

Date: February 28, 2008

Subject: Proposed Revision to the Computer and Information Science (CIS) Major (BA and BS)

From: Mike Vasey, Chair, Subcommittee C

Subcommittee C considered the proposal for revisions to the BA-CIS and BS-CIS programs on February 6, 2008. After a thorough discussion, the consensus of the committee was that the proposed revisions are well-justified and clearly articulated. No significant concerns were noted and the proposed changes were unanimously approved by the subcommittee.

The proposed changes to the BA-CIS and BS-CIS programs are largely intended to bring the two programs into line with the 10 credit hour reduction in GEC requirements. Because they are somewhat distinct, the proposed changes to the BA-CIS and the BS-CIS degrees are described separately below.

### BS-CIS Proposed Changes

The proposed changes to the BS-CIS program are intended to make the program compatible with the new reduced GEC requirements and to increase the rigor of the program to make it comparable to the BS in Computer Science and Engineering and thus make the program more attractive to prospective students. The CSE Department notes that students recognize that employers value the greater rigor of the BS-CSE degree (e.g., represented by the capstone design course that has been required of the BS-CSE degree but not the BS-CIS degree). Therefore, the following changes to the BS-CIS, which result in a net decrease of 10 credit hours (reflecting the decrease in the GEC), are proposed:

1. Reduction in GEC requirements for the major reflecting the 10 credit hour reduction in the revised GEC.
2. Addition of a required capstone design course. This course, previously required only of students in the BS-CSE program, provides students with valuable experiences in building large computing applications and develops teamwork and communication skills.
3. Addition of a requirement to take CSE 601, which is a 1-credit course on Social and Ethical Issues in Computing also previously required only of BS-CSE majors.

### BA-CIS Proposed Changes

The proposed changes to the BA-CIS program are similar to the changes described above for the BS-CIS program. These changes result in a net reduction of the BA-CIS program of 10 credit hours. Specifically, the changes are:

1. Reduction in GEC requirements for the major reflecting the 10 credit hour reduction in the revised GEC.

2. Addition of a requirement to take CSE 601, which is a 1-credit course on Social and Ethical Issues in Computing.
3. A 1-credit reduction in the number of elective hours to offset the increase associated with the addition of CSE 601.

The committee regarded the reduction in the GEC requirements of each program as being clearly justified by changes to the GEC. We regarded the course on ethical issues in computing to be an important addition to both programs. Finally, we regarded the addition of the capstone design course to the BS-CIS degree as a valuable enhancement of the program which is likely to increase the value of the degree and hence its attractiveness to students.

As noted above, no significant issues were noted. However, two necessary changes were noted to the summary sheets: 1) Addition of a 0-credit social diversity requirement to the list of GEC requirements; and 2) Revision of the "Possible 4-year Curriculum for BS-CIS Students" in consultation with the Arts and Sciences advising office.

**Transmittal History for Revision to CIS BA/BS Majors**

**MAPS College Curriculum Committee**

**Minutes 12-05-07**

**CIS Program change— Approved with contingency**

- i. intro- history; difference between BA-CIS and BS-CIS programs; curriculum changes (new courses; adjustments to meet the new GEC requirements); both dropped program credit hours to 181.
- ii. BA (p.3)- the electives are change from 20 to 19, excluding 494, 594 courses, choose courses under advising
- iii. BS (p.4)- recommendation to team up grad and undergrad students. Differences from BA: required Engineering courses and courses outside the department.
- iv. Technical electives- Info System option and individualized tracks (for business minors); possible minor programs
- v. **Suggest language change on the proposal: change the proposal language from having credit hours available to increase program rigor (p.1)**
- vi. Suggest not to move Stat 525 from the program list to the GEC list

Motion to approve with contingency (see v.): Hadad

2<sup>nd</sup>: Ryden

Yes: all No: none

**CCI Subcommittee C**

**UNAPPROVED minutes 2-6-08**

**BA-CIS & BS-CIS – approved**

- i. intro and summary of change by Neelam
- ii. Q&A: allocation of 15 hours of pre-electives; program admission; difference btw CSC and CIS programs
- iii. advising suggestion: put the Survey course MPS100 into the 1<sup>st</sup> year list; English 110- usually take in Spring, not in Autumn; Neelam will work with John Wanzer on the advising schedule/program plan

Approved.

