Department of Computer Science

Program Review
2004-2005

Self-Study

Verification of Faculty Review

Each full-time faculty member of the Department of Computer Science has been asked to sign the following statement.

My signature below verifies that I have had the opportunity to see and read the department's self-study report as submitted.

Signature	Date
Razvan Andonie	
Grant Eastman	
Ed Gellenbeck	
Boris Kovalerchuk	
Jim Schwing	

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Department of Computer Science
Self Study, 2004 – 2005

I. Departmental/Unit Mission and Goals

A. Departmental Mission Statement

The Computer Science Department's mission is to prepare students for living in and helping build a society increasingly affected by information technology. From basic technological literacy to the development of problem-solving skills, the General Education program will prepare students to understand the ethical and social impact of computing on society and the use of computing technology as they contribute to the modern world. Through experience, knowledge, and skills ranging from basic theory through experimental techniques to engineering methodology, the Computer Science degree programs will prepare students to be productive citizens who contribute in many ways to the information society that forms the backbone of much of the industry and business in the state of Washington. Computer Science faculty and students working in partnership with each other and with interdisciplinary colleagues will help address significant local, regional, and national problems through the use of this flexible, robust discipline.

B. General description of department that provides an overview and context for the rest of the self-study

The Computer Science Department seeks to educate graduates that will be both productive and creative in modern business and industry environments. Studies range from theory through experimental techniques to engineering methodology. This program exposes students to aspects of each of these disciplines and fosters an appreciation and understanding of each. Research, laboratory, and on-the-job experiences complement student classroom studies.

The field of computer science can trace its foundation to both mathematics and engineering methodology with the emphasis on practical experience. Using this philosophy, the Computer Science Department has designed a unique curricular model that seeks to provide an increased relevance to the real world. The Senior Project - capstone course - expands upon the experimental and design approach by introducing student to the creativity and productivity concerns required for business and industrial development.

The Department of Computer Science offers a degree program leading to a Bachelor of Science in Computer Science. The Department of Computer Science also jointly offers a program with the Industrial Engineering Technology (IET) Department in the College of Education and Professional Studies leading to a Bachelor of Science in Computer Engineering Technology. The Department also offers a Computer Science Minor and an Applied Computer Science Minor. All these programs are offered on the Ellensburg campus. In addition, the Computer Engineering Technology program is being offered at CWU Pierce County Center and the Applied Computer Science Minor has just been started to be offered to business majors at CWU Lynwood.

The Department is located in Hebeler Hall, which houses the department's state-of-the-art computing facilities. Computer Science faculty members have compiled an outstanding record as scholars and instructors. Members of the faculty teach all courses. (Specifically, there are no courses being taught by teaching assistants and only tenure-track faculty members teach major courses.) Students are offered access to a wide ranging computer science curriculum. Specialties in areas such as software engineering, information systems, computer systems, scientific computing and artificial intelligence are available.

The Computer Science Department is one of 12 departments in the College of the Sciences. The department is small with five tenure-track faculty members, one computer systems engineer, and one senior secretary. The department hosts the Imaging Research Lab that employs a senior scientist and a staff programmer who are funded from faculty generated grants. Depending upon grant-generated release time, the department hires adjunct faculty to help cover general education and technical writing courses.

C. List programmatic goals

1. **Identify and describe major program activities that will enable goals and objectives to be reached.**
2. **Identify what data will be used to measure (assess) whether objectives are achieved.**

Goal I. Promote the role of computer science and interdisciplinary technology-based studies in undergraduate education at Central Washington University.

Activities

A. Work with the ITAM (information Technology and Management) Department to support General Education through the development of basic skills courses in computer literacy and by defining common learning outcomes.
B. Work with the ITAM and MIS (Management Information Systems) Departments to coordinate programs and courses in business-related technology studies.
C. Expose general education students to problem-solving groups that develop technology-based solutions to problems.
D. Work with science, mathematics and technology departments to support interdisciplinary research and teaching across the university.
E. Continue to work to improve computing infrastructure in support of general education and service instruction.

Assessment

A. The General Education Committee of the Faculty Senate supervises the coordination of the courses developed for computer literacy. Student performance on exams in each of five content areas is used to assess their achievement. The department has also worked with ITAM and the Associate VP for Undergraduate Studies to develop a new, non-credit, entry level literacy course to address problems of students with almost no computer background who are unable to succeed at the basic computer literacy course. This course will be offered for the first time this Spring.
B. The three departments met to ensure that programs and courses complement each other and will continue to do so.
C. Recent changes in the general education course CS 105, Logical Basis of Computing, do exactly this by having problem solving teams develop algorithmic solutions to problems.
D. The chair meets regularly with other science, mathematics and technology departments to ensure that support courses are meeting their needs. Faculty and

students are currently involved in interdisciplinary research with Chemistry, Geography, Geology, and Mathematics.

E. With the help of the College of Sciences and Information Technology Services, the department has been successful in developing new labs for both general education and major-related instruction.

Goal II. Offer undergraduate programs that train students as computer specialists with a fundamental understanding of technology.

Activities

A. Strengthen student scholarship through a rigorous, inquiry-driven curriculum – this includes general education and major-related courses.
B. Build on strengths of the computer science and computer engineering technology programs, including support of new growth areas (for example, web programming and artificial intelligence) that are relevant to regional scientific and technical needs.
C. Integrate problem solving and research into the curriculum at all levels.
D. Promote undergraduate research across campus through continued undergraduate research projects and participation in SOURCE and other undergraduate research conferences.
E. Recognize the success of students in academic and scholarship endeavors annually.

Assessment

A. Assessment of this activity is detailed in section II below.
B. Conducted a successful search that resulted in the hiring of Razvan Andonie whose specialties complement those of Boris Kovalerchuk and Jim Schwing. In 2002, the department added a focus area in web programming.
C. The general education course CS 105 has been revamped to integrate team problem solving techniques with introductory programming. Core courses in the computer science curriculum have always included a problem-solving component while most advanced courses include course projects that encourage student research.
D. Student/faculty interaction in scholarship is one of the real success stories of the department. The numbers of students involved in SOURCE, senior projects, service projects, conference presentations, and student publications are detailed in section IIIA below. Recent gifts to the department have allowed us to set up a undergraduate research fund to help defray equipment, software, and travel expenses for students involved in undergraduate research.
E. The department holds an annual end-of-the-year celebration which honors the contributions of faculty and staff. This includes recognizing outstanding graduates, scholarship winners, and students who have made successful research presentation during the year.

Goal III. Maintain an intellectually stimulating learning environment where diverse perspectives are valued and encouraged.

Activities

A. Use scholarship support and participate in recruiting activities seeking to increase representation of underrepresented groups (women and minorities) in the computer science programs.
B. Encourage mentoring of students by faculty.
C. Increase the understanding of importance of service projects and professional ethics.

D. Provide opportunities for students to have scientific discussions with faculty in non-lecture settings.
E. Expand instructional laboratory space and upgrade lab equipment. Continue to work to improve computing infrastructure in support of major courses and student scholarship.

Assessment

A. The department has been fortunate to receive CSEMS scholarship support from the National Science Foundation. Recruiting for this scholarship specifically targeted women and minority students (seven women and three minorities).
B. The department believes that one component of success for undergraduate students lies in a strong advising program. Students in all programs (major, pre-major, and minor) are required to meet at least once a quarter with their advisor. In addition, the department runs a mentoring program for the CSEMS scholarship recipients. These students meet weekly with a faculty mentor with discussion topics ranging from academic concerns to research projects.
C. The department will work to expand its successful undergraduate research program to include more interaction with Academic Service Learning. Projects chosen for the senior capstone courses will provide service either to a university office or to the community. All computer science students will take the senior seminar class where a major learning object is an active understanding of professional ethics.
D. Faculty interact with project teams regularly in a non-lecture setting. Two primary examples are the senior capstone course and the senior colloquium. In addition, one of the successes of the computer science program is undergraduate research. A summary of the numbers of students involved is contained in Section III below.
E. By obtaining equipment grants, by judiciously using research grant and overhead money, and with the help of the College of Sciences, Information Technology Services, the department has been successful in developing new labs with new equipment for instruction of students in the major and in support of faculty and student scholarship. Work with appropriate departments to move instructional technology into the labs.

