

# DEPARTMENT REPORT OF PROGRAM LEARNING OUTCOMES ASSESSMENT

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Department: Computer Information Systems

Program (Degree): Computer Information Systems (CIS)

Type of Degree:  X  AAS      AA      AS      ATS      AIS

Chairperson: Charlotte Wharton                      Date: Spring 2004

Person(s) Interviewed: Charlotte Wharton, Patty Santoianni, Robert Sherman

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- I. Program Curriculum:** A description of the basis for the program curriculum (i.e., how it is derived and validated). Include accreditation organizations, advisory committees or external groups that influence curriculum. Describe curriculum review activities including the review of course master syllabi.\*

The CIS program curriculum has undergone a dramatic change that was begun in 1999-2000 and was completed by spring 2001. The new curriculum which better reflects current trends in the IT industry resulted from input from a variety of sources including curriculum models from the Association of Computing Machinery (ACM), the Association of Information Technology Professionals (AITP) and the Northwest Center for Emerging Technology for national input. A significant consideration in the development was alignment with the state of Ohio IT-Works curriculum model. This competency-based model was derived through a DACUM process using a panel of business, industry and labor in Ohio. Ongoing input about IT in the Miami Valley is provided by the Information Technology (IT) Alliance, an offshoot of Miami Valley Coalition of Economic Development, and our advisory committee. The department continues to work closely with Tech Prep to ensure a smooth transition between K-14 and the Sinclair CIS curriculum.

The Ohio Board of Regents approved the new CIS degree in spring 2001. The degree consists of a core of courses that align with competency OBOR specifications, Sinclair general education requirements, student feedback from the CIS capstone course, and industry trends. Students may choose electives from five areas of concentration that include: Network Manager, Network Engineer, User Support, Software Development/Programming, and Web Development.

Tech Prep information technology initiatives have expanded to include 19 area schools. They are:

Belmont High School, Centerville High School, Butler Technology and Career Development Center /D. Russel Lee Tech Center, Butler Technology and Career Development Center, /Fairfield High School  
Greene County Career Center  
Greenville High School  
Kettering-Fairmont HS  
Kings High School  
Butler Technology and Career Development Center /Lakota East High School  
Little Miami High School  
Miami East High School  
Miami Valley CTC  
Program(s): Digital Design, Engineering, Environmental, Information Technology  
Program(s): Business, Digital Design, Engineering, Information Technology  
Butler Technology and Career Development Center /Ross High School  
Springboro High School  
Program(s): Allied Health, Business, Digital Design (2003), Engineering, Information Technology  
Warren County Career Center  
Wayne High School  
Butler Technology and Career Development Center /Talawanda High School

The high schools provide introductory level courses in computer literacy, word processing database, spreadsheet, web development and networking or introductory programming. Sinclair builds on that foundation on an individual basis and moves students into more advanced course work. The CIS core curriculum is aligned with high school curriculums.

The department has completed the first year of our second National Science Foundation (NSF) Grant. The focus of the grant is to improve student success and retention in the core information technology courses. For the CIS Department, this includes work on CIS 110, CIS 111, CIS 107, and CIS 108. The grant is supporting curriculum development, faculty development, and the development of a Web delivery system and a searchable learning object repository. Our three partner community colleges, Belmont Technical College, Columbus State Community College, and Owens Community College, have had only a small part during the first year. This past year, we gained valuable input and expertise from our National Visiting Committee composed of nine members from industry and education and our external evaluator, Pam Tate, the president of CAEL. All recommended that we not only look at student retention and readiness through revision of the core courses, but that we also consider other intervention strategies. This led to a discussion about creating college success course. Patty Santoianni and Carolyn Hannah are beginning to work on this task. The grant work is moving us toward revisions in CIS 110, the course that often has the lowest success rate. Our team is beginning work on a new textbook and revision of the course competencies.

The department has added five new short term certificates to the five existing short term certificates, bringing the total to ten certificates. The new certificates include; Small Office Home Computer Use and Security, a certificate for the novice computer user; Security for the Networking Professional, a certificate to prepare students to take the Security + or CISSP exams; Network Engineering Associate, a certificate to prepare to

take the Cisco Certified Networking Associate (CCNA) exam; Advanced Networking Engineer, designed to help students prepare for the Cisco Certified Networking Professional (CCNP) exam; and Business Operations System Support (B.O.S.S.), an entry level certificate designed in conjunction with Lexis Nexis. An ad hoc advisory committee was formed to guide development of the two security certificates. Our networking advisory board was instrumental in development of the two Cisco related certificates and Lexis Nexis was a key player in development of the BOSS certificate. We continue to offer the following certificates: Web Authoring, Web Programming, Fast Track Programmer Analyst, Help Desk Analyst, and Java Enterprise Development. An IT Alliance focus group and our advisory boards were instrumental in guiding development of these certificates.

