer Science Fall Semester 2015

<table>
<thead>
<tr>
<th>REQUIRED</th>
<th>COURSE TITLE – FOR PREREQUISITES NOT INDICATED, SEE FSU CATALOG COURSE DESCRIPTIONS</th>
<th>FSU S.H.</th>
<th>GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPLIED MATHEMATICS CORE: minimum 18 credits</td>
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<tr>
<td>MATH 251</td>
<td>Statistics for the Life Sciences (MATH 130)*</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MATH 220</td>
<td>Analytical Geometry &amp; Calculus 1 (MATH 130 or by placement)*</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>MATH 230</td>
<td>Analytical Geometry &amp; Calculus 2 (MATH 220)*</td>
<td>4</td>
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<tr>
<td>MATH 320</td>
<td>Analytical Geometry &amp; Calculus 3 (MATH 230)*</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>MATH 322</td>
<td>Linear Algebra (MATH 230)*</td>
<td>3</td>
<td></td>
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<tr>
<td>COMPUTER SCIENCE CONCENTRATION REQUIREMENTS: minimum 29 credits</td>
<td></td>
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<tr>
<td>CPSC 130</td>
<td>Programming and Problem Solving (MATH 116 or MATH 120 or by placement)</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CPSC 200</td>
<td>Object Oriented Programming (MATH 126 or MATH 130 and CPSC 130)</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CPSC 300</td>
<td>Data Structures and Algorithms (CPSC 200)*</td>
<td>4</td>
<td></td>
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<tr>
<td>CPSC 330</td>
<td>Parallel Programming (MATH 216 or MATH 220; and CPSC 200 or ECNS 311)*</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CPSC 340</td>
<td>Computer Organization (CPSC 130 or CPSC 200 or ECNS 311)*</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>MATH 328</td>
<td>Discrete Structures (MATH 216 or MATH 220)*</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MATH 340</td>
<td>Numerical Analysis (MATH 230; and CPSC 130 or CPSC 200)*</td>
<td>3</td>
<td></td>
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<tr>
<td>CPSC or ECNS</td>
<td>ELECTIVE (300+) Pick from: CPSC 320, CPSC 326, CPSC 390, CPSC 442, or ECNS 323</td>
<td>3-4</td>
<td></td>
</tr>
</tbody>
</table>

**ELECTIVES:** to the minimum 120 credits required for this program
GENERAL EDUCATION REQUIREMENTS

Courses which qualify in the Scientific Understanding (Z), Cultural Enrichment (C) and Social Awareness (S) categories are delineated in the General Education section of the FSU electronic catalog:
http://www.ferris.edu/htmls/academics/gened/courses.html

<table>
<thead>
<tr>
<th>I. GENERAL EDUCATION REQUIREMENTS</th>
<th>Grade</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMUNICATION COMPETENCE</td>
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<tr>
<td>ENGL 150</td>
<td>3</td>
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<tr>
<td>ENGL 250</td>
<td>3</td>
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<tr>
<td>ENGL 311 or 321 or 323 or 325</td>
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</tr>
<tr>
<td>COMM 105 or 121</td>
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<tr>
<td>TOTAL</td>
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<table>
<thead>
<tr>
<th>II. SCIENTIFIC UNDERSTANDING</th>
<th>Grade</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Only approved “Z” courses may count toward this category. (one must be a lab course.)</td>
<td></td>
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<tr>
<td>Course</td>
<td></td>
<td></td>
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<tr>
<td>Lab</td>
<td></td>
<td></td>
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<tr>
<td>TOTAL</td>
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<td>7</td>
</tr>
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</table>

| III. QUANTITATIVE SKILLS          |       |         |
|                                   |       |         |
| TOTAL                             |       |         |

| IV. CULTURAL ENRICHMENT          |       |         |
|                                   |       |         |
| Only approved “C” courses may count toward this category.
Requirements: 1) one course must be 200+ level, 2) maximum 5 credit hours of music and/or theater activities may apply |
| Course                            |       |         |
| 200+ level                        |       |         |
| TOTAL                             |       | 9       |

<table>
<thead>
<tr>
<th>V. SOCIAL AWARENESS</th>
<th>Grade</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only approved “S” courses may count toward this category. Requirements: 1) two different subject areas including at least one “foundation” course, 2) one 200+ level course</td>
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<tr>
<td>Course</td>
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<tr>
<td>Foundation</td>
<td></td>
<td></td>
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<tr>
<td>200+ level</td>
<td></td>
<td></td>
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<tr>
<td>TOTAL</td>
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<td>9</td>
</tr>
</tbody>
</table>

SAMPLE COURSE SEQUENCE: The following chart depicts one strategy to begin program requirements. In order to complete this program in four years, students must average 16 – 17 credit hours per semester. Students MUST consult their faculty advisor to develop a course sequence plan appropriate to their academic development and educational plans.

| FIRST YEAR Fall Semester         |       |         |
| MATH by placement                | 3-4   |         |
| ENGL 150 English I               | 3     |         |
| Cultural Enrichment elective     | 3-4   |         |
| Social Awareness elective        | 3     |         |
| CPSC 130 or elective             | 3-4   |         |
| 15-18                             |       |         |

| FIRST YEAR Spring Semester       |       |         |
| Choose one: COMM 105 or COMM 121 | 3     |
| MATH by placement                | 3-4   |
| Scientific Understanding elective| 3-5   |
| CPSC 130 or CPSC 200             | 4     |
| Choose one: Cultural Enrich. or Social Awareness | 3 |
| 16-19                            |       |

NOTICE REGARDING WITHDRAWAL, RE-ADMISSION AND INTERRUPTION OF STUDIES
Students who return to the university after an interrupted enrollment (not including summer semesters) must normally meet the requirements of the curriculum which are in effect at the time of their return, not the requirements which were in effect when they were originally admitted.
 Admission requirements: First year student admission is open to high school graduates (or equivalent) who demonstrate appropriate academic preparedness, maturity and seriousness of purpose. High school courses and grade point average, ACT composite score, and ACT Mathematics and Reading sub scores will be considered in the admission and course placement process. Transfer students must have at least 12 credits at the time of application with a minimum 2.0 overall GPA including an English and mathematics course or they will be considered as first year students.