Yes: all

No: none



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December 7, 2007

Prof. David Andereck  
Chair, MPS Curriculum Committee

Dear Prof. Andereck:

The Undergraduate Studies Committee of the CSE Department, which I chair, discussed at several of its recent meetings, some possible changes, following the recently approved changes in the GEC component of all BS and BA programs in MPS/ASC, in the BS-CIS and BA-CIS programs. All of our faculty as well as student representatives were part of these discussions. The process we followed in arriving at these changes is described on page 2 of the attachment. Our faculty approved the changes unanimously at its meeting of Nov. 19, 2007. As you recall, the changes were presented to the MPS CC at its meeting of December 5. The feedback from the committee has been incorporated into the attached document. In particular, we have prepared a table (see page 6) which shows how a student can complete the program in four years; one of the committee members wished to see such a table.

We considered two sets of changes for the BS-CIS program, these being changes in the GEC component of the program following the recently approved GEC revisions, and in the technical portion of the program. The reason for the changes in the technical portion of the program are to make the program comparable to our BS-CSE degree. Currently, the BS-CIS program is somewhat weaker since students in this program are not required to take a *capstone design course* which students in the BS-CSE program are required to take. This makes BS-CIS students rather less attractive than BS-CSE students to employers since the capstone design course provides considerable practical experience in building large computing applications and also develops such important skills as team-working and communication abilities. Further, BS-CIS students are not required to take CSE 601, the one credit course on Social and Ethical Issues in Computing, which BS-CSE students are required to take. We feel this is a weakness, given the importance of such matters as privacy issues and copyright protection. In the proposed revision, BS-CIS students would be required to take both of these. In terms of the total number of hours in the program, the net result of the GEC changes and the changes in the technical portion of the program is that the the minimum number of credit hours for BS-CIS degree will be reduced from 191 hours currently to 181 hours under the revised program.

In the case of the BA-CIS program, the main changes are in the GEC component. The GEC hours are somewhat reduced while providing some added flexibility. This would reduce the program size from a total minimum of 191 credit hours to a minimum of 181 hours. In addition, we propose adding CSE 601 (the one credit course on Social and Ethical Issues in Computing) to the *core* portion of the program and reducing the number of elective hours correspondingly by one hour.

The details of the proposed changes appear in the attachment. We hope this proposal is acceptable to the MPS CC and request you to forward it to the ASC CCI. If you have any questions or comments,

please email me.

Thank you and best wishes.

Sincerely,

Neelam Soundarajan  
Chair, Undergrad Studies Committee, CSE Dept.

cc: Prof. Bruce Weide, Assoc. Chair, CSE Dept.

Attachment: Detailed proposal.

# Proposed Changes in the BA-CIS and BS-CIS Programs

Date: December 7, 2007.

Revised: February 28, 2008.

**Prepared by:** N. Soundarajan, Chair, CSE Undergraduate Studies Committee.

## Background

The university recently approved changes in the GEC requirements for all BA and BS degree programs in Arts and Sciences. During Autumn '07, the CSE faculty discussed ways to change the BA-CIS and BS-CIS programs to make them consistent with the new GEC requirements and to consider any other desirable changes.

