Minnesota State University, Mankato  
Curriculum Proposal

Please type or select the requested information. Print completed forms, add appropriate paper attachments, and route through MSU's curricular process for recommendations and decisions.

| College: Science, Engineering and Technology | Proposal #: 199 |
| Department: Computer Science | Effective Date of Change: |
| Program: Computer Science | Academic Year: 2006-07 |
| Type of Change: PROGRAM PROPOSALS | (For Office Use Only) |
| Proposed: Redesign: Changes in Courses | Course Designator and Number |
| Title Current: Computer Science | Number of Credits |
| Title Proposed: Computer Science | (if applicable) |
| 24-Char. Abbrev: Computer Science |

Include a course or program description for the Bulletin (30-40 words maximum for courses, 100 for programs):
Bachelor's degree programs offered by the Department of Computer Science prepare graduates for positions in computer-related fields as well as advanced post-graduate study. Computer science is a field that spans a wide range of topics from theoretical and algorithmic foundations to cutting-edge developments in robotics, computer vision, computational linguistics, intelligent systems, and bioinformatics. The department offers a major and minor in Computer Science. Admission to Major is granted by the department. Admission to the Major is required before the student is permitted to take 300- and 400-level courses.

Rationale or Justification for change:
Our last program review showed that we should move our CS program towards accreditation and towards national norms in terms of course credit hours and topics. This redesign maintains the credit hour requirements, title and degree of our program but increases the likelihood of national accreditation of the program.

***For General Education or Cultural Diversity Courses Only***

| General Education Course: | Cultural Diversity Course: |
| GE Category #: N/A | (Please check one.) |
| GE Category Name: N/A | Core (At least 75% devoted to topics of race, gender, sexual orientation, age, class, and disabilities as they occur in United States Society.) |
| (Maximum of 3 Categories) | Related (At least 25% devoted to the above topics or to a global perspective on topics related to African American, Asian, Hispanic, and Native American inhabitants of the United States.) |

? For Writing Intensive Courses, attach a description of the kind and quantity of writing.
? For Upper Division Courses, include a description of the respects in which it is broad and general rather than narrow and specific, and so suitable as GE.

Attach paper copies of the following:
a. Syllabus or course outline.
b. Course's student learning outcomes associated with each GE competency or CD designation.
c. List of strategies to be used to assess students' achievement of each GE competency or CD designation.

***For New Courses***

| (Check all that apply.) | Instructional Type: Lecture | Course will be offered: |
| Course is an elective. | Grading Format: | ☐ Fall Semester |
| Course is required for program | ☐ Grade | ☐ Spring Semester |
| Pre- or Co-requisites: | ☐ P/N | ☐ Summer Session |

☐ Other courses are being changed or eliminated. (Explain.)

☐ Course content or title is similar to courses in other departments. (Attach copy of letter of agreement with other program(s) contacted. Indicate the nature of the discussions and/or resolution of differences or potential conflicts.)

Attach paper copies of the following:
a. Syllabus or course outline.
b. Course's student learning outcomes.
c. A list of resources required to offer and support this course.
d. A description of how teaching this course will affect department staffing.
e. If 400/500 level course, an explanation of added expectations of graduate students.

Revised September 2002
<table>
<thead>
<tr>
<th><strong>Department</strong></th>
<th><strong>College Curriculum Committee</strong></th>
<th><strong>College Dean</strong></th>
<th><strong>General Education Subcommittee</strong></th>
<th><strong>Undergraduate Curriculum and Academic Policy Committee</strong></th>
<th><strong>Faculty Association Graduate Committee</strong></th>
<th><strong>Graduate Dean</strong></th>
<th><strong>Academic Affairs Council</strong></th>
<th><strong>Senior Vice President and Vice President for Academic Affairs</strong></th>
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<tr>
<td>Recommendation</td>
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<td>Department Chair: 10/17/03</td>
<td>Committee Chair: 11/2/06</td>
<td>General Education Subcommittee Chair: Date</td>
<td>UCAP Faculty Chair: 1/26/07</td>
<td>Faculty Association Graduate Chair: Date</td>
<td>Graduate Dean: Date</td>
<td>Assistant Vice President: 3/28/07</td>
<td>Sr. Vice President/Vice Pres. Academic Affairs: 3/28/07</td>
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CS Curriculum Redesign

1. Rationale for doing a redesign

It has been eight years since the conversion from quarters to semesters. At that time, we did a major redesign of all three of our CIS programs. However, our academic discipline changes rapidly and we must diligently maintain our programs to meet these changes.

An ongoing trend in the entire Computer Science and Information Technology/Systems area is a general divergence of focus among the disciplines that comprise it. The effect of this on our current department configuration has been (among other things) a divergence of the needs and expectations of the introductory courses as preparation for students moving into the individual sub-disciplines later in their academic careers. It is no longer possible to address the needs of all three types of students in the same introductory courses and it is our opinion that we need to separate the introductory Computer Science curriculum from that of the other disciplines.

Separating the introductory courses along discipline lines provides an opportunity to strengthen all three programs by immediately focusing student attention on the needs of the individual programs. Moreover, it provides opportunity to improve the mid- and upper-level course offerings in each of the three disciplines by tightening and focusing those courses on content appropriate to the individual disciplines. Consequently, all three disciplines will realize improved curricula if the separation extends beyond the introductory courses.

We view this situation as an opportunity to replace one large, sprawling program with three focused, well-structured and improved programs. To that end, this document outlines how we in the Computer Science discipline intend to organize our program.

2. Redesign of the CS curriculum

The proposed curriculum really represents a repackaging of the current COMS CS program. The content of most of the 300- and 400-level courses have been presented in 3-credit rather than 4-credit courses. Some of this repackaging represents an admission that we have been teaching less than 4-credits worth of material as suggested by our most recent program reviewers. Some material has been moved from “elective” to “core”.