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<th>FSU S.H.</th>
<th>GRADE</th>
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</thead>
<tbody>
<tr>
<td><strong>APPLIED MATHEMATICS CORE:</strong> 32 credits</td>
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</tr>
<tr>
<td>CPSC 130 Programming and Problem Solving</td>
<td>(MATH 116 or MATH 120 or by placement)</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CPSC 200 Object Oriented Programming</td>
<td>(MATH 126 or MATH 130 and CPSC 130)</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>MATH 220 Analytical Geometry &amp; Calculus 1</td>
<td>(MATH 130 or by placement)*</td>
<td>4</td>
<td></td>
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<tr>
<td>MATH 230 Analytical Geometry &amp; Calculus 2</td>
<td>(MATH 220)*</td>
<td>4</td>
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</tr>
<tr>
<td>MATH 251 Statistics for the Life Sciences</td>
<td>(MATH 130)*</td>
<td>3</td>
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</tr>
<tr>
<td>MATH 320 Analytical Geometry &amp; Calculus 3</td>
<td>(MATH 230)*</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>MATH 322 Linear Algebra</td>
<td>(MATH 230)*</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MATH 330 Differential Equations</td>
<td>(MATH 230)*</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MATH 340 Numerical Analysis</td>
<td>(MATH 230 and (CPSC 130 or CPSC 200))*</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>COMPUTER SCIENCE CONCENTRATION REQUIREMENTS:</strong> 17-19 credits</td>
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</tr>
<tr>
<td>CPSC 300 Data Structures and Algorithms</td>
<td>(CPSC 200)*</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CPSC 340 Computer Organization</td>
<td>(CPSC 130 or CPSC 200 or ECNS 311)*</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>MATH 328 Discrete Structures</td>
<td>(MATH 216 or MATH 220)*</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CPSC, Pick from: CPSC 320, CPSC 330, CPSC 442</td>
<td>3-4</td>
<td></td>
<td></td>
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<tr>
<td>CPSC, ECNS, Pick from: CPSC 320, CPSC 326, CPSC 330, CPSC 442, ECNS 323, MATH 360, MATH 440</td>
<td>3-4</td>
<td></td>
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</tr>
<tr>
<td>ELECTIVES: to the minimum 120 credits required for this program.</td>
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<table>
<thead>
<tr>
<th>A: COMMUNICATION COMPETENCE</th>
<th>12 Sem Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course</td>
<td>Grade</td>
</tr>
<tr>
<td>ENGL 150</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 250</td>
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<tr>
<td>ENGL 311 or 321 or 323 or 325</td>
<td>3</td>
</tr>
<tr>
<td>COMM 105 or 121</td>
<td>3</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>B: SCIENTIFIC UNDERSTANDING</th>
<th>7 Sem Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only approved “Z” courses may count toward this category (one must be a lab course).</td>
<td></td>
</tr>
<tr>
<td>Course</td>
<td>Grade</td>
</tr>
<tr>
<td>Lab</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C: QUANTITATIVE SKILLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>This requirement is achieved in the major requirements.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>D: CULTURAL ENRICHMENT</th>
<th>9 Sem Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only approved “C” courses may count toward this category. Requirements: 1) one course must be 200+ level, 2) maximum 5 credit hours of music and/or theater activities may apply</td>
<td></td>
</tr>
<tr>
<td>Course</td>
<td>Grade</td>
</tr>
<tr>
<td>200+ level</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>E: SOCIAL AWARENESS</th>
<th>9 Sem Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only approved “S” courses may count toward this category. Requirements: 1) two different subject areas including at least one “foundation” course, 2) one 200+ level course</td>
<td></td>
</tr>
<tr>
<td>Course</td>
<td>Grade</td>
</tr>
<tr>
<td>Foundation</td>
<td></td>
</tr>
<tr>
<td>200+ level</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>F: GLOBAL CONSCIOUSNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Each student must complete one course from the list of qualifying courses presented in the FSU catalog. This course may also count toward fulfilling the Cultural Enrichment or Social Awareness requirement.</td>
</tr>
<tr>
<td>Course</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>G: RACE/ETHNICITY/GENDER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Each student must complete one course from the list of qualifying courses presented in the FSU catalog. This course may also count toward fulfilling the Cultural Enrichment or Social Awareness requirement.</td>
</tr>
<tr>
<td>Course</td>
</tr>
</tbody>
</table>

SAMPLE COURSE SEQUENCE: The following chart depicts one strategy to begin program requirements. In order to complete this program in four years, students must average 16 – 17 credit hours per semester. Students MUST consult their faculty advisor to develop a course sequence plan appropriate to their academic development and educational plans.