In particular, the faculty wanted to make suitable changes in the BS-CIS program to make the Computer Science portion of the program comparable to the CS portion of the BS-CSE degree (in the College of Engineering). Currently, the BS-CIS program is somewhat weaker than the BS-CSE program since BS-CIS students are not required to take a *capstone design course* which students in the BS-CSE program are required to take. This makes BS-CIS students rather less attractive than BS-CSE students to employers since the capstone design course provides considerable practical experience in building large computing applications and also develops such important skills as team-working and communication abilities. Further, BS-CIS students are not required to take CSE 601, the one credit course on Social and Ethical Issues in Computing, which BS-CSE students are required to take. We feel this is a weakness, given the importance of such matters as privacy issues and copyright protection.

Students in the BA-CIS program are also not required to take either CSE 601 or a capstone design course. These students typically do not have the technical background to take any of the capstone design courses but faculty felt that CSE 601 is especially relevant to BA-CIS students and should be required of students in this program.

## Summary of changes

**BS-CIS program:** The GEC requirements for the BS-CIS program are revised to be consistent with the new university requirements; students will be required to take a capstone design course; and they will be required to take CSE 601. In terms of the total number of hours in the program, the net result is that the the minimum number of credit hours for the degree will be reduced from 191 hours currently to 181 hours under the revised program. (A four-year “bingo-sheet” for the revised program is presented on page 6.)

**BA-CIS program:** The GEC requirements are revised to be consistent with the new university requirements; students will be required to take CSE 601; the number of elective hours will be reduced by one credit hour. In terms of the total number of hours in the program, the net result is that the the minimum number of credit hours for the degree will be reduced from 191 hours currently to 181 hours under the revised program.

The details of these changes appear on pages 3–4 of this document.

## **Additional changes**

Some changes are also being proposed in the technical electives portion of the BS-CIS program. The main changes are the inclusion, with the addition described above of a capstone design course requirement for all BS-CIS students, of a *suggested* capstone design course in each option; the inclusion of specific *tracks* in the *Individualized* option; the removal, given its very low popularity, of the *Advanced Studies* as an option and the addition of a corresponding track in the *Individualized* option; and the removal of BusMgmt 630 as a required course in the *Information Systems* option. The new *Business Information Systems* track in the *Individualized* option should be attractive to students interested in business information systems.

These changes are described on page 5.

## **Process/Recommendation**

These changes were discussed extensively at a number of UGSC meetings during October and November. A student representative from the CIS program was part of these discussions. The committee approved all of the changes and recommended them to the CSE faculty for its approval. The faculty discussed the proposal at its meeting of November 19, 2007 and approved all of the proposed changes.

# BA-CIS

## Summary of changes

The main changes are in the GEC requirements. The only changes in the major are the addition of CSE 601 as a required course, and the reduction of electives by 1 hour.

*Net result:* Program size reduced by 10 hrs.

## Details of new program

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GEC (100 hrs):

Engl 110, Second writing:	10 hrs
Math & data analysis:	10 hrs
Math 151, Stat 245	
Nat. Sc.@1	15 hrs
Foreign language through 104@2	20 hrs
Soc. Sc.@3	10 hrs
Arts & Hum.@4	10 hrs
Historical study	10 hrs
Issues of contemp. world	5 hrs
Social Diversity (overlaps with another category)	0 hrs
Two additional courses from Nat.Sc./Soc.Sc./Arts & Hum.	10 hrs

- @1: must include one 2-course sequence in biological or physical sc;  
at least one course from each of bio. and phy. sc.
- @2: some/all of these hours may be EM hours;
- @3: two courses selected from two of the following three categories:  
Individuals and groups; Organizations & Politics; Human,  
Natural, and Economic resources.
- @4: at least five hours from the Literature category; and  
at least five hours from the second from Visual/Perf. Arts (VPA);

Major (81 hours):

Core: CSE 221, 222, 321, 360, 560, 601, 670:	25 hrs
Electives:	19 hrs
chosen from any 500-level CSE course or above, not including CSE 502, with approval of faculty advisor.	
Additional major requirements:	37 hrs
Math 152, 153, 366; CSE 459.xx; approved related field (intro course: 5 hrs, above intro level: 10 hrs);	
General elec. in major:	8 hrs
(courses CSE, Math, or related field)	

Total for degree: 181 hrs

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# BS-CIS

## Summary of changes

Changes with respect to the GEC as specified by ASC. Major is revised (to make it technically more comparable to the BS-CSE program) as follows: require CSE 601, and a capstone design course; the number of hours in each option (including capstone design course) will be 28 hours.