There has been only one truly new course in the core which is CS 310 (Algorithms), and a few new electives: CS 425, CS 431, and CS 433. Two of the new electives represent support for a new cross-departmental broad major called Cognitive Science. Finally, there are two new “capstone” courses --- CS 300 and CS 490 --- one intended for the end of the sophomore year and the other the last semester before graduation. Most students and many employers look for these types of courses as a way to prepare students for careers beyond MSU.
The total number of credits has increased, which will strengthen the skills and knowledge of our graduates. There are new requirements focusing on Electrical Engineering topics, more credits in the core, and additional capstone-type courses required.
To: Whom it may concern

From: David Haglin

Representing the proposed Computer Science program

Mahbubur Syed

Representing the proposed Information Technology Program

James Slack

Representing the proposed Information Systems Program

Date: 10/11/2006

Re: Mutual agreement concerning courses related to introductory programming, software engineering, networking and database systems

The Department of Computer and Information Sciences currently has three programs proposing to redesign and evolve as follows:

- Computer Science redesigned but the name remains, designator will be CS
- CIS redesigned but uses the name Information Technology, designator will be IT
- CMIS redesigned but uses the name Information Systems, designator will be ISYS

We have formed three groups of faculty and have worked to separate the curricula much more than the current COMS curriculum. This memo addresses the areas that remain closest among the programs after the separation.

We have divided most courses and topics between the redesigned programs in an obvious way. However, the fields of study of these programs intersect in a few places: introductory programming, software engineering, networking, and database systems.

The introductory programming courses in CS will use the C++ programming language to explore machine-level and operating-system-level concepts, such as register allocation and memory management. The introductory courses in ISYS and IT will use the Python and Java programming languages to focus on practical computer applications. The respective faculty groups agree that although there are some topics in common, the set of knowledge objectives of the respective courses is markedly dissimilar.

The other three intersection areas --- software engineering, networking and database systems --- are upper-level courses in all three programs. The faculty groups have agreed that theoretical and conceptual aspects of these
topics should belong to courses in the CS program, while the practical and applied aspects belong to courses in the ISYS and/or IT. In other words, the CS curriculum will focus on development of software engineering tools and techniques, while ISYS and IT will focus on how to use existing tools and techniques, possibly in new and better ways. The CS networking courses will focus on the algorithms and concepts behind network implementations whereas the IT program will focus on applications of these technologies to areas such as security, organization, support of information services such as web applications, and applications of state of the art networking technologies. Similarly, for database systems, CS will focus on the theory and concepts of database system software, and IYS and IT will focus on how to use database system software to solve organizational problems.

We feel that this separation of course focus and content is reflective of our respective fields of study.
Computer Science Program Objectives
(Student Learning Outcomes)

The Computer Science (CS) major prepares graduates for positions in computer-related fields as well as post-graduate study, putting emphasis on scientific analysis and mathematics. Our CS major offers a comprehensive foundation that permits graduates to adapt to new technologies and new ideas. The Department of Computer Science prepares students for positions in computer-related fields from theoretical and algorithmic foundations to cutting-edge developments in robotics, computer vision, computational linguistics, intelligent systems, and bioinformatics. It provides excellent preparation for students who wish to enter graduate programs. Students seeking the CS degree are required to have a minor. While any minor is acceptable, the required courses of the CS major also fulfill the requirements for a minor in Mathematics.

The learning objectives of the CS major reflect the graduates’ needs to grow and adapt in their future careers. The learning objectives follow.

1. Graduates will have knowledge of the software development process; will understand the importance of milestones; and have the ability to work effectively in a software development project.
2. Graduates will have the ability to communicate effectively with computer professionals and the general public.
3. Graduates will have knowledge of team dynamics and the ability to work effectively in a team environment.
4. Graduates will have the ability to continuously learn, demonstrated by an ability to access new developments in computer science and rapidly acquire the skills necessary to apply them.
5. Graduates will have the ability to reason abstractly (mathematic, algorithmic, scientific) for problem solving in the field of computer science.
6. Graduates will have practical experience designing and building solutions on a variety of platforms.
7. Graduates will be prepared to enter graduate programs in computer science and related fields.
8. Graduates will be prepared to be leaders in technology development.
Department Meeting – October 9, 2006

Many thanks to Sarah Kruse for taking these minutes during my absence due to illness.

--Leon Tietz

Members Absent: Quade, Roiger, Tietz, Hart, Bates.
On sabbatical this term: Azarbod, Case, Cornell.

The meeting was called to order at 1:05 p.m.

There is a search committee being formed to select the new dean for CSET. The committee will include one person from each department in the college. David will ask for volunteers and if there is more than one person a meeting will be arranged to determine the process to make the selection.

The motion to approve the IT curriculum was opened for discussion.

A week ago the three chairs decided to produce a document that would differentiate between the programs. A copy of the memo was emailed. Jim sent one revision which was made. A copy of the memo was distributed at the meeting for review/comments.
The memo was designed to answer the question, are IT and CS in agreement with latest curricula? Some of the specifics were included to help explain the differences to the college curriculum committee.

David has met with Steve and Becky and they discussed the IT curriculum and each is satisfied.

Questions remain such as what if a student wants to get both and IT and CS major? This is something that will need be established by each department.

David sent an email to David Gjerde there is not provision to automatically identify cross-listed courses. They will need a conversion grid so the registrar’s office knows how to evaluate if students have met requirements.

Motion carried with unanimous voice vote.

Mike: Motion made that the CS curriculum, as distributed on 10/8/06, be accepted.
Gregg: Second
David: In section 4 we have Math 290 as an option and that is different than our current program. Remove from section 4.
Accepted as a friendly amendment to the motion.
Revised Motion: A motion was made and seconded that the CS curriculum as distributed on 10/8/06, following the removal of Math 290 from section 4, be accepted.
Motion carried with unanimous voice vote.
David: It is now time to celebrate this milestone that has been reached.