<table>
<thead>
<tr>
<th>FIRST YEAR Fall Semester</th>
<th>FIRST YEAR Spring Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH by placement</td>
<td>Choose one: COMM 105 or COMM 121</td>
</tr>
<tr>
<td>ENGL 150 English 1</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 150 English 1</td>
<td>MATH by placement</td>
</tr>
<tr>
<td>Cultural Enrichment elective</td>
<td>ENGLISH 101</td>
</tr>
<tr>
<td>Social Awareness elective</td>
<td>3-4 have completed</td>
</tr>
<tr>
<td>CPSC 130 or elective</td>
<td>Scientific Understanding elective</td>
</tr>
<tr>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CPSC 130 or CPSC 200</td>
</tr>
<tr>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Choose one: Cultural Enrich. or Social Awareness</td>
</tr>
<tr>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>16-19</td>
</tr>
</tbody>
</table>

NOTICE REGARDING WITHDRAWAL, RE-ADMISSION AND INTERRUPTION OF STUDIES

Students who return to the university after an interrupted enrollment (not including summer semester) must normally meet the requirements of the curriculum which are in effect at the time of their return, not the requirements which were in effect when they were originally admitted.
CURRENT

COMPUTER SCIENCE MINOR

FERRIS STATE UNIVERSITY - COLLEGE OF ARTS AND SCIENCES
ADVISOR: Dr. James Nystrom
PHONE: (231) 591-5864 E-MAIL: nystroj@ferris.edu Campus Address: ASC 2056

Why Choose the Computer Science Minor?

A minor in Computer Science will significantly enhance the employability of a graduate from any program at Ferris. Computer skills are among the most important skills an employer is looking for in employees today. It can serve to enhance the expertise of the student in their major field and also serve as an excellent preparation for entry-level positions in the computing field.

Through the course work of the Computer Science minor, students will be provided the opportunity to learn computer science applications such as programming language, computer architecture, microprocessor-controlled equipment and local area networks.

Admission Requirements

This Computer Science minor is open to any student admitted to Ferris State and pursuing a baccalaureate degree except those pursuing the Applied Mathematics Computer Science option. The minor is designed to complement any Ferris major program. Students should choose courses carefully to avoid excessive overlap with their major or second minor. Students may use only one-third of the credits in a minor that overlap with the student’s major. For example: If a minor is 18 credits, 6 credits may be applied to the minor that are also used in the major. Students may apply 6 credit hours of overlap between minors.

Graduation Requirements

An academic minor may only be awarded upon completion of a baccalaureate degree at Ferris State. This minor requires a minimum of 20 credits and a minimum grade average of 2.5 in these courses. Also, 50% of the credits for a minor must be taught by Ferris State University.

| Required Courses | CPSC130 | Programming and Problem Solving | 4 |
| CPSC200 | Object Oriented Programming | 4 |
| CPSC300 | Data Structures and Object Orientation Design | 4 |

| Electives - Choose 3 | CPSC320 | Computer Simulations | 3 |
| CPSC326 | Computer Graphics | 3 |
| CPSC330 | Parallel Programming | 4 |
| CPSC340 | Hardware and Software Organization | 4 |
| CPSC442 | Programming Language Concepts | 3 |
| MATH328 | Discrete Structures | 3 |
| MATH340 | Numerical Analysis | 3 |
| ECNS323 | Real Time Operating Systems | 4 |
MINOR IN COMPUTER SCIENCE

NAME ___________________________ STUDENT NUMBER _______________________

STUDENT'S COLLEGE: _______________ B.S./B.A. PROGRAM: _______________

Procedures for declaring a minor: The student will meet with the minor advisor to create a plan for completion of the minor, sign Section A and receive a copy of the form. The minor advisor will route the form through the department office and the Dean's Office. The student is not enrolled in the minor until the Dean's Office submits the form to Records.

Procedures upon completion of a minor: The student will notify the minor advisor when requirements are complete. The department and the advisor will verify that the student has completed the minor, sign Section B and forward the form with copies of any approved substitutions or exceptions forms to the Dean's Office for signature. The Dean's Office will send a copy to Records for posting the completion of the minor.

<table>
<thead>
<tr>
<th>General Requirements:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) At least 50% of the credits of the minor must be numbered 300 or higher</td>
</tr>
<tr>
<td>2) At least 50% of the credits of the minor must be Ferris State University credits</td>
</tr>
<tr>
<td>3) This minor requires a minimum of 20 credits</td>
</tr>
<tr>
<td>4) This minor requires a minimum GPA of 2.5 in these courses.</td>
</tr>
<tr>
<td>5) Minor requirements must be completed prior to or at the time of the awarding of a baccalaureate or higher degree.</td>
</tr>
<tr>
<td>6) A maximum of 1/3 of the credits, but no more than 7 credits, in a minor may overlap with the student’s major*.</td>
</tr>
<tr>
<td>7) Students may apply 6 credit hours of overlap between minors**.</td>
</tr>
</tbody>
</table>

### Required Courses

<table>
<thead>
<tr>
<th>Required Courses</th>
<th>Credit Hours</th>
<th>Grade</th>
<th>Semester Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPSC 130</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPSC 200</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPSC 300</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Directed Elective 1</td>
<td>3-4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Directed Elective 2</td>
<td>3-4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Directed Elective 3</td>
<td>3-4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Signatures

<table>
<thead>
<tr>
<th>Signatures</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student</td>
<td></td>
</tr>
<tr>
<td>Advisor</td>
<td></td>
</tr>
<tr>
<td>Department</td>
<td></td>
</tr>
</tbody>
</table>

### Routing (Following completion of the required courses for the minor)

<table>
<thead>
<tr>
<th>Routing</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department</td>
<td></td>
</tr>
<tr>
<td>CAS Dean</td>
<td></td>
</tr>
<tr>
<td>Registrar</td>
<td>MyDegree Verified</td>
</tr>
</tbody>
</table>

DECLARATION SENT TO RECORDS ___________ COMPLETION SENT TO RECORDS ___________

C:\Users\swellerk\Documents\DocumentFolder\Department\AMCSRevision\ComputerScience\Minor_Current.DOC

CSCI

UPDATED FALL 2010
COMPUTER SCIENCE MINOR

FERRIS STATE UNIVERSITY - COLLEGE OF ARTS AND SCIENCES
ADVISOR: Dr. James Nystrom
PHONE: (231) 591-5864 E-MAIL: nystroj@ferris.edu Campus Address: ASC 2056

Why Choose the Computer Science Minor?