*Net result:* Program size reduced by 10 hrs.

## Details of new program

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GEC (100 hrs):

Engl 110, Second writing: 10 hrs

Quantitative/Logical Analysis: 10 hrs

Math 151, Math 152

Foreign language through 104@1 20 hrs

Nat. Sc.: 20 hrs

Phys 111/112 or 131/132;

two additional sc. courses, at least  
one must be biological;

Soc. Sc.@2 10 hrs

Arts & Hum.@3 10 hrs

Historical study 10 hrs

Social Diversity (overlaps with  
another category) 0 hrs

Additional breadth 10 hrs

Math 153, 366; 2 hrs. of Stat 427

(these courses are "prerequisites" for the major but may be  
taken after the student has been admitted to the major.

Students also have the option of taking other courses as  
specified by the college to meet the "additional breadth"  
requirement; but they would still have to take these courses.)

@1: some or all of these hours may be EM hours;

@2: two courses selected from two of the following three categories:  
Individuals and groups; Organizations & Politics; Human,  
Natural, and Economic resources.

@3: at least five hours from the Literature category; and  
at least five hours from the second from Visual/Perf. Arts (VPA);

Major (81 hrs):

Core: 46 hrs

221, 222, 321, 360, 459, 541, 560,  
601, 625, 655, 660, 670, 675.02, 680

Tech Option including capstone course (minimum): 28 hrs

Additional math 7 hrs

Math 566, 1 hr. of Stat 427, Stat 428

Total for degree: 181 hrs

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## **BS-CIS technical elective options**

(Note: Proposed changes are marked with “\*”).

### **1. Information and Computation Assurance (28 hours):**

Required: CSE 551, 651, 677, 678, capstone course: 16 hours;

Suggested capstone course: CSE 762 (\*).

Electives: 12 hours; at least 3 of the 12 hours must be CSE;

the remaining 9 may be CSE or non-CSE or combination of the two.

### **2. Software Systems (28 hours):**

Required: CSE 551, 677, 757 (\*); capstone course: 13 hours;

Suggested capstone course: CSE 758 (\*).

Electives: 15 hours; at least 10 of the 15 hours must be CSE.

\*Advanced Studies: Drop this option.\*

### **3. Information Systems (28 hours):**

Required: CSE 616, 671; AMIS 211/310; capstone course: 16 hours;

(\*omit: Bus Mgt 630 (4 hrs)\*)

Suggested capstone course: CSE 772 (\*).

Electives: 12 hours; at least 8 of the 12 hours must be CSE courses.

### **4. Individualized (28 hours):**

Required: 18 hours of CSE courses including a capstone course;

Electives: 10 hours of CSE+non-CSE courses approved by advisor;

OR a minor program approved by advisor.

Students in this option may want to consider following one of the tracks listed below.

Tracks (\*):

Graphics/Animation: Req: CSE 581;

Suggested capstone course: CSE 682 or 786;

Other recommended courses: CSE 681, 694A, 781, 782, 784; 786/682;

For students pursuing a minor, recommended minor(s):

Studio Art; Industrial, Interior & Visual Comm. Design.

AI: Req: CSE 630;

Suggested capstone course: CSE 786 or 731;

Other recommended courses: CSE 612, 634, 730, 732, 733, 735, 779, 731/786;

For students pursuing a minor, recommended minor(s):

Linguistics; Psychology.

Advanced Studies:

Req: One of CSE 725/755/780; one of 760/775; one of Math 568/571/647/648 (or similar);

For students pursuing a minor, recommended minor(s):

Mathematics.