The Advisory Committee which aligns with our curriculum and degree options, consists of over 60 members who provide representation for each technical area. Membership is drawn from the Dayton IT industry, Sinclair IT staff, area Tech Prep schools, and the Dayton New Horizons training center. We use them regularly to provide input about new technology that is being used in the work environment, to provide input about competencies they look for in a new employees, and to review proposed curriculum changes. They were instrumental in the addition of our new certificate programs and in our efforts to revise CIS 110.

**II. Program Learning Outcomes:** A description of what you intend for students to know (cognitive), think/feel (affective), or do (psychomotor), when they have completed your degree program. A suggested manageable number of outcomes should be in the range of five to ten. Describe Program Learning Outcomes review activities.\*

Even though there has been significant change in the curriculum structure, the program outcomes have not changed since the last program review.

An entry-level graduate with an Associate of Applied Science Degree in Computer Information Systems from Sinclair Community College will be able to:

Learning Outcomes	Related Courses
1. Apply mathematical skills to formulate and solve problems manually (later to be solved by programming a computer).	MAT 116 or 121, 122
2. Identify and apply the principles of financial accounting.	ACC 111
3. Describe/apply general business knowledge and skills.	ECO 201; LAW 101; MAN 205; MAR 201
4. Exhibit professional/occupational behavior and work habits.	all CIS courses

<b>Learning Outcomes</b>	<b>Related Courses</b>
5. Correctly design and program a computer solution using procedural and non-procedural methods, given detailed specifications of a problem.	CIS 110, 111; CIS language options
6. Apply program development techniques that demonstrate a formal process for decision making and problem solving.	CIS 110, 111, 210, 265
7. Identify, analyze, and document program/system specifications and information requirements for a typical business problem.	CIS 110, 111, 210, 265, and all CIS concentration electives
8. Demonstrate the ability to use an operating system and software packages on a personal computer to prepare and manipulate word processing documents, design and use spreadsheets, create graphs, use databases and communicate with other PCs using telecommunication facilities available.	CIS 107 or CIS 108, BIS 160 or BIS 161 (Advanced MS Office)
9. Demonstrate the ability to design and implement personal and corporate databases using a commercial database package.	CIS 265 or CIS 266
10. Identify the basic, underlying procedures and relationships which are the components of a business computer system, including hardware, software, data, and people.	CIS 210, 225, 230, 265
11. Work as part of a team to complete a system development project assignment.	CIS 265, 278

<b>Web Development Concentration Learning Outcomes</b>	<b>Related Courses</b>
1. Demonstrate the ability to use Web development software tools and programming languages to create attractive and efficient Web sites	CIS129, CIS130, CIS131, CIS134, CIS138, CIS136, CIS137, CIS141, CIS143, CIS144, CIS223, CIS229
2. Demonstrate the ability to design, create, and publish integrated Web-based solutions for business problems	CIS141, CIS143, CIS144, CIS223, CIS284, CIS285

<p><b>User Support Concentration Learning Outcomes</b></p> <ol style="list-style-type: none"> <li>1. Communicate to customers, either verbally or written, the necessary instructions to correct a problem in a logical, precise manner.</li> <li>2. Apply techniques that demonstrate the problem solving skills needed in the evaluation of user support needs.</li> <li>3. Demonstrate the ability to install hardware and software, troubleshoot and repair personal computers...</li> </ol>	<p><b>Related Courses</b></p> <p>BIS201 or 202, CIS164, CIS166, COM287, CIS162</p> <p>CIS164, CIS166, CIS162, COM287, PSY126</p> <p>CIS166, CIS238, CIS162, CIS264, CIS 225</p>
<p><b>Software Development Concentration Learning Outcomes</b></p> <ol style="list-style-type: none"> <li>1. Correctly design and program a computer solution event driven object-oriented techniques.</li> <li>2. Apply program development techniques that demonstrate a formal process for decision making and problem solving using classic methods as well as object-oriented methods.</li> <li>3. Identify, analyze, and document program/system specifications and information requirements for a typical business problem</li> </ol>	<p><b>Related Courses</b></p> <p>CIS112, CIS147, CIS233, CIS280</p> <p>CIS148, CIS234, CIS237, CIS281</p> <p>CIS112, CIS210</p>
<p><b>Network Manager Concentration Learning Outcomes</b></p> <ol style="list-style-type: none"> <li>1. Demonstrate the ability to plan, install, configure, and manage a computer network in a business environment using state of the art network operating systems.</li> <li>2. Demonstrate the ability to plan, install, configure, manage, and secure data in a shared network business environment.</li> <li>3. Demonstrate the ability to establish and administrate a company intranet.</li> </ol>	<p><b>Related Courses</b></p> <p>CIS271, CIS272</p> <p>CIS273, CIS274, CIS275</p> <p>CIS276, CIS260</p>
<p><b>Network Engineer Concentration Learning Outcomes</b></p>	<p><b>Related Courses</b></p>