Goal IV. Sustain a productive team of faculty and staff.

Activities

A. Allow faculty to carve out roles within the department that play to their strengths, particularly in the areas of teaching and scholarship.
B. Through the annual review of faculty, develop plans that support effective teaching and value the contribution of scholarship excellence in enhancing undergraduate education.
C. Build research lab space to support student and faculty projects.
D. Maintain a department profile that supports instruction in the core disciplines of computer science with faculty who are active in scholarship.

Assessment

A. This is particularly important in a small department like Computer Science. Of the five faculty, two make their contribution to the undergraduate program their primary emphasis, two have chosen a role that emphasizes their research interests, while the chair's time is divided fairly evenly among administration, teaching and scholarship activities.

B. The department believes that faculty are most likely to maximize their professional development when they undertake an honest look at where they stand and where they are headed. To that end the Computer Science department conducts an annual review of the achievements and goals of all faculty. This includes retention review, tenure review, and post tenure review as appropriate. The review looks at the traditional areas of evaluation: teaching, scholarship and service.
C. Five years ago, the department had no lab space for research or student projects. We now have one dedicated research lab, one shared research lab space and two special projects labs. By using grant request and overhead funds, the department has built the Imaging Research Lab dedicated to imaging and visualization research. The department has set up lab space for accessibility research. This space is shared with tutoring space for our student ACM club. Finally the department has set up lab space for students to experiment and gain experience in networking, alternative operating systems, data mining, and parallel and distributed computing.
D. As discussed in Section II below, the staff delivers a curriculum that closely matches the core recommendations found in Curriculum 2001. As noted in Section III, the faculty have been extremely active in scholarship for a small department at a university that emphasizes teaching.

Goal V. Play a leadership role in scholarship by making basic and relevant scientific contributions to our respective subdisciplines.

Activities

A. Encourage faculty to integrate undergraduate students in their scholarship activities.
B. Support grant writing by faculty through whatever means possible, including release time.
C. Support participation in professional meetings, financially when possible.
D. Acknowledge scholarly productivity by allowing principal investigators to utilize the majority of returned overhead funds in innovative ways that support the department's research programs.

Assessment

A. This has been a particular success for the department. Details can be found in Section III below.
B. With the support of the Dean, the department has been able to offer new tenure track faculty a two course release their first year to help establish their research programs. Faculty regularly agree to take on additional non-compensated teaching assignments. For example, mentoring senior project teams is always covered by contact course beyond the basic teaching assignment. The department tracks these contributions and when possible reimburses them with the particular objective of allowing faculty some research time.
C. The department has been fortunate in building its "Ledger 2" (non-state designated) funds over the last five years through grant overhead funds and the summer program. A significant part of these funds are dedicated to faculty scholarship activities.
D. As noted in part C, the department has been fortunate in building its "Ledger 2" (non-state designated) funds over the last five years through grant overhead funds and the summer program. Most of the overhead funds are put at the disposal of the principal investigator that generated the funds. The result has allowed the department to help build and equip the Imaging Research Lab and hire a Senior Scientist for the Lab.

Goal VI. Build an interdisciplinary research "Area of Distinction" and an associated Masters Degree program in geospatial information technologies.

Activities

A. Team up with the departments of Geography, Geology, and Mathematics to integrate the recognized national strengths of these programs into a university recognized "Area of Distinction."
B. Complete a draft proposal for a Masters degree in this area to be housed in the Computer Science Department.
C. Develop a curriculum for this Masters degree.
D. Establish and explore industry contacts for research support of new Master's program
E. Obtain faculty needed to sustain a high level of grant-writing and research activity, including continued support for the Imaging Research Lab.

Assessment

A. The department has proposed such a program. A copy of the proposed area of distinction can be found in Appendix A.
B. A prospectus for such a Master's program can be found in Appendix B.
C. This is a goal for AY 2004-2005.
D. This is a goal for AY 2004-2005.
E. This is an on-going goal of the department.

D. Centrality/Essentiality

Highlight the centrality and/or essentiality of your unit to the university's mission and its relevance to the university and college strategic goals.

Central Washington University's mission is to prepare students for responsible citizenship, responsible stewardship of the earth, and enlightened and productive lives. Faculty, staff, students, and alumni serve as an intellectual resource to assist central Washington, the state, and the region in solving human and environmental problems.

Qualified faculty and staff create a community that encourages and supports the emotional, personal, and professional growth of students from a variety of backgrounds. The university works with community colleges to establish centers throughout the state and employs technology to extend the reach of its educational programs.

The university community values teaching as the vehicle to inspire intellectual depth and breadth, to encourage lifelong learning, and to enhance the opportunities of its students. The faculty develop and strengthen bachelor's and master's degree programs in the arts, sciences, and humanities; in teacher education; in business; in the social services; and in technological specializations. A strong liberal arts foundation; applied emphases; opportunities for undergraduate research, creative expression, and international study; and close working relationships between students and faculty are hallmarks of the undergraduate experience. Graduate programs develop partnerships between faculty and students to extend scholarship to important areas of research and practice.

Almost all current and future human endeavors will involve information technology and computer automation in one form or another. Understanding the implicit and explicit impact of these effects is an essential part of leading an enlightened, productive life. For example, consider the impact of information technology and automation on disseminating information and mobilizing help during political campaigns. One of the primary tools for these activities is the internet. Further, the act of voting itself is controversially tied to computer automation. Responsible citizenship requires an understanding of the issues involved and the ability to use the technological tools. In addition, a thorough, well-grounded background combined with an appreciation of the ethical issues involved is essential for those involved in building and shaping this technology. The Computer Science Department through its general education and major/minor programs directly addresses these lifelong learning needs particularly in the technology arena. By encouraging students to participate in the scholarship experience, the department is educating the individuals that will contribute to building future technology.

The intellectual depth and breadth of the Computer Science programs is exemplified in its scholarship activities. Members of the faculty have been particularly effective in establishing interdisciplinary research programs. For a small department, the faculty have established a strong record in publishing and grant awards. Student-faculty and student-student interaction in real-world applications and scholarship activities are part of the key to this success. Measures of the success of these activities among the students include the senior capstone experience, participation in the local Symposium on Undergraduate Research and Creative Expression (SOURCE), regional and national conference presentations, and national student publications.

The department has a small, nascent, but growing contribution at the university centers by offering courses in support of the EET program at Pierce County and a new applied minor for business students at Lynnwood.

Goal I: Provide for an outstanding academic and student life on the Ellensburg campus.

The Computer Science department offers a high quality academic program that provides a solid grounding in the basic principles while asking students to take an in-depth look into one of the many computer-related application areas. The curriculum is designed to provide an educational experience with relevance to the real world along with the possibility of undergraduate research. The department delivers its programs in state-of-the-art facilities as seen through its instructional, project, and research labs. A strong academic and career advising program keeps the faculty in touch with students. The department provides rich independent study and undergraduate research experiences which enhance the extra-curricular faculty-student and student-student interactions. Office and technical staff provide a friendly, supportive environment that keeps paperwork in order and the instructional and research labs running.

Goal II: Provide for an outstanding academic and student life at the university centers.

As noted above, the department has a small, nascent, but growing contribution at the university centers by offering courses in support of the EET program at the Pierce County Center and a new applied minor for business students at the Lynnwood Center. The department will work to identify resources to maintain these programs.

Goal III: Develop a diversified funding base to support our academic and student programs.