Business Information Systems:

Req: CSE 616, 671; Business Minor;

Suggested capstone course: CSE 772.

**Possible 4-year Curriculum for BS-CIS Students**

<b>Year</b>	<b>Autumn</b>	<b>Winter</b>	<b>Spring</b>
1	Math 151 ASC Sur 100 GEC: 10  Total: 16 hrs	Math 152 CSE 221 GEC: 5  Total: 14 hrs	Math 153 CSE 222 Engl 110  Total: 14 hrs
2	CSE 321 Math 366 Phys 111/131 CSE 360 Total: 16 hrs	CSE 541 CSE 459 GEC: 5 2nd Writing Total: 14 hrs	CSE 560 CSE 601 Phys 112/132 GEC: 5 Total: 16 hrs
3	CSE 625 Stat 427 CSE 670 GEC: 5 Total: 14 hrs	CSE 655 CSE 675.02 Math 566 GEC: 5 Total: 16 hrs	Stat 428 CSE 680 GEC: 10  Total: 16 hrs
4	Tech elec: 12 CSE 660 Total: 15 hrs	Tech elec: 12 GEC: 5 Total: 17 hrs	Capst. Des.: 4 GEC: 10 Total: 14 hrs

# BSCIS

## Colleges of the Arts and Sciences

Both a Bachelor of Science (BS) and a Bachelor of Arts (BA) with a major in Computer and Information science are offered through the College of Mathematical and Physical Sciences, which is one of the coalitions of colleges which constitute the Colleges of the Arts and Sciences. These programs combine a broad liberal arts background with specialized study in computer science. The BS CIS program has a strong scientific and technical orientation, and encourages students to specialize by choosing one of the following options to accompany the core computer science courses: software systems, advanced studies, information systems, information and computation assurance, and an individualized option. The BA CIS program permits students to combine the study of computer science with the study of some related field of potential computer application.

## BSCIS

### Requirements for the Major<sup>+</sup> (85 - 89 hours)

#### Core Courses (45 hours)

221	Software Development Using Components .....	(4)
222	Development of Software Components .....	(4)
321	Design and Analysis of Component-Based Software .....	(4)
360	Introduction to Computer Systems.....	(4)
459*	Programming Languages for Programmers .....	(1)
541	Elementary Numerical Methods.....	(3)
560	Systems Software Design, Development, and Documentation.....	(5)
625	Introduction to Automata and Formal Languages.....	(3)
655	Introduction to the Principles of Programming Languages.....	(4)
660	Introduction to Operating Systems.....	(3)
670	Introduction to Database Systems I.....	(3)
675.02	Introduction to Computer Architecture .....	(4)
680	Introduction to Algorithms & Data Structures .....	(3)

#### CIS Options (23 - 27 hours)

(Detailed on subsequent pages)

- I. Software Systems
- II. Information Systems
- III. Advanced Studies
- IV. Information & Computation Assurance
- V. Individualized

#### Additional Math Requirements (17 hours)

Mathematics 153, 366, 566 .....	(11)
Statistics 427, 428 .....	(6)

### General Education

#### Curriculum (85 - 115 hours)

**Note: The GEC curriculum is under review and may result in a reduction of total credit hours.**

##### Requirements:

Writing and Related Skills		
English 110 .....	(5)	
Second writing course .....	(0 - 5)	
Quantitative and Logical Skills		
Math 151, 152.....	(10)	
Diversity Experiences (may be covered in other GEC categories).....		(0 - 15)
Foreign Language (through 104) .....	(10 - 20)	
Natural Science		
Physics 111/112 or 131/132.....	(10)	
Elective Science (Structured Selection).....	(15)	
Social Science* .....		(15)
Arts and Humanities		
Historical Survey .....	(10)	
Structured Selection.....	(15)	

### General College Requirement (15 hours)

Free Electives.....	(15)
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#### MINIMUM TOTAL HOURS FOR DEGREE 191

**+** The Colleges of the Arts and Sciences requires that students earn at least a "C-" or better for all courses listed for the major.