David: Effective Dec. David will be resigning as chair. He will be taking the position of Director of the Center for Excellence in Scholarship and Research. We do need to elect a chair for one semester for the current CIS department.

David: For the current students, can we continue to offer some of the 300/400 COMS courses so these students can finish?
This will be something that may need future discussion.

Julio: One concern is that we will have a new dean, what if the new dean does not like this approach. We haven’t secured the support of administration and that the university is willing to wait a number of years to let this evolve to see the result. It is a great sacrifice and a risk by the department.
David will solicit suggested wording from the department and compile that into a document that will be sent to Scott.

Adjourn at 1:51 p.m.
<table>
<thead>
<tr>
<th>Student Learning Outcomes (performance, knowledge, attitudes)</th>
<th>Related College Goals</th>
<th>Related University Goals</th>
<th>Method(s) of Assessment (What is the assessment?)</th>
<th>Who Assessed (Students from what courses - population)</th>
<th>When Assessed (dates)</th>
<th>Standard of Mastery/ Criterion of Achievement</th>
<th>What is Hoped to Be Learned?</th>
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</thead>
<tbody>
<tr>
<td>1. Graduates will have knowledge of the software development process.</td>
<td>I, II, VI</td>
<td>I, II</td>
<td>Assessment will be incorporated into the senior capstone experience: CS 490, CS497, or CS498.</td>
<td>Students in the Senior Capstone.</td>
<td>Every Semester</td>
<td>95% of the students will earn a passing grade.</td>
<td>Whether graduates have been prepared to contribute to a software development project.</td>
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<td>2. Graduates will have the ability to communicate effectively with computer professionals and the general public.</td>
<td>I, II, III, VI</td>
<td>I and II</td>
<td>Evaluation of current syllabi to count number of writing and oral presentation assignments.</td>
<td>Course syllabi in CS courses (i.e., all students)</td>
<td>January (when all syllabi are available for the year.)</td>
<td>Oral and written communication assignments each year of the program.</td>
<td>Whether the overall program helps develop student communication ability throughout their experience.</td>
</tr>
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<td>3. Graduates will have knowledge of team dynamics and the ability to work effectively in a team environment.</td>
<td>I, II, VI</td>
<td>I and II</td>
<td>Student survey of experiences in previous and current CS courses.</td>
<td>CS courses that currently require a team project.</td>
<td>Last week of semester.</td>
<td>Positive experience with or understanding of negative experiences with teams.</td>
<td>Whether students are learning about and developing abilities to work in teams.</td>
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<td>4. Graduates will have the ability to continuously learn, demonstrated by an ability to access new developments in computer science and rapidly acquire the skills necessary to apply them.</td>
<td>IV</td>
<td>II</td>
<td>Survey of skills acquired after graduation.</td>
<td>Alumni/alumnae 3 to 5 years after graduation.</td>
<td>Annually</td>
<td>70% of graduates should be confident in skills acquired after graduation.</td>
<td>Whether our program trains students for specific skills or prepares them to learn new skills.</td>
</tr>
<tr>
<td>Student Learning Outcomes (performance, knowledge, attitudes)</td>
<td>Related College Goals</td>
<td>Related University Goals</td>
<td>Method(s) of Assessment (What is the assessment?)</td>
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<td>5. Graduates will have the ability to reason abstractly (mathematic, algorithmic, scientific) for problem solving in the field of computer science.</td>
<td>I, II, III, VI</td>
<td>II</td>
<td>Assessment will be incorporated into the senior capstone experience: CS 490, CS497, or CS498.</td>
<td>Students in the Senior Capstone courses. Additional surveys may be collected from sophomores to gather longitudinal data.</td>
<td>Every Semester</td>
<td>95% of the students will earn a passing grade.</td>
<td>Whether our curriculum places the appropriate emphasis on these important topics.</td>
</tr>
<tr>
<td>6. Graduates will have practical experience designing and building solutions on a variety of platforms.</td>
<td>I, II, III, VI</td>
<td>V</td>
<td>Student survey of self-assessment of programming abilities and experiences. Faculty survey of student programming abilities in 400-level classes.</td>
<td>As part of the final report for Senior Capstone. Additional surveys may be collected from sophomores to gather longitudinal data.</td>
<td>As capstone is completed</td>
<td>80% of students should be comfortable with coding 10-page-long programs.</td>
<td>Whether students have the programming skills needed to succeed in industry and/or in upper-division courses.</td>
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<tr>
<td>7. Graduates will be prepared to enter graduate programs in computer science and related fields.</td>
<td>I, II, V</td>
<td>I, II</td>
<td>Seniors will be asked to identify plans for graduate school. Track numbers of students accepted/rejected.</td>
<td>Students who are graduating.</td>
<td>At the end of every semester.</td>
<td>80% of our majors applying for graduate school gain admission.</td>
<td>Whether our students are well-prepared to be successful in graduate programs.</td>
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<td>8. Graduates will be prepared to be leaders in technology development.</td>
<td>III, IV</td>
<td>I and II</td>
<td>Survey of career leadership</td>
<td>Alumni/alumnae 3 to 5 years after graduation.</td>
<td>Annually</td>
<td>50% of alums should be routinely engaging in technology development leadership roles</td>
<td>Whether students are prepared to become leaders.</td>
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</table>
## Computer & Information Sciences

**Chair:** Colin Wightman

Gregg Ascher, Cyrus Azarbod, Rebecca Bates, Steven Case, Lee Cornell, Cesar Guerra-Salcedo, David Haglin, Allan Har, Dean Kelley, Ann Quad, Richard Roiger, Hamed Sallam, Julio Sanchez, Susin Schilling, James Slack, Mahbubur Syed, Leon Tietz, Christophe Veltsos, Michael Wells

Bachelor's degree programs offered by the Department of Computer and Information Sciences prepare computer and information scientists for positions in computer-related fields. The department offers majors in Computer Science (CS), Computer Information Science (CIS), Management Information Systems (MIS), and three minors.