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Graduation Requirements

An academic minor may only be awarded upon completion of a baccalaureate degree at Ferris State. This minor requires a minimum of 18 credits and a minimum grade average of 2.5 in these courses. Also, 50% of the credits for a minor must be taught by Ferris State University.

Required Courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPSC 200</td>
<td>Object Oriented Programming</td>
<td>4</td>
</tr>
<tr>
<td>CPSC 300</td>
<td>Data Structures and Algorithms</td>
<td>4</td>
</tr>
<tr>
<td>CPSC 340</td>
<td>Computer Organization</td>
<td>4</td>
</tr>
<tr>
<td>MATH 328</td>
<td>Discrete Structures</td>
<td>3</td>
</tr>
</tbody>
</table>

Elective - Select 1

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPSC 320</td>
<td>Computer Simulations</td>
<td>3</td>
</tr>
<tr>
<td>CPSC 326</td>
<td>Computer Graphics</td>
<td>3</td>
</tr>
<tr>
<td>CPSC 330</td>
<td>Parallel Programming</td>
<td>4</td>
</tr>
<tr>
<td>CPSC 442</td>
<td>Programming Language Concepts</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 323</td>
<td>Real Time Operating Systems</td>
<td>4</td>
</tr>
</tbody>
</table>
COLLEGE OF ARTS AND SCIENCES - ACADEMIC MINOR CLEARANCE FORM

MINOR IN COMPUTER SCIENCE

NAME ___________________________ STUDENT NUMBER ___________________________

STUDENT'S COLLEGE: ______________________ B.S./B.A. PROGRAM: ______________________

Procedures for declaring a minor: The student will meet with the minor advisor to create a plan for completion of the minor, sign Section A and receive a copy of the form. The minor advisor will route the form through the department office and the Dean's Office. The student is not enrolled in the minor until the Dean's Office submits the form to Records.

Procedures upon completion of a minor: The student will notify the minor advisor when requirements are complete. The department and the advisor will verify that the student has completed the minor, sign Section B and forward the form with copies of any approved substitutions or exceptions forms to the Dean's Office for signature. The Dean's Office will send a copy to Records for posting the completion of the minor.

| General Requirements:                                                                 |
| 1) At least 50% of the credits of the minor must be numbered 300 or higher          |
| 2) At least 50% of the credits of the minor must be Ferris State University credits |
| 3) This minor requires a minimum of 18 credits                                    |
| 4) This minor requires a minimum GPA of 2.5 in these courses.                      |
| 5) Minor requirements must be completed prior to or at the time of the awarding of a baccalaureate or higher degree.  |
| 6) A maximum of 1/3 of the credits, but no more than 7 credits, in a minor may overlap with the student's major*. |
| 7) Students may apply 6 credit hours of overlap between minors**                   |

<table>
<thead>
<tr>
<th>SECTION A</th>
<th>DEclarATION OF MINOR</th>
<th>REQUIRED COURSES</th>
<th>CREDIT HOURS</th>
<th>GRADE</th>
<th>SEMESTER COMPLETED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>CPSC 200</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>CPSC 300</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>CPSC 340</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MATH 328</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Directed Elective 1</td>
<td>3-4</td>
<td></td>
<td></td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>SIGNATURES</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student</td>
<td></td>
</tr>
<tr>
<td>Advisor</td>
<td></td>
</tr>
<tr>
<td>Department</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SECTION B</th>
<th>MINOR COMPLETE</th>
<th>ROUTING (FOLLOWING COMPLETION OF THE REQUIRED COURSES FOR THE MINOR)</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Department</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CAS Dean</td>
<td>□ MyDegree Verified</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Registrar</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DECLARATION SENT TO RECORDS ___________________________ COMPLETION SENT TO RECORDS ________________

*Approved by the Academic Senate, January 14, 2014
**Approved by the Academic Senate, April 19, 2000
COURSE INFORMATION FORM

Complete all items below (New or Current)

Check all boxes where modifications are being made.

Course Identification

☐ Prefix (current) CPSC  ☐ Number (current) 200  Contact Hours (current): 4
Lecture ☑ Lab ☐ Seminar ☐

[Enter contact hours per week in blank above.]

☐ Prefix (proposed) Click here to enter text. ☐ Number (proposed) Click here to enter text. Contact Hours (proposed): Click here to enter text.
Lecture ☑ Lab ☐ Seminar ☐

[Enter contact hours per week in blank above.]

☐ Title (current): Object Oriented Programming

☐ Title (proposed): Click here to enter text.

☐ Credit Hours (current): 4  ☐ Prerequisites (current): (MATH 126 or MATH 130) and CPSC 130 or permission of instructor ☐ Co-requisites (current): Click here to enter text.

☐ Credit Hours (proposed): Click here to enter text. ☐ Prerequisites (proposed): Click here to enter text. ☐ Co-requisites (proposed): Click here to enter text.

☐ Course Description (current) 125 words maximum: This course introduces programming and software engineering. The methodology is based on object oriented analysis. Discussion of fundamental algorithms and elementary data structures is included, focusing an ADT’s throughout. User interfaces are covered in the specification of programming tasks.