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| 1. Demonstrate the ability to install a Local Area Network.                                                                                                                                                                                                                                                                    | CIS241                         |
| 2. Demonstrate the ability to plan, install, and configure a Local Area Network in a routed environment.                                                                                                                                                                                                                       | CIS241, CIS242                 |
| 3. Demonstrate the ability to provide a presentation in response to a "Request for a Bid" of computer network installation. The bid response should include the network design, detailed cost estimates, network address schemes, security plans, and a submission of the appropriate documentation for an executive decision. | CIS241, CIS242, CIS243, CIS244 |

**III. Assessment Method(s):** A measurable indicator of success in attaining the stated learning outcome(s). The methodology should be both reliable and valid. Please describe in detail.

- a. **Formative Assessment Method(s) and Description:** a measurable indicator of student in-progress success in attaining the stated learning outcome(s).

Formative assessment is achieved through course-by-course completion. CIS courses provide interactive learning experiences where students complete small projects. Tests and quizzes are also used to assess learning. As a result of work using the "adopt and adapt" strategy from the NSF model modular architecture, all CIS classes complete a beginning of class competency self assessment using an interactive Web site connected to a database of course competencies. This process was pilot tested using 15 courses winter term 2002 and implemented throughout the entire curriculum spring 2002. We have continued to use this assessment tool each term thereafter. Attached to this document is a report of the average perceived gain from the beginning of the term to the end of the term for each competency in our curriculum. There are some holes in the data. Those represent either a class that was not offered or faculty members who neglected to have their students complete the assessment or in some cases a technical glitch that caused students to be unable to retrieve their beginning of term assessment. In most cases, this results from students not recalling how they entered their identification information at the beginning of the term.

We use a pretest in each core course, CIS 107, 108, 110, and 111, to determine if students have the appropriate prerequisite skills as they enter the course. 85-90% of students achieve a passing score on the pretests. The results of these pretests help faculty understand what areas they need to emphasize and which students may need extra help.

- b. Summative Assessment Method(s) and Description: a measurable indicator of end-of-program success in attaining the stated program learning outcome(s).

Summative assessment is conducted in CIS 278, the capstone course for each concentration area of this degree. All students are required to participate in the capstone course. During the past two years, the capstone has been offered more terms to accommodate varied student schedules. During winter term, we offer one or two capstone sections depending on student demand. Typically, one section includes all networking and user support students and the other includes all programming and Web Development students. During spring term we offer five sections, one for each degree option area. During 2002-2004, projects have included numerous Web development projects, programming projects, and a few integrated projects that combined Web development, programming, user support, and networking activities at the same site. About 75% of our project work is done in companies and non-profit organizations in the Dayton area. About 25% of projects are done for offices or individuals on Sinclair's Campus. A total of 181 students have participated in capstone during the reporting period.

The capstone instructor acts as the development manager and user interviews are part of the early structure of the project. Collaboration and team dynamics play an important role in the success of the projects. The instructor also completes a transcript review for each student so that teams can pull from appropriate strengths and weaknesses of the students.

Another major part of CIS 278 is a career planning and placement component, including resume preparation, marketing, researching job opportunities, and interviewing. Students complete course and peer evaluation forms which are used to review the degree curriculum and the students' perceptions of their abilities. This data is shared with CIS faculty.

Final presentations were held in the CIL before a large group of students, faculty, and customers. Students were assessed by faculty and staff from various departments during the formal presentation of their projects.

**IV. Results:** A description of the actual results of overall student performance gathered from the summative assessment(s). (see III.b.)