It is obvious that in today's funding environment that programs need to generate alternative support. For a small department, the faculty have been particularly successful by generating over $1.2 million in external funding. Just as important, this funding targets the diverse needs of computer science programs. Major government research grants support our strong interdisciplinary scholarship activities for both faculty and student research. In addition, judicious use of these funds and associated overhead have allowed the department to establish a major research lab. Major support from the National Science Foundation has provided scholarships for students. The scholarship program has fueled major recruitment efforts of the department. In addition, we have participated in the National Science Foundation Science Technology and Mathematics Enhancement Program (NSF STEP), which includes a series of activities aimed at increasing enrollment/retention in the Sciences. Small grants received from Microsoft and Boeing have provided access to needed software and hardware. Finally, gifts have allowed the department to establish a fund to support basic student research expenses.

Goal IV: Build mutually beneficial partnerships with industry, professional groups, institutions, and the communities surrounding our campus locations.

One focus of research in the department is the study of web accessibility issues. The community and campus benefit from software produced in our senior project courses. One major example is the customized communications software created for a patient suffering from a traumatic brain injury. Faculty participate in annual programs that bring minority and other underrepresented groups to campus during both the summer and regular academic year in order to encourage expanded participation in the sciences.

Goal V: Strengthen the university's position as a leader in the field of education.

In 1998, the State removed its computer science endorsement for teachers. At present, there is no technology-related program for teachers. However, the department has the College of Education to include components for other endorsements.

Goal VI: Create and sustain productive, civil, and pleasant campuses and workplaces.

The success and achievements of the program would be impossible without the efforts of a plethora of individuals. The department has developed a program that annually recognizes these efforts of students, staff and faculty. Specifically, the department recognizes honor students, student research achievements, and outstanding service efforts by students, staff and faculty. Several other departmental efforts deserve special attention here. Instead of providing the minimum required office hours, faculty provide an open door policy that encourages faculty-student interactions. Office and technical staff provide a friendly, supportive environment that keeps paperwork in order and the instructional and research labs running.

E. Describe departmental governance system (provide organizational chart for department, if appropriate)

In general, since the Computer Science Department consists of five full-time faculty members, the department uses a committee-of-the-whole approach to its committees and, being a small department, attempts to seek consensus on most issues. Four committees carry out departmental business. When consensus cannot be achieved, voting is by majority of faculty present (refer to the CS Policy Manual, Appendix C).

Department Operations Committee – All full-time faculty members meet weekly to review the general business of the department. This business includes budget allocations, use of resources, university issues, and departmental, college and university policy.

Personnel Committee – The composition of the committee varies depending on the type of evaluation under consideration. At some point during the year all faculty will participate in at least one evaluation consideration (Merit and/or Salary Adjustment). Precise composition of the committees for Retention, Promotion, Tenure and Post-tenure evaluation is described in the CS Policy Manual, Appendix C and may include external faculty members.

Curriculum Committee - All full-time faculty members meet several times annually to consider topics such as peer evaluation of teaching, in-depth review of courses, new courses, curriculum structure, and program assessment.

Search Committee - All full-time faculty members (augmented as necessary to meet diversity composition goals) meet when faculty positions become available.

The Computer Science Department consists of tenure track faculty, non-tenure track, adjunct, and visiting faculty, and classified and exempt staff. The Department also houses the Imaging Research Lab that employs two research associates. All faculty and departmental staff report to the Department Chair. One staff member in the Imaging Research Lab reports to the Lab Director and the other staff member reports to the Department Chair (due to potential conflict of interest concerns). The personnel that have filled these positions over the last five years follow.

Department Chair
- Jim Schwing, Professor

Tenure Track Faculty
- Razvan Andonie, Associate Professor, Sep. 2003 – present
- Isabelle Bichindaritz, Assistant Professor, Sep. 2000 – Aug. 2002
- Barry Donahue, Professor, thru Aug. 2000
- Grant Eastman, Associate Professor, Sep. 2000 – present
- Ed Gellenbeck, Associate Professor
- Boris Kovalerchuk, Professor

Non-tenure Track and Adjunct Faculty
- Grant Eastman, Visiting Associate Professor, thru Aug. 2000
- Ritva Kinzel, Adjunct Instructor, Sep. 2002 – present
- Bob Ota, Adjunct Instructor, Sep. 2000 – present
- Jerry Rosenberg, Adjunct Instructor, Sep. 2002 – present
- Diana Springer-Lund, Adjunct Instructor, Sep. 2003 – present

Staff
- LaVelle Clerf, Senior Secretary
- Fred Stanley, Systems Administrator

Visiting and Adjunct Research Faculty
Evgenii Vitayev, 1999 - 2000
George He, Sep 2003 - present

Imaging Research Lab Director
Boris Kovalerchuk

Imaging Research Lab Staff
Bill Sumner, Senior Scientist
Michael Kovalerchuk, Staff Programmer

II. Description and explanation of programs – explain the role and provide data about departmental participation in each of the following programs or areas:

Undergraduate Programs

The Department of Computer Science offers a degree program leading to a Bachelor of Science in Computer Science. In order to expose computer science majors to a broad theoretical base while emphasizing the laboratory experience, all students complete a set of core courses. this core falls into three broad categories: problem solving and software design, computer architecture, and theory and analysis. To add depth and flexibility to their academic programs, students, working with an advisor, define a focus area. Focus areas may be developed in many topics of computer science, examples include artificial intelligence, computer systems, information systems, scientific computing, and software engineering.

As part of the Electrical Engineering Technology degree, the Computer Science Department jointly offers a program leading to a specialization in Computer Engineering Technology. The technologists graduating from this program are applications oriented, building upon a background of mathematics, science and technology. They interface with engineers at the product level and produce practical, workable results quickly; install and operate technical systems; devise hardware and software from proven concepts; develop and produce products; service machines, programs, and systems; manage production facilities and work groups; and provide support for technical systems hardware and software. The core of the major's course work is electronics, digital principles, programming, math, and science. The Electronic Engineering Technology degree is accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC/ABET). Since the accreditation visit occurred last year, we have attached a copy of that report (Appendix D) and will not make further specific reference to this program in this document.

The Department also offers two minor programs. a Computer Science Minor and an Applied Computer Science Minor. The Computer Science Minor program is designed for students who wish to investigate the basic core of the computer science discipline. This minor is appropriate for any student including those in teacher education seeking to enhance their technical computer science background. The Applied Computer Science Minor program is designed for students who wish to integrate a computer science component into their curriculum. This minor is appropriate for any student who wishes to include an enhanced technical computer science background as part of their overall curriculum.

Graduate Programs

The Department does not currently have a graduate program. As noted above, getting a master's program in place is one of the major goals of the department.

General Education Contributions

The department offers courses that satisfy two aspects of the "basic" requirements in general education. CS 101 – Computer Basics is a computer literacy, MS Office packages course that meets the computer literacy requirement. CS 105 – The Logical Basis of Computing is a course that introduces the basics of problem solving and algorithm development. This course meets the basic logic requirement.

Teacher Preparation Contributions

In 1998, the State dropped its computer science endorsement for teachers. At present, there are no computer-related endorsements for teachers.

Certificate Programs

The department does not offer any certificate programs.

Service to Other Programs Contributions

Several majors either require or recommend computer science courses to their students, these include several of the Engineering Technology programs, Information Technology, Mathematics, Geology, Physics (pre-engineering), and all programs in the College of Business. The courses meeting recommendations and requirements are the introductory problem solving and programming courses in a variety of programming languages.

Summer Session

The department runs a summer program to help meet the needs of both general education students and students in the major/minor programs. The department offers sections of both of the general education courses described above. The department also offers classes ranging from entry freshman-level classes to senior-level electives.

A. Analyze currency of curricula in discipline with specific supporting details and evidence (such as professional benchmarks, national trends, paradigm shifts, theoretical constructs). How does the quality of the curriculum compare to recognized standards promulgated by professionals in the discipline?