**MIS Note:** Management Information Systems (MIS) is a cross-disciplinary field of study which combines the technical aspects from computer science with the resource management techniques from business. To reflect the cross-disciplinary nature of this field, there are two MIS programs at MSU: one is offered in the Department of Computer and Information Sciences; the other offered in the Department of Management. Students who have an interest and an aptitude for the technical aspects of MIS should consider the MIS major in the Department of Computer and Information Sciences. This program has about two-thirds courses in the Department of Computer and Information Sciences and one-third Business courses. Students who have an interest and an aptitude for the resource management component of MIS should consider the Management major, MIS option in the Department of Management. This program has about two-thirds courses in the College of Business and one-third Computer and Information Sciences courses.

Admission to Major is granted by the department. Admission to the Major is based on the student's request to enroll in the Department of Management. This program has about two-thirds courses in the College of Business and one-third Computer and Information Sciences courses.

### Requirements are:
- A minimum of 32 earned semester credits
- Completion of MATH 121 with a grade of C or better
- Completion of ENG 101 with a grade of C or better
- Completion of COMS 110 with a grade of B or better
- Completion of COMS 211 and COMS 212 with a grade of C or better and a GPA of 2.5 in these courses (or their equivalents)

### Required General Education (7 credits):
- **ENG 101** Composition (4)
- **SPEE 100** Fund. of Speech Communication (3)

### Required Support Courses (7 credits):
- **ENG 271** Technical Communication I (4)
  Choose one of the following Speech courses:
  - 101, 102, 202, 203, 315, 325, 333, or 403.

### Required for Major (Core, 51 credits):
- **COMS 211** Fundamentals of Computer Science I (4)
- **COMS 212** Fundamentals of Computer Science II (4)
- **COMS 310** Data Structures and Algorithms (4)
- **COMS 320** Machine Structures and Programming (4)
- **COMS 370** Concepts of Programming Languages (4)
- **COMS 410** Abstract Machines and Grammars (4)
- **COMS 460** Operating Systems (4)
- **MATH 121** Calculus I (4)
- **MATH 122** Calculus II (4)
- **MATH 247** Linear Algebra I (4)
- **STAT 354** Concepts of Probability and Statistics (3)
- **MATH 375** Introduction to Discrete Mathematics (4)

### Choose one of the following courses:
- **COMS 360** Systems Programming (4)
- **COMS 362** Introduction to Data Communication and Networking (4)
- **COMS 420** Computer Organization II (4)
- **COMS 470** Compiler Construction (4)

### Required Electives (COMS, 8 credits):
Choose an additional eight credits of coursework from the following courses:
- **COMS 201** Introduction to Assistive Technology (2)
- **COMS 202** Computers in Society (4)
- **COMS 230** Applied Expert Systems (4)
- **COMS 340** Database Management Systems I (4)
- **COMS 350** Operations Research I (4)
- **COMS 360A** Systems Programming (4)
- **COMS 361** Windows Programming (4)
- **COMS 362** Introduction to Data Communication and Networking (4)
- **COMS 371** Applications Programming (4)
- **COMS 380** Systems Analysis and Design (4)
- **COMS 411** Parallel and Distributed Processing (4)
- **COMS 412** Graphics (4)
- **COMS 420A** Advanced Computer Organization (4)
- **COMS 430** Artificial Intelligence (4)
- **COMS 432** Robotics (4)
- **COMS 440** Database Management Systems II (4)
- **COMS 450** Operations Research II (4)
- **COMS 460** Operating Systems (4)
- **COMS 462** Communication Protocols (4)
- **COMS 463** Client Server and Web Applications (4)
- **COMS 464** Mobile Applications (4)
- **COMS 465** Distributed Processing (4)
- **COMS 470A** Compiler Construction (4)
- **COMS 480** Software Engineering (4)
- **COMS 481** Rapid Application Development (4)
- **COMS 495** Seminar in Computer Science (1)
- **COMS 496** Selected Topics in Computer Science (1-4)
- **COMS 497** Internship (4)
- **COMS 499** Individual Study (1-2)

* Minimum of 4 credits of required electives must be of 400-level.

# Required Electives (Science, 12 credits):
Choose one of the following sequences:
- **BIOL 105** General Biology I (4)
- **BIOL 106** General Biology II (4) OR
- **CHM 201** General Chemistry I (5)
- **CHM 202** General Chemistry II (5) OR
- **GEO 121** Physical Geology (4)
- **GEO 122** Earth History (4) OR
- **PHYS 222** General Physics II (5) OR
- **PHYS 223** General Physics II (5) AND

Any class numbered 200 or above in Astronomy, Biology, Chemistry, Geology, or Physics or one class from another sequence listed above.

# May be used to fulfill General Education requirements.

### Required Minor: Yes, Any. Note that the Mathematics requirements specified above fulfill the requirements for a mathematics minor.

### Required Support Courses (11 credits):
- **ENG 101** Composition (4)
- **SPEE 100** Fund. of Speech Communication (3)
- **STAT 154** Elementary Statistics (3)
Computer Science
College of Science, Engineering & Technology
Department of Computer Science
273 Wissink Hall • 507-389-2968
Web site: www.cset.mnsu.edu/cs
Chair: David Haglin
Rebecca Bates, Steven Case, David Haglin, Dean Kelley, Hamed Sallam, Julio Sanchez

Bachelor's degree programs offered by the Department of Computer Science prepare graduates for positions in computer-related fields as well as advanced post-graduate study. Computer science is a field that spans a wide range of topics from theoretical and algorithmic foundations to cutting-edge developments in robotics, computer vision, computational linguistics, intelligent systems, and bioinformatics. The department offers a major and minor in Computer Science.