☐ Course Description (proposed) 125 words maximum: Click here to enter text.

☐ Course Outcomes and Assessment Plan (current):

1. C++ Basics: Students will understand and apply basic C++ data types, operators, expressions, and control structures such as sequence, selection, and iteration.
2. Compilers: Students will use a C++ compiler and predefined code libraries.
3. Functions: Students will design and implement C++ functions, demonstrating an understanding of call-by-value and call-by-reference.
4. Arrays: Students will understand and use simple data structures such as strings, arrays, and vectors.
5. File I/O and Namespaces: Students will understand and use file I/O, separate compilation, and C++ namespaces.
6. Classes: Students will design and implement C++ classes.
7. Recursion: Students will understand and implement recursive C++ functions.
8. Debugging: Students will identify and debug syntax, logic, and run-time errors in a C++ program.
9. Programming Style: Students will develop good programming style and structure, including the principles of problem decomposition and top-down design, to produce code that is easy to maintain.

Assessment Tools: Homework, Labs, Tests

☐ Course Outcomes and Assessment Plan (proposed): Click here to enter text.


Operator Overloading (4 hr): Basic operator overloading. Overloading binary and unary operators. Overloading with member functions. Overloading with friend functions. Overloading insertion and extraction operators, the assignment operator, increment and decrement operators, and the array operator.

Strings (4 hr): C-strings. Character manipulation tools. The C++ standard string class.

Pointers and Dynamic Arrays (4 hr).

Separate Compilation and Namespaces (4 hr).

Streams and File I/O (4 hr).

Recursion (4 hr).

Inheritance (4 hr).

Templates (4 hr).

Linked Data Structures (2 hr, if time).
MODIFY A COURSE – Course Data Entry Form

FORM F-M
Effective Fall 2015

I. ACTION TO BE TAKEN: MODIFY A COURSE

Desired Term Effective (6 digit code): 201608 Examples: 201601 (Spring), 201605 (Summer) NOTE: The first four digits indicate year, the next two digits indicate month in which term.

II. COURSE TO BE MODIFIED:

A. Course Prefix: CPSC  B. Number: 200
C. Course Title: Object Oriented Programming

LIST THE LETTER(S) OF ALL CHANGES FROM SECTION III BELOW: O, R See Appendix E Instructions for Completing Forms.

III. MODIFICATIONS

A. Course Prefix: Click here to enter text.  B. Number: Click here to enter text.
B. Contact Hours: Click here to enter text.  Lecture □ Lab □ Seminar □ [Enter contact hours per week in blank. See formula for contact hours to credit hours in Appendix E.]  
C. Practicum □ Independent Study □ [Check Box as appropriate. See Definitions in Appendix E]
D. Course Title: Click here to enter text. Limit to 30 characters including punctuation and spaces.  
E. College Code: Click here to enter text.  G. Department Code: Click here to enter text.  H. Credit Hours: Variable □ Fixed □
I. Minimum Credit Hours: Click here to enter text.  J. Maximum Credit Hours: Click here to enter text.  [Enter number is space.]
K. Hours May Be Repeated for Extra Credit: Yes □ No □ If yes, max times Click here to enter text. Or max credits Click here to enter text awarded.
L. Levels: Undergraduate □ Graduate □ Professional □
M. Grade Method: Normal Grading □ Credit/No Credit (Pass/Fail) □
N. Does proposed new course replace an equivalent course? Yes □ No □
O. Equivalent Course: Prefix: Click here to enter text.  Number: Click here to enter text.
P. Catalog Description: Limit to 125 words – PLEASE BE CONCISE. Click here to enter text.

Q. Term Offered: F, SP  R. Max Section Enrollment: 25  Lecture: _______ Lab: _______
S. Prerequisites or Restrictions: If none, leave blank. Click here to enter text.
T. Co-requisites: Courses must be taken concurrently. If none, leave blank. Limit to 100 characters including punctuation and spaces. Click here to enter text.

To be completed by Academic Affairs Office: Standards & Measures Coding and General Education Code

Basic Skill (BS) □ General Education □ Occupational Education □ G E Codes: Click here to enter text.

UCC Chair Signature/Date  Academic Affairs Approval Signature/Date

OFFICE OF THE REGISTRAR USE ONLY

Date Rec’d: Click here to enter text. Date Completed: Click here to enter text. Entered: SCACRSE □ SCADETL □ SCARES □ SCAPREQ □
COURSE INFORMATION FORM

Complete all items below (New or Current)
Check all boxes where modifications are being made.

Course Identification
☐ Prefix (current) CPSC  ☐ Number (current) 300  Contact Hours (current): 4
Lecture ☑ Lab ☐ Seminar ☐

[Enter contact hours per week in blank above.]

☐ Prefix (proposed)  Click here to enter text.  ☐ Number (proposed)  Click here to enter text.  Contact Hours (proposed):  Click here to enter text.
Lecture ☐ Lab ☐ Seminar ☐

[Enter contact hours per week in blank above.]

☒ Title (current): Data Structures and Algorithms
☐ Title (proposed):  Click here to enter text.

☒ Credit Hours (current): 4  ☐ Prerequisites (current): CPSC 200 with a grade of C- or better  ☐ Co-requisites (current):  Click here to enter text.

☐ Credit Hours (proposed):  Click here to enter text.  ☐ Prerequisites (proposed):  Click here to enter text.  ☐ Co-requisites (proposed):  Click here to enter text.