Once a decade, computer professionals from business, industry, and education get together and analyze the needs and trends in computer education. The most recent curriculum review was published with the title Curriculum 2001. The department commenced a total curriculum review in 2000 based on advanced releases of the document. The review was completed with just after Curriculum 2001 was issued and the new curriculum was published for students beginning in the 2002 academic year.

The organization of the computer science undergraduate program was one of the major results of this review. Prior to 2002, students were required to choose one of five specializations: artificial intelligence, computer systems, information systems, scientific computing and software design. Under this arrangement, each of these specializations had a fixed set of courses and any modifications had to pass through the university curriculum committee. Adapting to the changing demands of a computer science education was proving to be difficult. The 2002 reorganization required each student to take a set of core courses

Table 1. Analysis of Computer Science Department relative to the CS Body of Knowledge found in Curriculum 2001

CWU Core Courses

	Appendix A: CS Body of knowledge	CS 110 Programming Fundamentals I	CS 111 Programming Fundamentals II	CS 301 Data Structures	MATH 172.1 Calculus	CS 112 Foundations of CS	CS 302 Advanced Data Structures	CS 311 Computer Architecture I	CS 312 Computer Architecture II	CS 325 Technical Writing in CS	CS 361 Principles of Programming Languages	CS 362 Principles of Programming Languages	CS 392 Lab Exper. in Teaching in CS	CS 420 Database Management Systems	CS 427 Algorithm Analysis	CS 446 User Interface Design	CS 470 Operating Systems	CS 480 Software Engineering	CS 481 Software Engineering Project	CS 489 Senior Colloquium	CS 492 Lab Exper. in Teaching in CS	MATH 260 Sets and Logic	MATH 330 Discrete Mathematics	Min Time Requirement	Total Provided	Difference
DS1	Functions, relations, and sets														1							12	10	6	23	17
DS2	Basic logic	2	1						2						2							3	0	10	10	0
DS3	Proof techniques														8							10	10	12	28	16
DS4	Basics of counting																					3	2	5	5	0
DS5	Graphs and trees			2			4								3								8	4	17	13
DS6	Discrete probablility														2								2	6	4	-2
PF1	Fundamental programming constructs	10				1		3																9	14	5
PF2	Algorithms and problem-solving	2	1	2		1	2	4										5						6	17	11
PF3	Fundamental data structures	1	1	8			8																	14	18	4
PF4	Recursion			3				1							2								5	5	11	6
PF5	Event-driven programming		1													4								4	5	1
AL1	Basic algorithm analysis		1	3		1	2								6									4	13	9
AL2	Algorithmic strategies		1	3		1	3								6									6	14	8
AL3	Fundamental computing algorithms	2	2	6			6																	12	16	4
AL4	Distributed algorithms																							3	0	-3
AL5	Basic computability			1		1	1								3									6	6	0
AR1	Digital logic and digital systems					2			5															6	7	1
AR2	Machine level representation of data	1				4			2															3	7	4
AR3	Assembly level machine organization					2		5	5															9	12	3
AR4	Memory system organization and architecture								5															5	5	0
AR5	Interfacing and communication								3															3	3	0
AR6	Functional organization								5															7	5	-2
AR7	Mulitiprocessing and alternative architectures								2															3	2	-1
OS1	Overview of operating systems					1											6							2	7	5
OS2	Operating system principles																5							2	5	3
OS3	Concurrency																5							6	5	-1
OS4	Scheduling and dispatch																4							3	4	1
OS5	Memory management																5							5	5	0
NC1	Introduction to net-concentric computing					1																		2	1	-1
NC2	Communication and networking																							7	0	-7
NC3	Network security					2																		3	2	-1
NC4	The web as an example of client-server computing																							3	0	-3
PL1	Overview of programming languages	1				1					3													2	5	3
PL2	Virtual machines	1										2												1	3	2
PL3	Introduction to language translation					1					2	4												2	7	5
PL4	Declarations and types	2				1					3													3	6	3
PL5	Abstraction mechanisms	1	1								2	2												3	6	3
PL6	Object-oriented programming	5	7			1						4												10	17	7
HC1	Foundations of human-computer interaction															6								6	6	0
HC2	Building a simple graphical user interface		3													5								2	8	6
GV1	Fundamental techniques in graphics																							2	0	-2
GV2	Graphic systems	1														1								1	2	1
IS1	Fundamental issues in intelligent systems					1																		1	1	0
IS2	Search and constaint satisfaction																							5	0	-5
IS3	Knowledge representation and reasoning																							4	0	-4
IM1	Information models and systems													1										3	1	-2
IM2	Database systems													3										3	3	0
IM3	Data modeling													4										4	4	0
SP1	History of computing	1				1			2										1					1	5	4
SP2	Social context of computing																	2	1	1				3	4	1
SP3	Methods and tools of analysis (ethics & society)																			2				2	2	0
SP4	Professional and ethical responsibilities																		1	2				3	3	0
SP5	Risks and liabilities of computer-based systems																		1	1				2	2	0
SP6	Intellectual property																			3				3	3	0
SP7	Privacy and civil liberties	1	1																	1				2	3	1
SE1	Software design	1	1			1												5						8	8	0
SE2	Using APIs	2	2													5								5	9	4
SE3	Software tools and environments	1														1			1					3	3	0
SE4	Software processes	1																4						2	5	3
SE5	Software requirements and specifications																	4						4	4	0
SE6	Software validation																	3						3	3	0
SE7	Software evolution					1												2						3	3	0
SE8	Software project management																	3						3	3	0
	Totals	36	23	28	0	25	26	13	31	0	10	12	0	8	33	22	25	28	5	10	0	28	37	280	400	120
																									Total Over	154
																									Total Under	-34

and to work out a focus area with the guidance of an advisor. Table 1 above summarizes how the core courses in current curriculum organization match recommendations the CS Body of Knowledge recommendations found in Curriculum 2001.

Note that the core courses required of all majors in the computer science program covers almost 88% of the CS Body of Knowledge identified by Curriculum 2001. Further, when one includes popular elective courses (Networking and Data Communications, Graphics I, Parallel Processing, and Artificial Intelligence) coverage of the CS Body of Knowledge is over 98%.

Other changes made during this complete curriculum review.

- CS 112 – Foundations of Computer Science, a new course was added to the core courses. Among other things this course begins an introductory look at computer architecture.
- The CS 112, 311, 312 computer architecture sequence was restructured and modernized.
- The CS 110, 111, 301, 302 introduction to programming and problem solving and data structures sequence was restructured and modernized.
- The department revamped the theory and analysis course sequence by working with the Mathematics Department to review the content of Math 260, Sets and Logic, and Math 330, Discrete Mathematics, and restructure them along with CS 427, Analysis of Algorithms.

B. Describe and analyze the effectiveness of the process for reviewing curriculum and making alterations. What and how are data gathered in order to make curricular decisions? What criteria are used to make the decisions?

The department specifically considers the results of the following in measuring and assessing the student learning outcomes, reviewing the curriculum and making alterations.

- All seniors participate in the Major Field Test published by ETS. In addition to an overall score, the test provides scores on three (formerly four) major indicators in undergraduate computer science education.
- All seniors participate in a two-term capstone sequence of courses. Results of this sequence course form part of the consideration of our assessment of student learning outcomes.
- All seniors participate in a senior colloquium. Results of this course form part of the consideration of our assessment of student learning outcomes.
- All seniors participate in exit interviews. Feedback from these interviews form part of the consideration of our assessment of student learning outcomes.
- Many students participate in undergraduate research, independent studies, cooperative education and internships. The faculty considers the effectiveness of these projects and activities in furthering the goals of the students.
- All students participate in the core curriculum. Review of these courses and student performance help measure the breath of the program.
- The faculty conducts an annual peer review of instruction. The primary purpose of this review is two-fold. In addition to reviewing faculty performance, it allows the faculty to take an in-depth look a several courses.