**#** The Information Systems option requires ECON 200.

**\*** CSE 459.41 (COBOL) is recommended for students in the Information Systems option.

**\*\*** The BS program has been approved for the Drop a GEC option per ASC guidelines.



# BSCIS in Arts and Sciences

## Technical Options (23 - 27 cr hrs)

**Technical Options (23-27 credit hours):** BSCIS majors are required to choose one of the five technical options described below and on the next page. The "23-27 credit hours" characterization is not quite accurate for the Individualized Option; see the description of that option for full details. Each of the first four options includes a set of **required** courses and a number of credit hours of **elective** courses.

**Elective CSE Courses:** The CSE courses that may be included as **elective courses** in each of the options are:

- Letter-graded CSE courses at the 500-level and above, unless otherwise noted in the *OSU Course Bulletin*;
- Up to 1 hour of 459 (in addition to that required as part of the core);
- Up to 2 hours of 693/793 combined (individual studies);
- Up to 3 hours of 699 or H783 combined (for honors students pursuing undergraduate research).

Only one of Math 568 or Math 571 may be counted.

*If you wish to count as an elective course one that does not meet the requirements of your chosen option, you must get prior approval from your faculty advisor.*

### I. Software Systems Option (23 hours)

This option can provide a general broad-based overview of the field., or electives may be tailored to emphasize particular areas such as AI, graphics, databases, distributed computing, software engineering, etc. The option prepares students for positions as general applications programmers and systems analysts.

#### Required Courses (9-10 hours)

- CSE 757 Software Engineering.....(3)
- CSE 676 or 677 or 775 Hardware Elective .....(3)
- CSE 581 or 662 or 756  
or 758 Software Lab Elective ..... (3-4)

#### Elective Courses (13-14 hours)

At least 9 credit hours of the elective courses must be CSE courses listed under **elective CSE courses** at the top of this page. The remainder may be either CSE courses listed at the top, or ISE 573, Math 568/571, Math 572, Math 575, Math 647, Math 648, AMIS 310, BusFin 420, BusMHR 400, BusMgt 430/630, BusMktg 450.

### II. Advanced Studies Option (24 hours)

This option emphasizes advanced studies in the core areas of computer science and is designed to prepare students for graduate work in computer science. It includes subjects that are likely to be found in the Computer Science section of the Graduate Record Examination.

#### Required Courses (9 hours)

- CSE 725 or 755 or 780 Computing Concepts Elec..... (3)
- CSE 760 or 775 Computing Technology Elec..... (3)
- Math 568 or 571 or 647 or  
648 Math Foundations Elec. .... (3)

#### Elective Courses (15 hours)

At least 12 credit hours of the elective courses must be CSE courses listed under **elective CSE courses** at the top of this page. The remainder may be either CSE courses listed at the top, or ISE 573, Math 568/571, Math 572, Math 575, Math 647, Math 648, AMIS 310, BusFin 420, BusMHR 400, BusMgt 430/630, BusMktg 450.

# BACIS

## Colleges of the Arts and Sciences

### Requirements for the Major\* (86 hours)

#### Core Courses (24 hours)

221	Software Development Using Components .....	(4)
222	Development of Software Components .....	(4)
321	Design and Analysis of Component-Based Software .....	(4)
360	Introduction to Computer Systems .....	(4)
560	Systems Software Design, Development, and Documentation .....	(5)
670	Introduction to Database Systems I .....	(3)

#### Electives (20 hours)

To be chosen from the list of courses which follows and other CSE courses at the 600 level and above:

541, 616, 625, 630, 655, 660, 671, 675.02, 680, 757

#### Additional Major Requirements (42 hours)

Math 152, 153	Calculus and Analytic Geometry ...	(10)
Math 366	Discrete Mathematical Structures I.....	(3)
Statistics 245	Introduction to Statistical Analysis....	(5)
CSE 459.xx	Programming Language Elective.....	(1)
Approved Related Field*		
Introductory level .....		(5)
Above the introductory level .....		(10)
General Electives in Major .....		(8)
(additional courses in CSE, Math, or the related field)		

### General Education Curriculum (90 hours)

Note: The GEC curriculum is under review and may result in a reduction of total credit hours.