The 2002 and 2004 projects included: Two web page development projects (*The Dayton Daily News*, The Network Engineering Option for the Computer Information Systems Department), four networking projects (two simulations using the Windows Networking environment and two using Cisco), two programming projects (Developmental Writing tool, Class Roster), two database projects (Charitable Giving and Volunteers database for the city of Clayton, and a grades database for Sinclair faculty), and one user support project (Unity/Case Management). Other projects included: A full analysis and design to convert the paper-based business system to a computerized system at the Dayton Christian Supply Company; Create a computer lab from spare parts and broken equipment as well as provide training for a non

profit organization; Create a similar lab for the Mound Street Academy. Students are completing all projects and demonstrate competence in computer skills and problem solving. Feedback from CIS 278 customers indicates that students' technical skills are very good. Areas needing emphasis include oral and written communication, time management, teamwork, and critical thinking. Students found great value in working with a team on a "real" project with customers who sometimes changed the requirements. Several students have gone on to work for the companies for whom they did a capstone project.

All students are asked to complete the web-based competency self-assessment exit survey (developed as part of our first NSF grant and discussed in the Formative Assessment section above). A full report of the assessment that shows average perceived gains on each competency for the entire program is attached to this report.

- V. **Analysis/Actions:** From analysis of your summative assessment results, do you plan to or have you made any adjustments to your program learning outcomes, methodologies, curriculum, etc.? If yes, describe. If no, explain.

As a result of inconsistent quality capstone student presentation skills, we are investigating adopting and adapting a common rubric for both oral and written communication. The goal is to apply the rubric across all courses in the CIS program.

We have continued to analyze the pre and post assessment results as well as student retention and success in each course, particularly the core courses where we are attempting to improve student success and retention. Overall, students perceive improved skill and knowledge at the end of the course. Some exceptions occur, because students at the beginning of the term believe they know more about the topic than they actually do. IPR completed an analysis (attached at end of report) of student retention and success beginning with CIS 110 and 111 in fall 2000 and tracked degree seeking students through spring 2004. The report tracks declared CIS degree seeking student success and retention. The tracking begin with CIS 110, since that course is required of all degree seeking students. Fall 2003, 63 degree seeking students enrolled. 65.1%, or 41 students, went on to complete CIS 111. 70.7%, or 29 students, were successful (grade of A, B, or C) in CIS 111. Only nine, or 14.3%, of the original students went on to complete CIS 278, the capstone class within the two year period. This does not mean that these student will not continue and eventually be successful, since most students take longer than two years to complete the course work. However, of note is the loss between CIS 110 and 111. By sheer head count, the loss from 107 and 108, our very first courses, to CIS 110 is significant. See the attached chart comparing core course head count for the past two years.

We have revised the competencies for several courses to reflect new technology. The changes include CIS 136, CIS 137, and all of the network manager courses.

**VI. General Education:** Are you using any tool(s) to assess any of the three primary general education outcomes\* (communication, thinking, values/citizenship)? If so, describe.

General education components are built into the program on a course-by-course basis. The master syllabus for CIS 110, Program Design and Logic, has been used as a model by other departments for incorporating general education learning outcomes for communication, thinking and values/citizenship/community into a course.

- a. Where within the major do you assess written communication? Describe the assessment method(s) used. Describe assessment results if available.

Written communication is incorporated in many courses. We do not have a standard plan to evaluate consistently across these courses. We rely on the grades from ENG 111 or 131, ENG 112 or 132 at this time.

- b. Where within the major do you assess oral communication? Describe the assessment method(s) used. Describe assessment results if available.

The oral communication checklist is used in the capstone course for assessment of the team project presentations. Use of the oral communication checklist is at the discretion of the individual faculty member. We are discussing implementing a modest revision of this checklist to evaluate oral presentations more consistently in CIS classes where presentations are a part of the course activities.

Teamwork activities incorporating interpersonal communication are used by some CIS instructors.

- c. Where within the major do you assess thinking? Thinking might include inventing new problems, seeing relationships and/or implications, respecting other approaches, demonstrating clarity and/or integrity, or recognizing assumptions. Describe the assessment method(s) used. Describe assessment results if available.

All CIS courses contribute significantly to the students' abilities to think logically within the computer information content areas. Courses such as programming, networking, Web development, hardware and software troubleshooting, as well as the capstone course require problem solving, creativity, and revision to develop working solutions. Grades of C or better in these classes indicate a moderate to high level use of these skills.