As noted above, the department also reviews the program curriculum with respect to the recommendations of current experts in the field of computer science education, the most recent being Curriculum 2001.

Participation of all seniors is assured as all measures are tied to specific course requirements (this includes participation in the MFT and exit interviews that are part of the course requirements in the senior colloquium).

Consider here, two changes that occurred as a direct result of this process. First, results in one of the indicators in the MFT lead the department to revamp its computer architecture sequence. Second, input from both the exit interviews and from the then newly published Curriculum 2001, played important roles in revamping courses during our last full curriculum review in 2001-2002.

C. Effectiveness of instruction – What evidence is gathered and used in the department to evaluate the effectiveness of instruction? Describe how the department addresses the scholarship of teaching with specific supporting documentation including each of the points below.

The department conducts an annual peer review of instruction, which is highly effective in addressing these questions. The department utilizes the faculty development day set aside at the end of the spring term for this review. As noted in the prior section, the main purpose of the review is two-fold. In addition to reviewing faculty performance, it allows the faculty to take an in-depth look a several courses.

The process for the review asks each faculty member to prepare a teaching portfolio for one of the classes he or she has taught during the year. The choice of course must change annually until all courses in the curriculum have been covered by this in-depth review. The portfolio should include the choice of text, the syllabus, hand-out and on-line materials, projects assigned, copies of exams and other exercises collected along with samples of student work, and student evaluations.

1. **Effectiveness of instructional methods to produce student learning based upon programmatic goals including innovative and traditional methods – examples include:**
   a. **Collaborative research between student and faculty**
   b. **Inquiry-based, open ended learning**
   c. **Use of field experiences**
   d. **Classic lectures**
   e. **Lecture and inquiry based guided discussions**
   f. **Service learning or civic engagement**

   The department prides itself in using a variety of methods to instruct students. Table 2 below summarizes the methods used in both general education and major classes. Not surprisingly, most of courses involve both a lecture and a laboratory component. Enhancing the communication experience continues to be a major effort and as such a number of classes incorporate a writing/presentation component. Other courses use or include a seminar-style component where students read, present, and discuss current research articles. Many of the advanced courses involve individual or group projects, including written and oral presentations. Finally, many of the junior and senior classes incorporate small-group discussions, debates, and inquiry-based learning exercises.

   As examples, consider the methods used in computer science classes on the two extreme ends of the spectrum – the general education class, CS 105, and the senior project sequence, CS 480 and 481. In CS 105, students are focused on problem solving and

Table 2. Instructional techniques used in Computer Science Department courses

General Education and Major Courses		Lecture	Laboratory	Inquiry-based Disc.	Writing/Oral Presentation	Seminar/Literature Review	Group or Class Projects	Individual Projects	Teaching Experience
101	Computer Basics	x	x						
105	Logical Basis of Computing	x	x				x	x	
110	Programming Fundamentals I	x	x					x	
111	Programming Fundamentals II	x	x					x	
112	Foundations of Computer Science	x		x	x		x		
301	Data Structures	x	x					x	
302	Advanced Data Structures	x	x					x	
305x	Programming Language Survey	x	x					x	
311	Computer Architecture I	x	x					x	
312	Computer Architecture II	x					x	x	
325	Technical Writing in CS				x			x	
350	Web Development Technologies I	x	x	x	x	x	x	x	
351	Web Development Technologies II	x	x	x	x	x	x	x	
352	Web Development Technologies III	x	x	x	x	x		x	
361	Principles of Language Design I	x	x	x	x			x	
362	Principles of Language Design II	x	x	x	x		x	x	
392	Lab Experience in Teaching CS I								x
410	Formal language Theory	x	x	x		x		x	
420	Database Management Systems	x	x	x	x			x	
427	Algorithm Analysis	x	x	x				x	
435	Simulation	x	x	x		x		x	
440	Computer Graphics I	x	x	x			x	x	
441	Computer Graphics II	x	x	x		x	x	x	
446	User Interface Design	x	x	x	x			x	
450	Computer Networks & Data Comm.	x	x	x				x	
455	Artificial Intelligence	x	x	x	x	x			
456	Data Mining	x	x	x	x	x	x	x	
457	Computational Intelligence	x	x	x	x	x	x	x	
458	Artificial Intelligence Project				x			x	
460	Optimization	x	x	x				x	
465	Compiler Design	x	x	x			x	x	
470	Operating Systems	x	x	x			x	x	
473	Parallel Computing	x	x	x	x	x	x	x	
480	Software Engineering	x	x	x	x		x	x	
481	Software Engineering Project				x		x		
489	Senior Colloquium				x	x			
490	Cooperative Education / Internship				x			x	
492	Lab Experience in Teaching CS II								x
496	Individual Study				x			x	

algorithm development. Each week, they divide into teams and work on generating solutions to one phase of the current problem. Team solutions are posted and students then individually select from among the posted pieces for integration and testing of a final solution. Senior project students form teams that work on real problems for real clients. Teams are responsible for the complete implementation of a solution from requirements specification, to design and test plans, to final validation and verification.

2. **Describe the information technologies faculty regularly and actively utilize in the classroom to foster student learning.**

Computer technology is an important part of instruction in all computer classes. Instructors in the lecture components of classes generally use computer technology for delivery of the classes. This is not limited to the presentation of PowerPoint slides summarizing the high points of the lecture although that is one of the primary uses. Instructors also use the computers for other activities demonstrating software and interactive problem solving. Given that this is a computer science program, computer labs and associated projects form a major component of most classes. For computer science labs, the technology includes both the hardware and software. A successful program must have access to the state-of-the-art for both hardware and software. Currently, the department labs are being kept up-to-date through the combined efforts of the department, the college, and the university. Finally, the department with the help of the university is working to expand student access to this technology. The department purchases an annual license form Microsoft that allows students free access to all (non-Office-related) software. The department has also converted one room to allow students to access the net via Ethernet cable. By the end of next term, this access will have converted to wireless.

Since almost all computer science classes include a component with laboratory instruction, it is important that these facilities meet the needs of the program. The department has been successful in developing new instructional laboratory facilities over the last five years. In AY99-00, there were three instructional computer labs with 30, 20, and 10 workstations respectively. Another lab jointly housed the computer architecture and parallel processing labs. In AY04-05, there are four instructional labs with 30, 20, 20, and 13 workstations. Another lab jointly housed the computer architecture and parallel processing labs. An additional lab jointly houses the networking lab, the Linux lab and the data mining lab. With the help of the Dean's Office and ITS, the department has kept state-of-the-art hardware and software in the labs. The only major component in the labs is that none of them have built-in instructional media. This must be wheeled-in and hooked-up on an as-needed basis.

D. Required measures of quantity for academic programs for the last five years.

1. FTES

Table 3. FTES Computer Science

	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004
Lower Division	85.7	86.8	82.0	93.9	88.5
Upper Division	49.5	54.9	67.7	45.0	43.3
Total	135.2	141.7	149.7	138.9	131.9

Table 4. FTES College of the Sciences

	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004
Lower Division	1355.0	1340.8	1422.6	1554.6	1584.6
Upper Division	1019.5	1011.7	1049.2	1122.3	1218.6
Graduate	159.0	146.5	119.8	126.5	142.9
Total	2533.5	2499.0	2591.5	2803.4	2946.2

Table 5. FTES Central Washington University

	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004
Lower Division	3352.6	3392.4	3645.1	3858.6	
Upper Division	3729.3	3571.4	3689.5	3906.2	
Graduate	366.3	323.9	336.9	341.1	
Total	7448.2	7287.8	7671.5	8105.9	

Note. Institutional Research has been involved in high priority projects this fall so data in these tables was generated from last year's report and information from the College of the Sciences and the Computer Science Department. Unfortunately, due to these circumstances, some of the information presented is incomplete.