#### Requirements:

Writing and Related Skills .....	(10)
English 110	
Second writing course	
Quantitative and Logical Skills	
Math 151 .....	(5)
Data Analysis (included in the major).....	(0)
Foreign Language (through 104).....	(10 - 20)
Diversity Experiences (may be covered in other GEC categories) .....	(0-15)
Natural Science .....	(20)
Social Science .....	(15)

#### Arts and Humanities

Historical Survey.....	(10)
Structured Selection .....	(15)
Issues of the Contemporary World.....	(5)

### General College Requirements (15 hours)

Free Electives .....	(15)
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MINIMUM TOTAL HOURS FOR DEGREE 191

\* The Colleges of the Arts and Sciences requires that students earn at least a "C-" or better for all courses listed for the major.

+ The related field may be any in which Computer Science has potential application. At least one of these courses must be technical in nature. All courses used to satisfy the requirement of the Approved Related Field must be at the 200 level or above. Approval forms are available from the CSE undergraduate advising office.

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# BSCIS in Arts and Sciences

## Technical Options (con'd.)

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### III. Information Systems Option (26 hrs)

This option combines a rigorous CSE curriculum with an introduction to business topics. It places emphasis on the design and implementation of information processing systems. The option prepares students for positions as analysts and application programmers in a business environment.

Note that students in this option must take Econ 200 as a Social Science GEC course since it is a prerequisite for AMIS 211/310.

#### Required Courses (16 hours)

- CSE 616 Object-Oriented Systems Analysis ..... (4)
- CSE 671 Introduction to Database Systems II ..... (3)
- AMIS 211 or 310 Introduction to Accounting ..... (5)
- Bus-Mgt 630 Introduction to Operations Mgt..... (4)

#### Elective Courses (10 hours)

All 10 credit hours of the elective courses must be CSE courses listed under **elective CSE courses** at the top of the previous page, or ISE 573.

### V. Individualized Option (24 hours OR 15 CSE hours + approved minor)

This option is intended to allow students to tailor their technical electives in such a manner as to enable them to study, in depth, a particular area of computer science such as networking or graphics or AI etc., or possibly explore the applications of computing to other areas such as linguistics or visualization of large amounts of scientific data, etc.

Students pursuing this option are required to complete 15 hours of CSE courses and one of the following:

- 9 hours of CSE and non-CSE courses approved by the advisor; OR
- a minor program approved by the advisor.

The CSE courses included in the program must be from among those listed under **elective CSE courses** at the top of the previous page.

Students interested in this option are urged to consult with their advisors early in their program, so that they can get approval of the courses they propose to take including the non-CSE courses or the minor, whichever applies.

### IV. Information and Computation Assurance Option (25 hours)

Over the last few years, issues related to information and computation assurance (ICA) have become increasingly important. These issues are related to privacy concerns of individuals, national security considerations, as well as private businesses concerned with protecting trade and other secrets. The ICA option is well suited for students interested in this topic.

#### Required Courses (13 hours)

- CSE 551 Introduction to Information Security .....(3)
- CSE 651 Network Security .....(3)
- CSE 677 Introduction to Computer Networking .....(3)
- CSE 678 Internetworking .....(3)
- CSES 601 Social & Ethical Issues in Computing .....(1)

#### Elective Courses (12 hours)

At least 3 credit hours of the elective courses must be CSE courses listed under **elective CSE courses** at the top of the previous page, or other appropriate courses such as: AMIS 531,627,653,658,659, and CRP/GEOG 607.