Admission to Major is granted by the department. Admission to the Major is required before the student is permitted to take 300- and 400-level courses.
Requirements are:
- A minimum of 32 earned semester credits
- Completion of MATH 121 with a grade of C or better
- Completion of ENG 101 with a grade of C or better
- Completion of CS 113 with a grade of B or better
- Completion of CS 111, CS 210, and CS 220 with a grade of C or better and a GPA of 2.5 in these courses (or their equivalents).

COMPUTER SCIENCE BS
Required General Education (7 credits):
ENG 101 Composition (4)
SPEE 100 Fundamentals of Speech Communication (3)

Required Support Courses (7 credits):
ENG 271 Technical Communication (4)
Choose one of the following Speech courses:
101, 102, 202, 203, 315, 325, 333, or 403.

Required for Major (Core, 71 credits):
CS 110 Computer Science I (4)
CS 111 Computer Science II (4)
CS 210 Data Structures (4)
EE 106 Intro to Electrical/Computer Engineering 1 (3)
CS 220 Machine Structures and Programming (4)
CS 300 Large-Scale Software Development (4)
CS 310 Algorithm Analysis (3)
CS 320 Computer Architecture (3)
CS 340 Concepts of Database Management Systems (3)
CS 350 Network Architectures (3)
CS 370 Concepts of Programming Language (3)
CS 380 Analysis and Design of Software Systems (3)
CS 410 Formal Languages/Abstract Machines (3)
CS 460 Operating Systems (3)
CS 495 Computer Science Seminar (1)
MATH 121 Calculus I (4)
MATH 122 Calculus II (4)
MATH 247 Linear Algebra I (4)
STAT 354 Concepts of Probability and Statistics (3)
MATH 375 Introduction to Discrete Mathematics (4)
Capstone Experience (4 credits):
   CS 490 Senior Capstone (4)
   CS 497 Internship (1-4)
   CS 498 Senior Thesis (4)

Required Electives (CS, 9 credits)*:
Choose an additional nine credits of coursework from the following courses:
CS 230 Intelligent Systems (4)
CS 360 Systems Programming (3)
CS 361 Windows Programming (3)
CS 415 High Performance Computing (3)
CS 420 Advanced Computer Architecture (3)
CS 425 Real-time and Embedded Systems (3)
CS 430 Artificial Intelligence (3)
CS 431 Computational Linguistics (3)
CS 433 Data Mining/Machine Learning (3)
CS 452 Network Protocol Internals (3)
CS 454 Mobile & Wireless Networks (3)
CS 470 Compilers (3)
CS 480 Advanced Programming Practices (3)
CS 498 Selected Topics in Computer Science (1-4)
CS 499 Individual Study (1-2)
ISYS 202W Computers in Society (4)
* minimum of 6 credits of required electives must be of 400-level

The following courses are not to be used in this major: CS 171, CS209, CS 293, CS 296, CS 496.

Required Electives (Science, 12 credits):
Choose one of the following sequences:
BIOL 105W General Biology I (4)*
BIOL 106 General Biology II (4) OR
CHEM 201 General Chemistry I (5)*
CHEM 202 General Chemistry II (5) OR
GEOL 121 Physical Geology (4)*
GEOL 122 Earth History (4)* OR
PHYS 221 General Physics I (5)*
PHYS 222 General Physics II (5) AND
Any class numbered 230 or above in Astronomy, Biology, Chemistry, Geology, or Physics or one class from another sequence listed above.
* May be used to fulfill General Education requirements.

Required Minor: Yes. Any. Note that the Mathematics requirements specified above fulfill the requirements for a mathematics minor.

COMPUTER SCIENCE MINOR
Required for Minor (Core, 11 credits):
CS 110 Computer Science I (4)
CS 111 Computer Science II (4)
EE 108 Introduction to Electrical/Computer Engineering 1 (3)

Choose three of the following courses:
CS 210 Data Structures (4)
CS 220 Machine Structures and Programming (3)
CS 310 Algorithm Analysis (3)
CS 320 Computer Architecture (3)
CS 360 Systems Programming (3)
CS 350 Network Architectures (3)
CS 370 Concepts of Programming Languages (3)
CS 380 Analysis and Design of Software Systems (3)
CS 420 Advanced Computer Architecture (3)
CS 452 Network Protocol Internals (3)
CS 460 Operating Systems (3)
CS 470 Compilers (3)

For a hardware emphasis, students should choose CS 220, CS 320, and CS 420. For a networking emphasis, students should choose CS 210, CS 350, and CS 452.

POLICIES/INFORMATION

GPA Policy. A GPA of 2.5 or higher in courses required for a major or minor in the Department of Computer Science is required for graduation. This GPA requirement is calculated and must be maintained for each of the following areas: 1) for the combined Required General Education and Required Support Courses, or their substitutions, if any; 2) for the Required for Major and Required Electives courses including Category I courses, if any.
Refer to the College regarding required advising for students on academic probation.

Grading Policy. All coursework applied towards the major or minor, including required general education and support courses, must be taken for a letter grade except for courses offered only as P/N. A minimum grade of C is required in all courses which are to be applied towards a departmental major or minor program, including those required courses which are in supporting areas (such as ENG 271). In addition, a minimum grade of C is required for all prerequisite courses. Grades of D are not accepted by the department. Any student who receives a D or F in a CS class, or who drops a CS class after the first two weeks of the semester, will have a hold for CS classes put on his/her registration. In other words, he/she will not be able to register for future CS courses until the hold is released. To have the hold released, the student must meet with his/her advisor and present the advisor with an appeal form. This form will be available from the Office of Computer Science (273 Wissink Hall).