It is clear that the department has felt some of the national trend away from computer science as a major.

2. Number of graduates from each department based degree programs

Table 5. Graduates from Computer Science last six years.

Central Washington University

Department of Computer Science
Bachelor's Degrees Conferred, Academic Years 1998-1999 through 2003-2004

Specialization	*Second Specialization*	*Third Specialization*	*1998-1999*	*1999-2000*	*2000-2001*	*2001-2002*	*2002-2003*	*2003-2004*	*Total*
no specialization								*4*	*4*
Computer Systems			2	2	1	7	4	2	18
Software Design & Applications	none		10	15	17	16	10	8	76
	Scientific Computing		1		2				3
		Artificial Intelligence				1			1
	Artificial Intelligence		1						1
	Information Systems				1	1	2		4
	Subtotal		12	15	20	18	12	8	85
Scientific Computing			1			1	2	1	5
Artificial Intelligence			1			3	2		6
Information Systems			3	9	5	10	11	3	41
Total			19	26	26	39	31	18	159
Total COTS Bachelor's Degrees			515	537	496	561	521	571	3,201
Computer Science as Percent of COTS Bachelor's Degrees			3.7%	4.8%	5.2%	7.0%	6.0%	3.2%	5.0%
Total CWU Bachelor's Degrees			1,982	2,077	1,866	1,963	1,859	2,167	11,914
Computer Science as Percent of CWU Bachelor's Degrees			1.0%	1.3%	1.4%	2.0%	1.7%	0.8%	1.3%

E. Required measures of efficiency for each department for the last five years

1. SFR (FTES/FTEF) disaggregate data

Table 6. Student Faculty Ratio (SFR) Computer Science

	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004
FTES	135.2	141.7	149.7	138.9	131.9
FTEF	4.86	5.70	5.36	5.29	5.71
SFR	27.8	24.9	27.9	26.3	23.1

Table 7. Student Faculty Ratio (SFR) College of the Sciences

	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004
FTES	2533.5	2499.0	2591.5	2740.2	2946.2
FTEF	130.6	135.3	130.6	141.4	141.2
SFR	19.4	18.5	19.8	19.4	20.9

Table 8. Student Faculty Ratio (SFR) Central Washington University

	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004
FTES	7448.2	7287.8	7671.5	8105.9	
FTEF	404.8	410.3	376.1	418.2	
SFR	18.4	17.8	20.4	19.4	

Note. Institutional Research has been involved in high priority projects this fall so data in these tables was generated from last year's report and information from the College of the Sciences and the Computer Science Department. Unfortunately, due to these circumstances, some of the information presented is incomplete.

Even having experienced the effect of the national trend in decline of major enrollment, the department continues to have a student faculty ratio significantly above that of the college and the university.

2. Average class size

Table 9. Average Class Size Computer Science

	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004
Lower Division	43.9	39.4	41.1	39.3	35.8
Upper Division	13.9	17.6	18.1	13.8	12.9
Total	23.9	25.4	26.2	22.7	22.0

Table 10. Average Class Size College of the Sciences

	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004
Lower Division	40.6	40.1	44.5	43.7	
Upper Division	20.3	19.0	22.1	22.4	
Total	28.1	26.8	30.6	30.6	

Table 11. Average Class Size Central Washington University

	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004
Lower Division	26.5	26.3	29.0	28.9	
Upper Division	15.0	14.4	15.4	16.0	
Total	24.0	23.7	26.5	27.0	

Note. Institutional Research has been involved in high priority projects this fall so data in these tables was generated from last year's report and information from the College of the Sciences and the Computer Science Department. Unfortunately, due to these circumstances, some of the information presented is incomplete.

F. Assessment of students and programs

1. Describe and analyze the results of how students are assessed as they enter the program.

The department requires that pre-majors complete a collection of six courses with a 2.50 GPA. Specifically, the six courses are: Eng 101 & 102 – English I & II, Math 172 – Calculus I, CS 110 & 111 – Programming Fundamentals I & II, and CS 301 – Data Structures. The purpose is to ensure that students will have the necessary language, mathematics, and problem solving skills to successfully complete the computer science program.

Readers should note that the numbers in this section are reconstructed from individual student records and thus are not exact. About 9% of students declared as pre-majors do not make sufficient progress on the entry requirements and change majors as part of the advising process generally as part of the pre-major advising process. Another 4% of pre-major students, who submit applications to the major, fail to meet the entry requirements described above. Of these, more than half will retake one or two of the entry courses and then successfully enter the major. The remaining students will decide to change their major. Over 90% of the students who successfully complete the entry-to-major requirements also successfully complete the major.

The department does a full curriculum review every five years. These entry requirements are reviewed at that time. The department feels that the success of these entry-to-major requirements justifies maintaining them as is.

2. Describe and analyze the results of how students are assessed as they exit the major/program. What data exists within the department to demonstrate that students achieve the program and student learner goals?

As noted above in section II.B, the department specifically considers the results of the following exit measures in measuring the assessing the student learning outcomes (see Appendix E), reviewing the curriculum and making alterations.

- All seniors participate in the Major Field Test published by ETS. In addition to an overall score, the test provides scores on three (was four) major indicators in undergraduate computer science education.

  Currently, approximately 150 computer science departments across the country use this test as part of their assessment process. The faculty have reviewed the list of institutions participating in the computer science MFT and feel it provides a fair cross section of computer science programs, many from what are considered peer-institutions.

The MFT was chosen to help determine the following student outcomes:

- Graduates will have a reasonable level of understanding of each of the subject areas that define the discipline as well as the interrelationships that exist among them: algorithms, architecture, artificial intelligence and robotics, data structures, database and information retrieval, human-computer interaction, operating systems, programming languages, and software engineering.
- Graduates will have the ability to utilize appropriate theoretical constructs: definitions, and axioms, theorems, proofs, and interpretation of results.
- Graduates will have the ability to utilize appropriate abstractive constructs: hypothesis formation, data collection, modeling and prediction, experimental design, and analysis of results.
- Graduates will have the ability to utilize appropriate design constructs: requirements analysis and specification, design, implementation, and testing.
- Graduates will have the necessary background for entry into graduate study.

Table12. Average MFT scores for students in the Central Computer Science Program along with the national percentile ranking of these averages.

	99-00		**00-01**		**01-02**		**02-03**		**03-04**	
	Score	Percentile	Score	Percentile	Score	Percentile	Score	Percentile	Score	Percentile
Num. Stu.	20		22		36		31		28	
Overall	144.0	39	148.9	58	143.5	39	152.2	71	151.6	71
Programming	45.4	29	44.9	29	43.6	25	53.4	71	54.2	63
Comp. Org.	25.0	30	24.8	30	26.9	37	33.0	77	38.2	91
Theory	34.5	24	47.7	79	35.0	28	43.6	63	43.7	63
Software	35.3	46	39.3	66	n/a		n/a		n/a	
GPA – avg.	3.12		3.27		3.22		3.39		3.18	

Performance on the MFT revealed some weaknesses early in this five year evaluation period. Indeed, in the 99-00 results weaknesses appeared in each sub-category. As already noted, the department commenced revamping the curriculum in 2000. Again as noted above, particular attention was paid to three areas: programming and problem solving, computer architecture, and theory and analysis. The faculty believe that the generally increasing trend in the MFT scores reflects positively on this effort.

- All seniors participate in a two-term capstone sequence of courses. Results of this sequence course form part of the consideration of our assessment of student learning outcomes.

  The senior capstone courses are used to help determine the following student outcomes:

  - Graduates will have the ability to utilize appropriate theoretical constructs: definitions, and axioms, theorems, proofs, and interpretation of results.
  - Graduates will have the ability to utilize appropriate abstractive constructs: hypothesis formation, data collection, modeling and prediction, experimental design, and analysis of results.
  - Graduates will have the ability to utilize appropriate design constructs: requirements analysis and specification, design, implementation, and testing.