☒ Course Description (current) 125 words maximum:  This course covers data structures and object-oriented design in some depth. Topics covered include data structure, a formal treatment of recursion, an introduction to basic problem solving strategies, an introduction to complexity analysis and theory of computability. Sorting and searching algorithms are presented in the light of the presentation of problem-solving strategies and complexity issues. Finally, object-oriented design methodologies are studied.

☐ Course Description (proposed) 125 words maximum:  Click here to enter text.

☒ Course Outcomes and Assessment Plan (current):
1. Asymptotic Analysis: Students will analyze worst-case, average-case, and best-case running times of algorithms and C++ functions using asymptotic analysis and compare the asymptotic behaviors of polynomial, exponential, and logarithmic functions and algorithms.
2. Fundamental Data Structures: Students will understand fundamental data structures and the analyses of operations performed on them. As time allows, topics will include container classes, linked lists, stacks, queues, priority queues, trees, hash tables.
3. Applications: Students will use appropriate algorithms and associated data structures to solve complex problems.
4. Data Structure Design and Implementation: Students will design and implement new data structures using existing ones.
5. Standard Template Library: Students will apply standard library data structures in software design.
6. Searching and Sorting: Students will explain the major algorithms for searching and sorting and describe and compare the run-time analyses of these algorithms.
7. Recursion: Students will understand and apply recursion in problem solving.
8. Advanced C++: Students will understand and apply advanced features of the C++ programming language. As time allows, topics will include data abstraction and encapsulation, information hiding, operator overloading, dynamic memory allocation, template functions, template classes, iterators, inheritance, exception handling.

Assessment Tools: Homework, Labs, Tests

☐ Course Outcomes and Assessment Plan (proposed):  Click here to enter text.
- The phases of software development (4 hr): Specification, design, implementation.
- Abstract data types and C++ classes (4 hr).
- Container classes (6 hr).
- Pointers and dynamic arrays (2 hr): Designing classes with dynamic array members.
- Linked lists (4 hr).
- Software development with templates, iterators, and the STL (6 hr).
- Stacks (4 hr).
- Queues (4 hr): Queues, priority queues, and deques.
- Recursion (2 hr).
- Trees (4 hr).
- Balanced trees (4 hr).
- Searching (4 hr).
- Sorting (4 hr).
MODIFY A COURSE – Course Data Entry Form

I. ACTION TO BE TAKEN: MODIFY A COURSE

Desired Term Effective (6 digit code): 201608 Examples: 201601 (Spring), 201605 (Summer) NOTE: The first four digits indicate year, the next two digits indicate month in which term.

II. COURSE TO BE MODIFIED:

A. Course Prefix: CPSC  B. Number: 300
C. Course Title: Data Structures and Algorithms

LIST THE LETTER(S) OF ALL CHANGES FROM SECTION III BELOW: Q, R  See Appendix E Instructions for Completing Forms.

III. MODIFICATIONS

A. Course Prefix: Click here to enter text.  B. Number: Click here to enter text.
B. Contact Hours: Click here to enter text.  Lecture ☐ Lab ☐ Seminar ☐ [Enter contact hours per week in blank. See formula for contact hours to credit hours in Appendix E.]
C. Practicum ☐ Independent Study ☐ [Check Box as appropriate. See Definitions in Appendix E]
D. Course Title: Click here to enter text. [Limit to 30 characters including punctuation and spaces]
E. College Code: Click here to enter text.  G. Department Code: Click here to enter text.  H. Credit Hours: Variable ☐ Fixed ☐
I. Minimum Credit Hours: Click here to enter text.  J. Maximum Credit Hours: Click here to enter text. [Enter number is space.]
K. Hours May be Repeated for Extra Credit: Yes ☐ No ☐  If yes, max times Click here to enter text. Or max credits Click here to enter text. awarded.
L. Levels: Undergraduate ☐  Graduate ☐  Professional ☐
M. Grade Method: Normal Grading ☐  Credit/No Credit (Pass/Fail) ☐
N. Does proposed new course replace an equivalent course? Yes ☐ No ☐
O. Equivalent Course: Prefix: Click here to enter text.  Number: Click here to enter text.

P. Catalog Description: Limit to 125 words – PLEASE BE CONCISE. Click here to enter text.

Q. Term Offered: F  R. Max Section Enrollment: 25  Lecture: Lab:
S. Prerequisites or Restrictions: If none, leave blank. Click here to enter text.
T. Co-requisites: Courses must be taken concurrently. If none, leave blank. Limit to 100 characters including punctuation and spaces. Click here to enter text.

To be completed by Academic Affairs Office: Standards & Measures Coding and General Education Code

Basic Skill (BS) ☐  General Education ☐  Occupational Education ☐  G E Codes: Click here to enter text.

UCC Chair Signature/Date  Academic Affairs Approval Signature/Date

OFFICE OF THE REGISTRAR USE ONLY

Date Rec’d: Click here to enter text. Date Completed: Click here to enter text. Entered: SCACRSE ☐ SCADETL ☐ SCARRES ☐ SCAPREQ ☐
Complete all items below (New or Current)
Check all boxes where modifications are being made.

Course Identification

☒ Prefix (current) CPSC  ☒ Number (current) 320  Contact Hours (current): 3
Lecture ☒ Lab ☐ Seminar ☐  [Enter contact hours per week in blank above.]

☐ Prefix (proposed) Click here to enter text. ☐ Number (proposed) Click here to enter text. Contact Hours (proposed): Click here to enter text. Lecture ☐ Lab ☐ Seminar ☐  [Enter contact hours per week in blank above.]

☒ Title (current): Computer Simulation
☐ Title (proposed): Click here to enter text.