Incomplete Policy. An incomplete grade for a course will generally be given only under two conditions. The first condition is illness — a doctor’s written recommendation must be supplied. The second condition arises when a death in the student’s family has caused the student to be away from the campus for an extended period of time. The student must have a satisfactory grade (C or better) in the course at the time of the onset of the condition.
CS 171, CS209, CS293, CS 296 and CS 493 do not count toward a major or minor in the computer science.

Residency: At least 50 percent of the computer and information sciences credits required for a major or minor from this department must be earned at Minnesota State Mankato.
4. Proposed Major Requirements
   a. Credit Summary

<table>
<thead>
<tr>
<th>General Education:</th>
<th>44</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG 101</td>
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<tr>
<td>ENG 271</td>
<td>4</td>
</tr>
<tr>
<td>SPEE 131</td>
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</tr>
<tr>
<td>SPEE 212 or 233</td>
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</tr>
<tr>
<td>Science Sequence:</td>
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<tr>
<td>BIOL 105*-106, CHEM 201*-202,</td>
<td></td>
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<tr>
<td>GEOL 121*-122*, or PHYS 221*-222</td>
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<tr>
<td>Math Requirements:</td>
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<tr>
<td>Math 121, 122, 247, 354, 375</td>
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<tr>
<td>Computer Science Major</td>
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</tr>
<tr>
<td>Total</td>
<td>128</td>
</tr>
</tbody>
</table>

   b. Major Requirements Summary

   CS-I, II, and III          12
   HW I and HW II             7
   Required Core              28
   Electives                  9
   Seminar                    1
   Capstone                   4
   Science Elective           4
   Total                      65

   c. Course Numbering Strategy

   The first digit indicates the level (e.g. 3 => junior-level), the middle digit indicates CS sub-area, and the third digit is used to differentiate within the sub-area. The sub-areas are as follows:

   00 – entry
   10 – theory
   20 – hardware (architecture, assembly programming, etc.)
   30 – machine intelligence (data mining, intelligent systems, artificial intelligence, linguistics)
   40 – database
   50 – networking
   60 – system-level programming (operating systems, system programming, windows programming)
   70 – computer languages
   80 – software development practices
   90 – miscellaneous
d. Computer Science Courses

- **Introduction Sequence (19 credits):**
  - CS 110(4): Computer Science I
  - CS 111(4): Computer Science II
  - CS 210(4): Data Structures
  - EE 106(3): Introduction to Electrical/Computer Engineering I

- **Required Core (28 credits):**
  - CS 300(4): Large-Scale Software Development
  - CS 310(3): Algorithm Analysis
  - CS 320(3): Computer Architecture
  - CS 340(3): Concepts of Database Management Systems
  - CS 350(3): Network Architectures
  - CS 370(3): Concepts of Programming Languages
  - CS 380(3): Analysis and Design of Software Systems
  - CS 410(3): Formal Languages/Abstract Machines
  - CS 460(3): Operating Systems

- **Required Electives (9 credits):**
  - CS 230(4): Introduction to Intelligent Systems
  - CS 360(3): Systems Programming
  - CS 361(3): Windows Programming
  - CS 415(3): High Performance Computing (Parallel & Distributed Processing)
  - CS 420(3): Advanced Computer Architecture
  - CS 425(3): Real-time and Embedded Systems
  - CS 430(3): Artificial Intelligence
  - CS 431(3): Computational Linguistics
  - CS 433(3): Data Mining/Machine Learning
  - CS 452(3): Network Protocol Internals
  - CS 454(3): Mobile and Wireless Networks
  - CS 470(3): Compilers
  - CS 480(3): Advanced Programming Practices

- **Capstone Experience (5 credits):**
  - CS 295/495(1): Computer Science Seminar
  - CS 490(4): Senior Capstone
  - CS 497(1-4): Internship
  - CS 498(4): Senior Thesis

- **Other and Service Courses**
  - CS 171: Intro to C++ Programming for Engineers
  - CS 209(2): C++ For Java Programmers
  - CS 496(1-4): Selected Topics in Computer Science
  - CS 499(1-2): Individual Study
  - CS 293/493(1): MAX Scholar Seminar
5. Pre-requisite Structure

6. Roadmap

- **Year 1 Fall**
  - CS 110(4)
  - MATH 121(4)
  - ENG 101(4)
  - Gen. Ed.(3)

- **Year 1 Spring**
  - CS 111(4)
  - EE 106(3)
  - MATH 122(4)
  - SPEE 101(3)
  - General Education(3)

- **Year 2 Fall**
  - CS 210(4)
  - CS 220(4)
  - MATH 247(4)
  - Science(4)

- **Year 2 Spring**
  - CS 300(4)
  - CS 320(3)
  - Science(4)
  - SPEE 212/233(3)
  - General Education(3)

- **Year 3 Fall**
  - CS "Core" Classes(6)
  - CS Electives(3)
  - MATH 375(4)
  - Science(4)

- **Year 3 Spring**
  - CS "Core" Classes(9)
  - CS Seminar(1)
  - Math 354(3)
  - ENG 271(4)

- **Year 4 Fall**
  - CS "Core" Classes(6)
  - CS Electives(3)
  - General Education(7)

- **Year 4 Spring**
  - CS Electives(3)
  - CS Capstone(4)
  - General Education(6)
7. Sample Course Offering Schedule

Our strategy is to offer every introductory-sequence course every semester, every core course once per year, and three to five elective courses every semester. Here we present a two-year rotation plan.

<table>
<thead>
<tr>
<th>Class</th>
<th>Credits</th>
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<th>Spring</th>
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<td>CS 454</td>
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Note: Two of the "Var" classes will be offered each semester.