- d. Where within the major do you assess values/citizenship/community? These activities might include behaviors, perspective, awareness, responsibility, teamwork, ethical/professional standards, service learning or community participation. Describe the assessment method(s) used. Describe assessment results if available.

Ethics is an important component of CIS 278 and is included as part of the competency, "Exhibit professional/occupational behavior and work habits."

The classes discuss ethical behavior in the workplace as well as ethical behavior in the job search process. The capstone classes in some cases complete a project that fits into the service learning arena. All projects involve group work. Evaluation is done through instructor feedback, client feedback, and student self-assessment.

The CIS department sponsors a student chapter of AITP, Association of Information Technology Professionals, where students learn about professional ethics.

Discussion of ethical aspects of computing is significantly incorporated into CIS 210 and CIS 278 and is a part of every option area in other courses. A significant addition to our curriculum is the new course approved spring 2004 CIS M73 Cyber Ethics. Ethics is an integral part of both new security certificates.

**IPR Report**  
**Core courses taking behavior of CIS majors after CIS 110**  
**2002 through 2004**

## Core courses taking behavior of CIS majors after CIS 110

The Computer Information Systems (CIS) program has four core courses:

- CIS 110 (Programming Design & Logic)
- CIS 111 (Introduction to Computer Programming)
- CIS 230 (Computer Networks)
- CIS 278 (Capstone Experience)

How many of the CIS majors who take CIS 110 go on to take the other core courses? Are there places in this sequence of courses where CIS majors are lost? To answer this question, all students who took CIS 110 in Fall 2000 were identified, and those who were CIS majors at the time they took CIS 110 were examined for subsequent enrollment in the other core courses (CIS 111, CIS 230, and CIS 278).

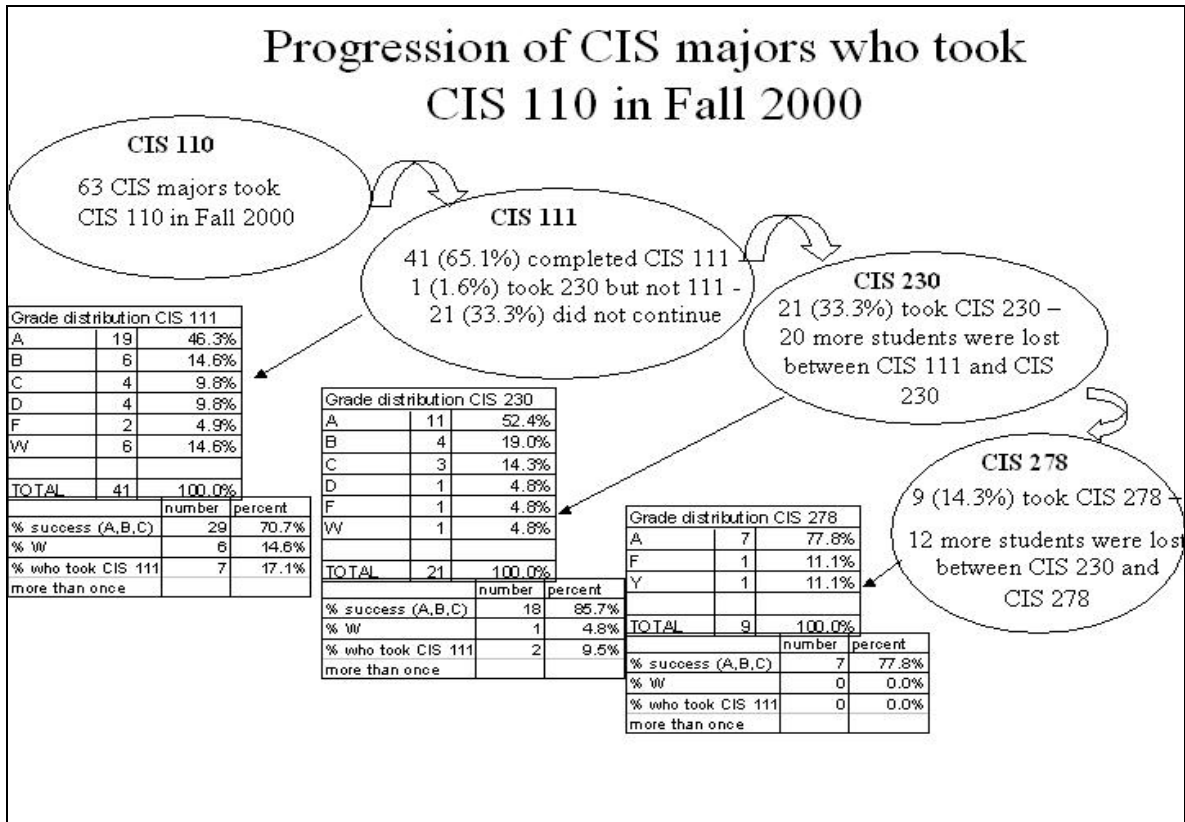
There were 197 students who took CIS 110 in Fall 2000. Of these, 68 (34.5%) had a program code of CIS.AAS as of Fall 2000 (these students were identified using the `STC.ACTIVE.PROGRAMS` field in the `STUDENT.ACAD.CRED` file in `COLLEAGUE` with information associated with Fall 2000). Of the 68 CIS majors, five had already taken CIS 111 or CIS 230. Since the focus of this research is to examine the course taking behavior of students after completing CIS 110, these five students were eliminated from further analysis, leaving 63 (32.0%) students with a program code of CIS.AAS. The table below displays the CIS 110 grades for these 63 students.