- Graduates will be able to appreciate the intellectual depth and abstract issues that will continue to challenge researchers in the future. They should have a strong foundation on which to base lifelong learning and development.
- Graduates will have the necessary background for entry into graduate study.
- Graduates will have the ability to communicate effectively.

In these courses, students as part of teams develop a piece of software for an external client. Students are responsible for all aspects of the project from the initial requirements writing to the final acceptance test. All faculty are involved in the evaluation of these projects. Appendix F contains a copy the software requirements document from one of the projects developed during the last academic year to give a flavor for the scope of this work. Based upon the performance of the students over the last five years, it is the evaluation of the faculty that these outcomes are being met.

- All seniors participate in a senior colloquium. Results of this course form part of the consideration of our assessment of student learning outcomes.

  The senior seminar is used to help determine the following student outcomes:
  - Graduates will be exposed to ethical and societal issues associated with the computing field.
  - Graduates will have the ability to communicate effectively.

  Students in this class go through an in-depth study of professional codes of ethics, ethical systems and reasoning and case studies. They also are responsible for preparing a major research paper and making an oral presentation on it. Faculty alternate supervising the seminar. Based upon the performance of the students over the last five years, it is the evaluation of the faculty that these outcomes are being met.
- All students participate in the core curriculum. Review of these courses and student performance help measure the breadth of the program.

  The core curriculum is used to help determine the following student outcomes:
  - Graduates will have a reasonable level of understanding of each of the subject areas that define the discipline as well as the interrelationships that exist among them: algorithms, architecture, artificial intelligence and robotics, data structures, database and information retrieval, human-computer interaction, operating systems, programming languages, and software engineering.
  - Graduates will have the ability to utilize appropriate theoretical constructs: definitions, and axioms, theorems, proofs, and interpretation of results.
  - Graduates will have the ability to utilize appropriate abstractive constructs: hypothesis formation, data collection, modeling and prediction, experimental design, and analysis of results.
  - Graduates will be familiar with recent technological and theoretical developments, general professional standards, and have an awareness of their own strengths and limitations as well as those of the discipline itself.
  - Graduates will be aware of the history of computing, including those major developments and trends - economic, scientific, legal, political, and cultural - that have combined to shape the discipline.
  - Graduates will be able to appreciate the intellectual depth and abstract issues that will continue to challenge researchers in the future. They should have a strong foundation on which to base lifelong learning and development.
  - Graduates will have the ability to communicate effectively.

As noted in Table 1, the core courses cover much of the CS Body of Knowledge defined by Curriculum 2001. Through the end-of-the-year annual peer-review of teaching, the faculty also review these courses for content and whether they are meeting listed learning outcomes. Based upon the performance of the students over the last five years, it is the evaluation of the faculty that these outcomes are being met.

- Many students participate in undergraduate research, independent studies, cooperative education and internships. The faculty considers the effectiveness of these projects and activities in furthering the goals of the students.

  Student research is used to help determine the following student outcomes:
  - Graduates will be able to appreciate the intellectual depth and abstract issues that will continue to challenge researchers in the future. They should have a strong foundation on which to base lifelong learning and development.
  - Graduates will have the necessary background for entry into graduate study

  Through an annual review of student scholarship, the faculty review these projects for how they impact learning outcomes. Based upon the performance of the students over the last five years, it is the evaluation of the faculty that these outcomes are being met

- All seniors participate in exit interviews. Feedback from these interviews form part of the consideration of our assessment of student learning outcomes.

  The Department interviews each of it graduating seniors. This is a two-stage process. During the first stage, students fill out a survey. A copy of the survey is contained in Appendix G. This is followed by a discussion about the program. The goal of the discussion is to determine how the students view the strengths and weaknesses of their education. The interviews, though free ranging, cover five basic areas.
  - Core classes – coverage including completeness, lacks and excesses; also specifics of the courses
  - Advanced classes – coverage including completeness, lacks and excesses; also specifics of the courses
  - Faculty
  - Laboratory Facilties
  - Staff

  While there have been a few specific concerns expressed about core and advanced classes, generally speaking the students have been positive about the coverage, lacks and excesses of our courses. The faculty discussed these concerns during curriculum review. Based upon response from students through these and other evaluations, the following changes were adopted by the Department over the last five years.
  - Web-related work has been added to the curriculum in the form of a new focus area with a year-long sequence of classes: CS 350, 351 and 352 – Web Development Technology I, II & III.
  - An increased emphasis on SQL was added to the CS 420 – Database Management Systems course.
  - The teaching languages used in classes have been updated to use primarily Java and C++. Modula 2 has been replaced with more modern compiler development tools such as lex and yacc in CS 361 & 362 – Principles of Programming Languages I & II.

The faculty were perceived as being knowledgeable and concerned about the students. Being a discipline where the use of state-of-the-art equipment is essential and one in which that state is pushed forward at a rapid pace. Laboratories are viewed as meeting the needs of the program with respect to both hardware and software. Staff help is uniformly viewed as helpful and friendly.

3. What data are gathered about program graduates and their successes? e.g. survey data about employer and student satisfaction, alumni? (Include data from Institutional Research.)

Student satisfaction information is collected two ways. This information is part of the exit interview conducted by the department and it is also part of the exit survey conducted by the university. The results of the departmental exit interviews were discussed in the previous section. The information provided by Institutional Research can be found in Appendix H. Highlights from that survey include the following.

Successes

- Computer Science students believe that developing technology skills is essential. Student also believe that CWU has been a strong or major factor in achieving this goal.
- Computer Science students believe that developing management skills is essential or very important. Student also believe that CWU has been a strong or major factor in achieving this goal.
- Computer Science students are either mostly or very satisfied with their major advising.
- Computer Science students are either mostly or very satisfied with their computer lab facilities.
- Computer Science students range from somewhat to very satisfied with employment. This is somewhat reassuring considering that these surveys were taken after the “dot com” bubble burst.
- Computer Science students believe that most or almost all instructors hold the students to high expectations.
- Computer Science students believe that most or almost all instructors are respectful of student diversity.
- Computer Science students believe that most or almost all instructors encourage active learning.
- Computer Science students believe that most or almost all instructors encourage faculty/student interactions.
- Computer Science students believe that most or almost all instructors encourage independent thinking and learning.
- Computer Science students are mostly or very satisfied with their career readiness.

Concerns

- Computer Science students are only somewhat or mostly satisfied with their writing and speaking development.
- Computer Science students view volunteer service as somewhat or not important. They also believe that CWU has made a moderate or no contribution to this area.

- Computer Science students view gender and ethnic issues as somewhat or not important. They also believe that CWU has made a moderate or no contribution to this area.

Collection of student job placement information has been inconsistent. From the small amount of information we have, we find that graduates continue to be employed in the field, but the time required to find such employment has risen significantly. Employers range from Microsoft and Microsoft contractors to small businesses and consulting industries.

4. Describe faculty involvement in assessment.

Section II.F.2 above details the types of data collected as students exit the program. Faculty in a committee of the whole are involved in reviewing and assessing this data. As noted in section II.B, there are two other measures of assessment that the faculty reviews.

- Many students participate in undergraduate research, independent studies, cooperative education and internships. The faculty considers the effectiveness of these projects and activities in furthering the goals of the students.

  For a small department, the number of such projects and courses has been quite strong. As noted in section III below, the department has annually averaged over the last five years
  - 3.8 SOURCE projects
  - 3.4 student conference presentations
  - 2.6 student publications
  - 21.6 students involved in independent study or research projects
  - 6.6 senior project teams
  - 9.0 students on supervised internships

- The faculty conducts an annual peer review of instruction. The primary purpose of this review is two-fold. In addition to reviewing faculty performance, it allows the faculty to take an in-depth look a several courses.