☒ Credit Hours (current): 3  ☒ Prerequisites (current): (MATH 216 or MATH 220) and CPSC 200 and MATH 251, all with a grade of C- or better
☐ Co-requisites (current): Click here to enter text.

☐ Credit Hours (proposed): Click here to enter text. ☐ Prerequisites (proposed): Click here to enter text. ☐ Co-requisites (proposed): Click here to enter text.

☒ Course Description (current) 125 words maximum:  An introduction to discrete and continuous processes including queues, and population dynamics. Examples will be modeled using Pascal and/or simulation languages such as Dynamo, and SIMSCRIPT.

☐ Course Description (proposed) 125 words maximum: Click here to enter text.

☒ Course Outcomes and Assessment Plan (current):
1. Simulation Fundamentals: Students will understand the basic principles and methods underlying elementary Monte Carlo methods and computer simulation of discrete-event stochastic systems.
2. Stochastic Systems: Students will gain familiarity with the most commonly used stochastic models for discrete-event systems.
3. Probability Models: Students will become skilled at developing probabilistic models of a wide variety of real-world systems.
4. Implementation: Students will become adept at designing, running, and analyzing simulations.
5. Applications: Students will appreciate the power and wide applicability of simulation techniques.
6. Interpretation of Simulation Results: Students will be able to critique someone else’s simulation results.

Assessment Tools: Homework, Labs, Tests

☐ Course Outcomes and Assessment Plan (proposed): Click here to enter text.
Course Outline including Time Allocation (current): Click here to enter text.

- General introduction and overview of modeling and simulation; key issues in simulation (4 hr).
- Fundamental concepts of systems and models (4 hr).
- Probability theory (4 hr).
- Statistical methods (4 hr).
- Monte Carlo methods (6 hr).
- Discrete-event stochastic systems (6 hr).
- Data collection and model validity (2 hr).
- Selecting input probability distributions (4 hr).
- Random number generators (4 hr).
- Random variate generation (4 hr).
- Discrete distributions.
- Continuous distributions.
- Output data analysis; decision making using simulation (2 hr).

course Outline including Time Allocation (proposed): Click here to enter text.
MODIFY A COURSE – Course Data Entry Form

I. ACTION TO BE TAKEN: MODIFY A COURSE

Desired Term Effective (6 digit code): 201608 Examples: 201601 (Spring), 201605 (Summer) NOTE: The first four digits indicate year, the next two digits indicate month in which term.

II. COURSE TO BE MODIFIED:

A. Course Prefix: CPSC  B. Number: 320
C. Course Title: Computer Simulation

LIST THE LETTER(S) OF ALL CHANGES FROM SECTION III BELOW: O, R  See Appendix E Instructions for Completing Forms.

III. MODIFICATIONS

A. Course Prefix: Click here to enter text.  B. Number: Click here to enter text.
B. Contact Hours: Click here to enter text.  Lecture □ Lab □ Seminar □ [Enter contact hours per week in blank. See formula for contact hours to credit hours in Appendix E.]
C. Practicum □ Independent Study □ [Check Box as appropriate. See Definitions in Appendix E]
D. Course Title: Click here to enter text.  [Limit to 30 characters including punctuation and spaces]
E. College Code: Click here to enter text.  G. Department Code: Click here to enter text.  H. Credit Hours: Variable □ Fixed □
I. Minimum Credit Hours: Click here to enter text.  J. Maximum Credit Hours: Click here to enter text. [Enter number is space.]
K. Hours May be Repeated for Extra Credit: Yes □  No □  If yes, max times Click here to enter text. Or max credits Click here to enter text. awarded.
L. Levels: Undergraduate □  Graduate □  Professional □
M. Grade Method: Normal Grading □  Credit/No Credit (Pass/Fail) □
N. Does proposed new course replace an equivalent course? Yes □  No □
O. Equivalent Course: Prefix: Click here to enter text.  Number: Click here to enter text.
P. Catalog Description: Limit to 125 words – PLEASE BE CONCISE. Click here to enter text.

Q. Term Offered: SPE  R. Max Section Enrollment: 25  Lecture: □  Lab: □
S. Prerequisites or Restrictions: If none, leave blank. Click here to enter text.
T. Co-requisites: Courses must be taken concurrently. If none, leave blank. Limit to 100 characters including punctuation and spaces. Click here to enter text.

To be completed by Academic Affairs Office: Standards & Measures Coding and General Education Code

Basic Skill (BS) □  General Education □  Occupational Education □  G E Codes: Click here to enter text.

UCC Chair Signature/Date  Academic Affairs Approval Signature/Date

OFFICE OF THE REGISTRAR USE ONLY

Date Rec’d: Click here to enter text. Date Completed: Click here to enter text. Entered: SCACRE □  SCADEL □  SCARRS □  SCAPREQ □
COURSE INFORMATION FORM

Complete all items below (New or Current)
Check all boxes where modifications are being made.

Course Identification

☒ Prefix (current) CPSC  ☐ Number (current) 330  Contact Hours (current): 4
☐ Lecture ☐ Lab ☐ Seminar ☐

[Enter contact hours per week in blank above.]

☐ Prefix (proposed) Click here to enter text.  ☐ Number (proposed) Click here to enter text.  Contact Hours (proposed): Click here to enter text.
☐ Lecture ☐ Lab ☐ Seminar ☐

[Enter contact hours per week in blank above.]

☒ Title (current): Parallel Programming
☐ Title (proposed): Click here to enter text.

☐ Credit Hours (current): 3  ☐ Prerequisites (current): (MATH 216 or MATH 220) and (CPSC 200 or ECNS 311), with a grade of C- or better
☐ Co-requisites (current): Click here to enter text.