### CIS majors' CIS 110 grades

Grade distribution CIS 110		
A	30	47.6%
B	9	14.3%
C	6	9.5%
D	3	4.8%
F	6	9.5%
W	9	14.3%
TOTAL	63	100.0%

It is worth noting that of the 9 CIS majors who withdrew from the CIS 110 course, only 3 of them attempted to take CIS 111 (one received a 'D' and two received 'W's'). In terms of core course completion for CIS majors, it appears that the first obstacle is successfully completing the CIS 110 course. Approximately 14% of the CIS majors who enrolled in CIS 110 withdrew from the course, most did not continue in subsequent core courses, and none of those that continue performed well in their core courses.

The 63 CIS majors who took CIS 110 in Fall 2000 were examined for subsequent enrollment in CIS 111, CIS 230, and CIS 278. The graph that follows displays the number of these original 63 students who subsequently enrolled in other core courses. Note that students were not considered to have enrolled if they withdrew without record.



The number of CIS majors who were lost between CIS 110 and CIS 111 was about the same as the number of students lost between CIS 111 and CIS 230 (about 20 students). And additional 12 were lost between CIS 230 and CIS 278, so it does appear that once CIS majors had taken CIS 230, they were somewhat less likely to fall out of the track.

The table below compares success rates (grades of A, B, or C) and withdrawal rates of these CIS majors with that of CIS 111, CIS 230, and CIS 278 as a whole in AY 2000-2001.

### AY 00-01 Grade Distribution

	CIS 111		CIS 230		CIS 278	
	CIS majors FA00 (n = 41)	Total CIS AY00-01 (n = 308)	CIS majors FA00 (n = 21)	Total CIS AY00-01 (n = 78)	CIS majors FA00 (n = 9)	Total CIS AY00-01 (n = 21)
% success	70.7%	63.6%	85.7%	87.2%	77.8%	90.0%
% W	14.6%	21.1%	4.8%	2.6%	0.0%	5.0%

As can be seen, in CIS 111 the success rate for CIS majors who took CIS 110 in Fall 2000 was somewhat higher than that of all students for the fiscal year, while withdrawals were lower. In CIS 230 performance was comparable to other students, while in CIS 278 CIS majors who took CIS 110 in Fall 2000 had a somewhat lower success rate, as well as a slightly lower withdrawal rate (keep in mind that there were only 9 CIS majors who had taken CIS 110 in Fall 2000, and this small sample size makes the actions of any one individual more influential). On the whole it seems that these CIS majors who took CIS 110 in Fall 2000 performed as well as or better than their peers in CIS core courses.

Does participation in subsequent core courses after CIS 110 differ between CIS majors and non-CIS majors? The table below compares CIS majors and non-CIS majors in terms of subsequent enrollment in CIS core courses. Chi-square analysis indicated that there were no statistically significant differences between CIS and non-CIS majors.