The number of sections of each category of course:

- 4 credit
  - Fall: 6
  - Spring: 7
- 3 credit
  - Fall: 6
  - Spring: 6
- 600-level
  - Fall: 2
  - Spring: 1

Minimum number of full-teaching positions to cover these offerings: 4 1/6
<table>
<thead>
<tr>
<th>Current CS Curriculum</th>
<th>Proposed CS Curriculum</th>
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<tr>
<td><strong>Required Core (51 Credits)</strong></td>
<td><strong>Math Requirements (19 Credits)</strong></td>
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<tr>
<td>MATH 121 Calculus I</td>
<td>MATH 121 Calculus I</td>
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<tr>
<td>MATH 122 Calculus II</td>
<td>MATH 122 Calculus II</td>
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<tr>
<td>MATH 247 Linear Algebra I</td>
<td>MATH 247 Linear Algebra I</td>
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<tr>
<td>MATH 375 Introduction to Discrete Mathematics</td>
<td>MATH 375 Introduction to Discrete Mathematics</td>
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<tr>
<td>COMS 211 Fundamentals of Computer Science I</td>
<td>CS 110 Introductory Sequence (19 Credits)</td>
</tr>
<tr>
<td>COMS 212 Fundamentals of Computer Science II</td>
<td>Computer Science I</td>
</tr>
<tr>
<td>COMS 310 Data Structures and Algorithms</td>
<td>Computer Science II</td>
</tr>
<tr>
<td>COMS 320 Machine Structures and Programming</td>
<td>Data Structures</td>
</tr>
<tr>
<td>COMS 370 Concepts of Programming Languages</td>
<td>EE 109 Intro to EE and CE</td>
</tr>
<tr>
<td>COMS 410 Abstract Machines and Grammars</td>
<td>CS 220 Machine Structures and Programming</td>
</tr>
<tr>
<td>COMS 490 Operating Systems</td>
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</tr>
<tr>
<td><strong>Choose one of the following:</strong></td>
<td><strong>Required Core (28 Credits)</strong></td>
</tr>
<tr>
<td>COMS 380 Systems Programming</td>
<td>CS 300 Large-Scale Software Development</td>
</tr>
<tr>
<td>COMS 302 Intro to Data Comm. and Networking</td>
<td>CS 310 Algorithm Analysis</td>
</tr>
<tr>
<td>COMS 420 Computer Organization II</td>
<td>CS 320 Computer Architecture</td>
</tr>
<tr>
<td>COMS 470 Compiler Construction</td>
<td>CS 340 Concepts of Data Management Systems</td>
</tr>
<tr>
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<td>CS 350 Network Architectures</td>
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<td>CS 370 Concepts of Programming Languages</td>
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<td>CS 380 Analysis and Design of Software Systems</td>
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<td>CS 410 Abstract Machines and Grammars</td>
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<td>CS 490 Operating Systems Design and Implementation</td>
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<td><strong>Required Electives (8 Credits)</strong></td>
<td><strong>Required Electives (8 Credits)</strong></td>
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<td>COMS 201 Introduction to Assistive Technology</td>
<td>ISYS 202 Computers in Society</td>
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<td>COMS 240 Database Management Systems I</td>
<td>CS 381 Windows Programming</td>
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<td>COMS 330 Operations Research I</td>
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<td>COMS 360 Windows Programming</td>
<td>CS 415 High Performance Computing</td>
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<td>COMS 371 Applications Programming</td>
<td>CS 420 Advanced Computer Architecture</td>
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<td>COMS 390 Systems Analysis and Design</td>
<td>CS 425 Real-Time and Embedded Systems</td>
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<td>COMS 411 Parallel and Distributed Processing</td>
<td>CS 430 Artificial Intelligence</td>
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<td>COMS 412 Graphics</td>
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<td>COMS 430 Artificial Intelligence</td>
<td>CS 439 Data Mining/Machine Learning</td>
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<td>COMS 432 Robotics</td>
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<td>COMS 440 Database Management Systems II</td>
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<tr>
<td>COMS 450 Operations Research II</td>
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<td>COMS 460 Operating Systems</td>
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<td>COMS 462 Communication Protocols</td>
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<td>COMS 463 Client Server and Web Applications</td>
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<td>COMS 464 Mobile Applications</td>
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<td>COMS 465 Distributed Processing</td>
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<td>COMS 481 Rapid Application Development</td>
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<td>COMS 483 Seminar in Computer Science</td>
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<td>COMS 499 Selected Topics in Computer Science</td>
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<td>COMS 497 Internship</td>
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<td>COMS 499 Individual Study</td>
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<td><strong>Required Support Courses</strong></td>
<td><strong>Required Support Courses</strong></td>
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<td><strong>Required Science Electives (12 Credits)</strong></td>
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</tr>
<tr>
<td>SPEE</td>
<td>SPEE</td>
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</table>
PROGRAM REDESIGN APPLICATION

Completion of the Program Redesign Application is the means by which most program modifications can be made. The various kinds of modifications are shown below. Program redesigns may be considered at any time of the year. In most cases, the review and approval of the application will be handled by Academic Programs Unit staff, and will not require formal Board review and approval.