☐ Credit Hours (proposed): Click here to enter text.  ☐ Prerequisites (proposed): Click here to enter text.  ☐ Co-requisites (proposed): Click here to enter text.

☒ Course Description (current) 125 words maximum: Introduction to the parallel computing landscape and a parallel programming language. Overview of processes, synchronization, and the use and implementation of semaphores. Introduction to distributed programming techniques (including message passing, RPC and rendezvous), process interaction paradigms and scientific computing (including heartbeat algorithms, pipeline algorithms, broadcast algorithms, grid computations and particle computations).

☐ Course Description (proposed) 125 words maximum: Click here to enter text.

☒ Course Outcomes and Assessment Plan (current):

Assessment Tools: Homework, Labs, Tests

Outcomes:
A student succeeding in this course should be able to:

- Enumerate and describe the concepts involved in the construction of parallel and distributed systems including how deadlock, livelock, and incorrect results may arise from uncontrolled parallel execution of programs accessing shared resources and/or cooperating to accomplish a scientific computation.
- Understand how parallel processes can synchronize through use of semaphores, message passing, RPC, and rendezvous techniques.
- Understand and implement various process interaction paradigms including heartbeat algorithms, pipeline algorithms, broadcast algorithms, grid computations, and particle computations.

☐ Course Outcomes and Assessment Plan (proposed): Click here to enter text.
I. The Parallel Computing Landscape (6 hours)
   - Hardware and Software for Parallel Computing
   - Parallel Matrix Multiplication
   - Producers and Consumers, Clients and Servers

II. Processes and Synchronization (10 hours)
   - States, Actions and Parallelization
   - Atomicity and Await
   - Safety and Liveness Properties
   - Barrier Synchronization

III. Semaphores (10 hours)
   - Syntax, Semantics and Implementation
   - Basic Problems: Barriers, Producers and Consumers, Bounded Buffers
   - Readers/Writers and the Technique of Passing the Baton

IV. Message Passing (10 hours)
   - Asynchronous Message Passing
   - Fillers, Clients and Servers, Interacting Peers
   - Synchronous Message Passing

V. RPC and Rendezvous (8 hours)
   - Remote Procedure Call
   - Rendezvous, Applications
   - Case Study: SR Language

VI. Process Interaction Paradigms (10 hours)
   - Heartbeat Algorithms
   - Pipeline Algorithms
   - Broadcast Algorithms
   - Grid Computations
   - Particle Computations

VII. Languages, Compilers, Libraries and Tools (5 hours)
   - Pthreads, MPI
   - Parallelizing Compilers

Your course outline includes time allocation (proposed): Click here to enter text.

Express time allocation in one of the following formats for a 3 credit hour course; adjust accordingly: Weeks (15 weeks), Hours (45 hours, assuming 3 contact hours per week, Percentages (100 percent)
I. ACTION TO BE TAKEN: MODIFY A COURSE

Desired Term Effective (6 digit code): 201608 Examples: 201601 (Spring), 201605 (Summer) NOTE: The first four digits indicate year; the next two digits indicate month in which term.

II. COURSE TO BE MODIFIED:

A. Course Prefix: CPSC  B. Number: 330  
C. Course Title: Parallel Programming

LIST THE LETTER(S) OF ALL CHANGES FROM SECTION III BELOW: Q, R  See Appendix E Instructions for Completing Forms.

III. MODIFICATIONS

A. Course Prefix: Click here to enter text.  B. Number: Click here to enter text.
B. Contact Hours: Click here to enter text. Lecture ☐ Lab ☐ Seminar ☐ [Enter contact hours per week in blank. See formula for contact hours to credit hours in Appendix E.]
C. Practicum ☐ Independent Study ☐ [Check Box as appropriate. See Definitions in Appendix E]
D. Course Title: Click here to enter text. [Limit to 30 characters including punctuation and spaces]
E. College Code: Click here to enter text. G. Department Code: Click here to enter text.  H. Credit Hours: Variable ☐ Fixed ☐
I. Minimum Credit Hours: Click here to enter text. J. Maximum Credit Hours: Click here to enter text. [Enter number is space.]
K. Hours May be Repeated for Extra Credit: Yes ☐ No ☐ If yes, max times Click here to enter text. Or max credits Click here to enter text. awarded.
L. Levels: Undergraduate ☐ Graduate ☐ Professional ☐
M. Grade Method: Normal Grading ☐ Credit/No Credit (Pass/Fail) ☐
N. Does proposed new course replace an equivalent course? Yes ☐ No ☐
O. Equivalent Course: Prefix: Click here to enter text. Number: Click here to enter text.

P. Catalog Description: Limit to 125 words — PLEASE BE CONCISE. Click here to enter text.

Q. Term Offered: On Demand  R. Max Section Enrollment: 25  Lecture: Lab:
S. Prerequisites or Restrictions: If none, leave blank. Click here to enter text.
T. Co-requisites: Courses must be taken concurrently. If none, leave blank. Limit to 100 characters including punctuation and spaces. Click here to enter text.

To be completed by Academic Affairs Office: Standards & Measures Coding and General Education Code

Basic Skill (BS) ☐ General Education ☐ Occupational Education ☐ G E Codes: Click here to enter text.

UCC Chair Signature/Date  Academic Affairs Approval Signature/Date

OFFICE OF THE REGISTRAR USE ONLY

Date Rec'd: Click here to enter text. Date Completed: Click here to enter text. Entered: SCAESE ☐ SCADTL ☐ SCARRES ☐ SCAPREQ ☐