	CIS majors		non-CIS majors		TOTAL	
	#	%	#	%	#	%
did not take other core courses	20	29.4%	48	37.2%	68	34.5%
CIS 111 only	23	33.8%	39	30.2%	62	31.5%
CIS 230 only	3	4.4%	9	7.0%	12	6.1%
CIS 278 only	1	1.5%		0.0%	1	0.5%
CIS 111 and CIS 230	13	19.1%	21	16.3%	34	17.3%
CIS 111 and CIS 278	0	0.0%	0	0.0%	0	0.0%
CIS 230 and CIS 278	0	0.0%	1	0.8%	1	0.5%
CIS 111, CIS 230, and CIS 278	8	11.8%	11	8.5%	19	9.6%
TOTAL	68	100.0%	129	100.0%	197	100.0%

It appears that CIS majors were not appreciably more likely to take subsequent CIS core courses. One possible explanation is that many of the non-CIS majors later switched their major to CIS after completing CIS 110. The current major program of these students was assessed using the STU.ACTIVE.PROGRAMS field in the STUDENTS file in COLLEAGUE. The table below displays the number of students who took CIS 110 in Fall 2000 who are currently CIS majors (with a current program code of CIS.AAS, NEEN.AAS, NEMA.AAS, SODE.AAS, USSU.AAS, or WEDE.AAS).

#### Current major of students who took CIS 100 in Fall 2000

	#	%
Total number of students in CIS 110 in Fall 2000	197	
Number of CIS 110 students who were CIS majors in Fall 2000*	68	100.0%
Number of CIS 110 students who were CIS majors in Fall 2000 <i>who are still CIS majors</i>	54	79.4%
Number of CIS 110 students who were CIS majors in Fall 2000 <i>who are no longer CIS majors</i>	14	20.6%
Number of CIS 110 students who were non-CIS majors in Fall 2000	129	100.0%
Number of CIS 110 students who were non-CIS majors in Fall 2000 <i>who are now CIS majors</i>	40	31.0%
Number of CIS 110 students who were non-CIS majors in Fall 2000 <i>who are still non-CIS majors</i>	89	69.0%

\* includes those five CIS majors who had already taken CIS 111 or CIS 230

As can be seen, there were 40 of the non-CIS majors who took CIS 110 in Fall 2000 who subsequently became CIS majors. This helps explain why there is so little difference in terms of subsequent enrollments in CIS core courses between CIS majors and non-CIS majors – many of the non-CIS majors became CIS majors after taking CIS 110, and were therefore required to take the CIS core courses.

In summary, it appears that about the same percent of students is lost between each of the core courses. The initial point of departure appears to be before CIS 110 even concluded in Fall 2000, in that CIS majors who withdrew from the course did not succeed in subsequent core courses.

After CIS 110, of the 63 CIS majors in CIS 110 in Fall 2000, about two-thirds enrolled in CIS 111, about one-third enrolled in CIS 230, and about 14% completed the core courses with the capstone experience in CIS 278. Attrition does not appear to be appreciably higher between any two courses in the core track than it is between the others, although when in-term retention is considered fewer CIS majors received a “W” in the higher level courses.

**Head Count Success and Retention in the CIS Core Courses  
CIS 107, CIS 108, CIS 110, and CIS 111  
2002-2004**

## Success in CIS Core Courses

Course	2002-03			2003-04		
	enrollment	A-B-C	D-F-W	enrollment	A-B-C	D-F-W
CIS 107	570	433	137	496	353	143
CIS 108	344	240	104	245	171	74
CIS 110	462	307	155	480	290	190
CIS 111	291	189	102	300	185	115