PROGRAM REDESIGN POSSIBILITIES

1. Change program name
2. Change program CIP at the 6-digit level
3. Change credit length within policy limitations
4. Change credit length beyond policy limitations
5. Add program alternative:

   Emphases (baccalaureate, AAS/diploma only)
   Option (baccalaureate or master's programs only)

6. Change or delete program emphasis or option
7. Redesign of a degree or diploma to add or convert an award
   - AAS to add or convert to an AS (Creation of an AS award requires a formal articulation agreement with a baccalaureate degree-granting institution)
   - AAS or AS to include a diploma or certificate
   - Diploma to add or convert to an AAS or AS degree or certificate (AS requires articulation agreement; diploma must be at least 42 credits)
   - AS to add or convert to an AAS
   - BA to add or convert to a BS or other baccalaureate degree
   - MA to add or convert to an MS or other master's degree

8. Delete an award related to an existing program
9. Redesign or addition of a program within the same or a related 6-digit CIP classification (check with Academic Program staff for approved list of related CIP classifications)

Questions regarding the redesign application process and completion of this form should be addressed to the staff member working with your application. Submit one electronic copy of the completed application via e-mail, and one paper copy via fax or mail to the following address:

Academic Program Review Unit
Colleges: JoAnn Simser, 651-297-2285, joann.simser@so.mnscu.edu
State Universities: Mitchell Rubinstein, 651-296-5793, mitchell.rubinstein@so.mnscu.edu
Minnesota State Colleges and Universities
500 World Trade Center 30 E. Seventh Street
Saint Paul, MN 55101
FAX: (651) 296-3214

MnSCU Board Policy - 3.19 ACADEMIC PROGRAM REDESIGN POLICY
Minnesota State Colleges and Universities
PROGRAM REDESIGN APPLICATION

RELATED POLICY or STATUTE: MS 1996, Ch. 368, Sec. 33; MS 1995, Ch. 248, Article 11, Sec. 10; and MS 1996, Ch. 398, Sec. 38; Board Policy 3.14, 3.17, 3.19

[This form is designed for electronic use. You should have some familiarity with the Word table-making function. Enter your information in the correct box on the table below.] Please submit an individual form for each program you are redesigning. Multiple changes to the same program may be made on the same form. You may delete all the tables that do not apply to your redesign request.]

SECTION I: DESCRIPTION OF CURRENTLY APPROVED PROGRAM

<table>
<thead>
<tr>
<th>8-Digit CIP #</th>
<th>Program Name</th>
<th>Award</th>
<th>Cr Length</th>
<th>Location/s</th>
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<tbody>
<tr>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

Name of affiliated educational institution that offers one or more credits in this program: 

Is this award jointly offered: Yes No

Section II: CHANGE CREDIT LENGTH WITHIN POLICY

Previous: 85 Semester Credits

Proposed: 106 Semester Credits

SECTION III: REDESIGNED PROGRAM SUMMARY

Program Requirements:

Complete this section if the number of credits in the award has increased from the previous design, or if it is a new award.

Use the following headings to provide information on each of the components in the program. List all credit totals required for the students to graduate, including prerequisites. If this application is for multiple awards (AAS and/or diplomas and/or certificates) duplicate this table and list requirements for each award separately.

<table>
<thead>
<tr>
<th>Program Name: Computer Science</th>
<th>Award:</th>
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</table>

<table>
<thead>
<tr>
<th>Program Component</th>
<th>Previous Credits</th>
<th>Proposed Credits</th>
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<tbody>
<tr>
<td>General Education/Liberal Studies</td>
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<td>44</td>
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<tr>
<td>Prerequisites</td>
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<td>Major-Core</td>
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<td>71</td>
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<tr>
<td>Major-Alternative (see above)</td>
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</table>
Major-Restricted Electives   | 12 | 13
Required Minor (or est. 20 credits) | |
Free Electives | 21 |
TOTAL PROGRAM CREDITS | 128 | 128

SECTION IV: APPROVAL VERIFICATION

Application Author:  DAVID HAGLIN
Title:  Professor and Chair
Campus:  
Phone and E-Mail:  507-389-5306  HAGLIN@MNSU.EDU

Approval Chief Academic Officer:  
Approval of President:  
Signature of cooperating institution's president for joint awards:  

SECTION V: APPENDICES/SUPPORTING DOCUMENTATION

A. Institution Curriculum Committee Membership and Minutes showing recommendations (required)
B. Occupational/Professional Demand Data (required, if adding a certificate or AAS to an AS).
C. Copies of Agreements with Institutions (Joint and Articulated degrees) (required, if applicable)
D. Justification for Exceeding Program Credit Lengths set in Policy (required, if applicable)
E. Evidence of business/industry support (required for occupational programs, optional for others)
F. Letters of Support (optional)
Present: Harry Petersen (AMET), Beth Lavoie (Biology), Jim Rife (Chemistry/Geology), Gregg Asher (CIS), Julio Mandojana (ECET), Brian Wasserman (IDCM), Dan Singer (Math/Statistics), Karen Chou (ME/CivE), Youwen Xu (Physics/Astronomy), Mahbubur Syed (UCAP Representative for CSET).

Guests: David Haglin (CIS), Bill Hudson (ECET)

1. The meeting was called to order at 8:06 AM.
2. The minutes of 10-24-2006 meeting was approved as written.
3. Karen Chou thanked Jim Rife and Gregg Asher for chairing the 10-24-06 meeting.
4. David Haglin and Bill Hudson attended in order to clarify any confusion in the proposal CIS and ECET submitted. Bill Hudson also brought some of the previously required documentation to the committee for reviewing.
5. The committee reviewed 165 proposals. 164 proposals were approved contingent upon the required materials submitted in proper format. Please see attached spreadsheet for details.
   Proposal 07168 was tabled for insufficient of information.
3. Jim Rife left at 9 AM, and Beth Lavoie left at 9:20 AM, due to prior commitment.
4. Several members of the committee suggested UCAP to allow “Class action” for simple proposals such as change of designators or change of prerequisites. It would save the related parties a lot of work.
5. Two proposals were delivered to us yesterday (10-30-06) afternoon at 4 PM. Many committee members did not have a chance to review the proposal. They are general education proposals. We may vote on these proposals using email if possible.

Meeting adjourned at 9:50 am.

Respectfully submitted,

Youwen Xu, Secretary
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