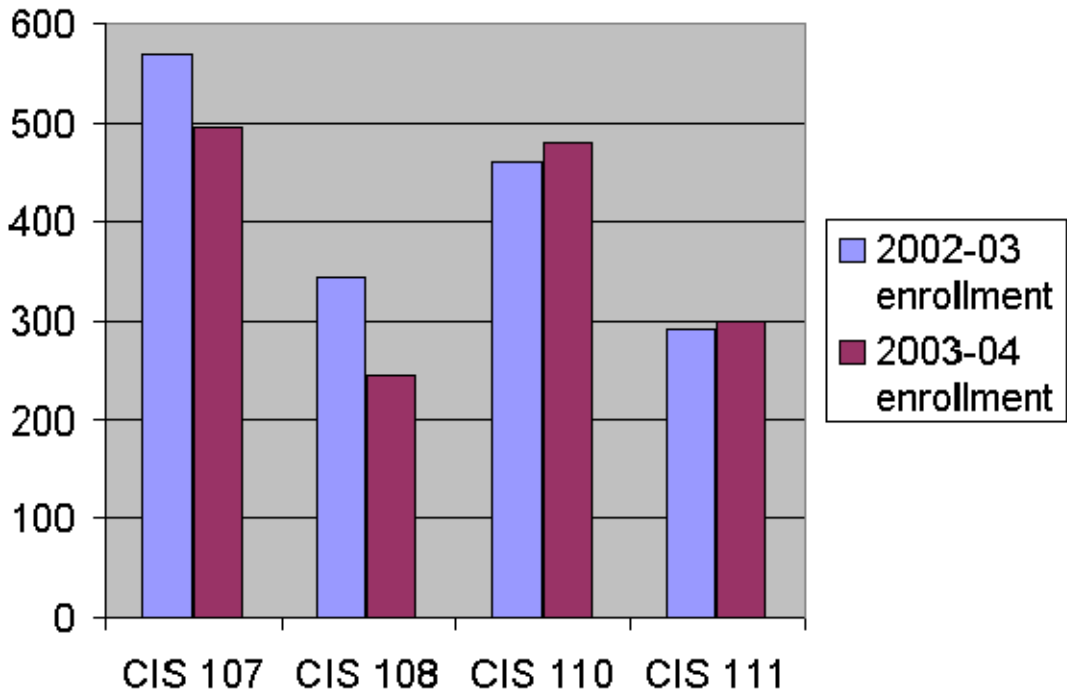
**Percent  
fewer from  
110 to 111**

37.0%

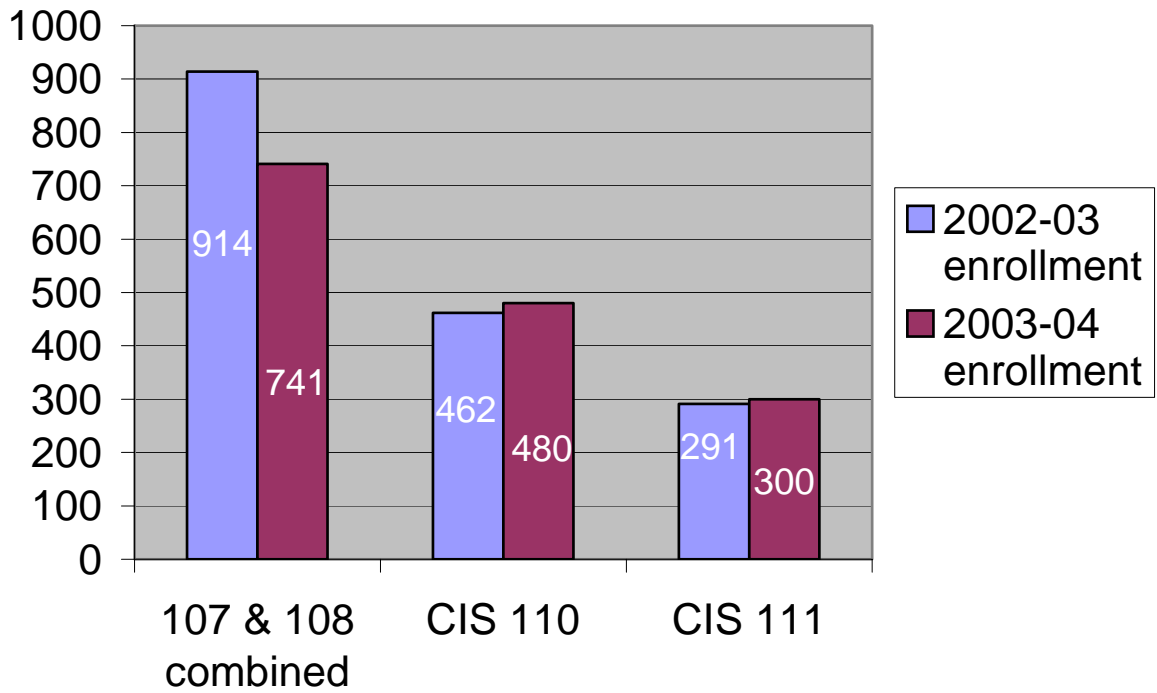
37.5%

Course	2002-03		2003-04	
	Percent ABC	Percent DFW	Percent ABC	Percent DFW
CIS 107	76.0%	24.0%	71.2%	28.8%
CIS 108	69.8%	30.2%	69.8%	30.2%
CIS 110	66.5%	33.5%	60.4%	39.6%
CIS 111	64.9%	35.1%	61.7%	38.3%

### Enrollment in CIS Core for Two Years



## Enrollment in CIS Core for Two Years



**Average Perceived Gain for Each Competency in the CIS Curriculum  
As Measured by the Web-based Competency Self-Assessment Tool  
2002-2004**

*(Attached as a separate file)*