  The process for the review asks each faculty member to prepare a teaching portfolio for one of the classes he or she has taught during the year. The choice of course must change annually until all courses in the curriculum have been covered by this in-depth review. The portfolio should include the choice of text, the syllabus, hand-out and on-line materials, projects assigned, copies of exams and other exercises collected along with samples of student work, and student evaluations. This allows the faculty to focus on special concerns or successes that may arise.

  The review has lead to changes in material and approach in the Data Structures sequence, the Principles of Programming Language sequence and Operating Systems.

5. **Describe and provide evidence of how programs are assessed in department and how these assessments results are used to change or adapt program/major curriculum, faculty, or resources.**

   This question has been discussed in detail above in sections II.F.2 and II.F.5.

6. **What steps need to be taken in order to ensure that all of the appropriate assessment activities including programmatic and student are being accomplished?**

   The major step that needs to be taken is the design and implementation of a plan to facilitate the accurate collection of data for two categories.

   - What happens to pre-majors that do not pass the program entry requirements.
   - What are the employment statistics of graduates.

III. Faculty

A. Faculty profile – What levels of commitment do faculty demonstrate for mentoring student research, professional service activities, scholarly activities including grant writing and teaching?

As noted in section I.D, the faculty consists of five full-time positions that have been filled at times by non-tenure track appointments. Currently, all five positions are tenure track. The department supports the philosophy that while it is important for everyone to be effective in each of the traditional areas of teaching, scholarship, and service; it is efficient to allow faculty to develop roles that match their strengths. Of the five current faculty members, two make their contribution to the undergraduate program their primary emphasis, two have chosen a role that emphasizes their research interests, while the chair's time is divided fairly evenly among administration, teaching and scholarship activities.

Table 13 records the scholarship, service and student supervision measures of faculty productivity. Further, the table demonstrates the effectiveness of allowing faculty members to develop roles that match their strengths.

Table 13. Faculty Productivity - scholarship, service and student supervision.

Scholarship measures	**1999 2000**	**% of faculty**	**2000 2001**	**% of faculty**	**2001 2002**	**% of faculty**	**2002 2003**	**% of faculty**	**2003 2004**	**% of faculty**	**5-yr total**	**Annual avg**	**% of faculty**
Conf / Invited Presentations	5	60	6	60	5	60	5	75	9	60	30	6.0	100
Add'l Conf Attended	0	0	1	20	3	60	1	25	5	80	10	2.0	80
Books / Book Chap	2	40	2	40	0	0	0	0	2	40	6	1.2	40
Jour / Conf Publications	7	60	8	40	8	60	7	75	12	60	42	8.4	100
External / Active Grants Recv'd	0	0	2	40	3	60	5	75	4	60	14	2.8	80
Add'l External Grants Submitted	1	40	6	40	2	40	4	50	2	40	15	3.0	80
Internal Grants Received	0	0	0	0	1	20	0	0	1	20	2	0.4	40
Add'l Internal Grants Submitted	2	20	4	20	1	20	3	75	2	40	12	2.4	60
Wrkshp / Panels Organized/Present	1	20	3	60	5	60	8	100	8	80	25	5.0	100
Service measures	**1999 2000**	**% of faculty**	**2000 2001**	**% of faculty**	**2001 2002**	**% of faculty**	**2002 2003**	**% of faculty**	**2003 2004**	**% of faculty**	**5-yr total**	**Annual avg**	**% of faculty**
Department Committees	15	100	15	100	15	100	12	100	15	100	72*	14.4	100
College Committees	3	40	3	40	3	60	3	50	4	40	16	3.2	60
University Committees	6	60	8	60	9	80	10	100	7	80	40	8.0	80
Community Service	4	80	4	80	4	80	4	75	4	60	20	4.0	80
Departmental Advising	5	100	5	100	5	100	4	100	5	100	24**	4.8	100
Journal Editor / Ed Review Board	1	20	1	20	1	20	1	25	0	0	4	0.8	20
Journal / Conf Reviewer	9	60	9	60	10	60	16	100	28	100	72	14.4	100
Conf / Workshop Committee	3	40	3	40	7	80	6	100	7	60	26	5.2	100
Book Reviewer	1	20	3	40	3	20	4	25	3	40	14	2.8	60
Supervised Student Research	**1999 2000**	**% of faculty**	**2000 2001**	**% of faculty**	**2001 2002**	**% of faculty**	**2002 2003**	**% of faculty**	**2003 2004**	**% of faculty**	**5-yr total**	**Annual avg**	**% of faculty**
SOURCE Projects	3	40	3	40	5	60	4	50	4	60	19	3.8	80
Research / Ind. St. Projects	12	60	21	100	17	80	27	100	31	100	108	21.6	100
Senior Project Teams	6	80	8	100	7	100	6	100	6	100	33	6.6	100
Service Projects	0	0	0	0	2	20	0	0	1	20	3	0.6	20
Internships Supervised	6	60	9	60	14	80	10	50	6	40	45	9.0	80
Student Conf Presentations	1	20	2	20	1	20	9	75	4	80	17	3.4	80
Student Publications	1	20	0	0	1	20	6	50	5	20	13	2.6	60

B. Copies of faculty vitae

Please see Appendix I for faculty curriculum vitae and Appendix J for faculty structured performance records (accomplishments for the last five years).

C. Departmental teaching effectiveness – report a five-year history of the "teaching effectiveness" department means as reported on SEOIs, indexed to the university mean on a quarter-by-quarter basis.

The following statement and list is taken from section 1.8.A of the Computer Science Policy Manual (Appendix C).

> Evaluation of teaching effectiveness is inherently a subjective process that cannot be reduced to simple quantitative measures. Nonetheless, such evaluations must be performed. As noted above, what follows is an attempt to list what the department perceives to be important components in the evaluation. It is important that faculty members receive periodic feedback on their teaching performance, and that sufficient information on teaching effectiveness is maintained to allow evaluations to be made fairly.
>
> - Course materials including: syllabi, web pages, examinations, and supplementary materials
> - SEOI
> - Classroom peer-reviews
> - Class preparation
> - Evidence of learning assistance provided to students
> - Content of courses taught
> - Demonstrable efforts to improve teaching skills
> - Efforts at developing innovative teaching techniques and methods
> - Evidence of currency of knowledge in the subject field
> - Ability to teach a reasonable variety of courses appropriate to the faculty member's expertise
> - Awards of teaching
> - Course / curriculum development
> - Instructor or lab manuals and other course support materials
> - Supervision of internship and independent study
> - Student participation in research
> - Student publications and/or participation in conferences
> - Goals – current and evaluations of prior
> - MFAT results and other assessment outcomes
>
> As noted the department feels annual peer evaluation of teaching is important for the delivery of effective instruction. To this end, the department will set aside the annual departmental development day for evaluation of instruction.

The department has a twofold strategy for considering teaching effectiveness. First, the department looks all of the measures listed above. In addition, the department is prepared to deal effectively with shortcomings that are detected in the review process. In what follows, we present information related to both of these.

The department believes that one of the most effective measures of teaching effectiveness is the observation of section II.F.2 that all student learning outcomes are being met. As noted, the department also conducts an annual peer review of instruction, which is highly effective in addressing questions of teaching effectiveness. Recall the process for the review asks each faculty member to prepare a teaching portfolio for one of the classes he or she has taught during the year. The choice of course must change annually until all courses in the curriculum have been covered by this in-depth review. The portfolio should include the components described above.

Based on the results of most recent peer-review, the faculty have concluded that all current faculty are meeting department goals for teaching effectiveness.

Such an evaluation has not always been the case. It is also important to describe how this process continues when concerns in teaching effectiveness arise. What follows is a description of how such a case was handled during the period covered by the self-study. In this case, the annual peer-review indicated that one of the tenure-track faculty members was not meeting departmental goals for teaching effectiveness. The department set up a program to help the faculty member improve performance. The department worked with the Dean of the College of Education and Professional Studies (CEPS) to generate a program with specific goals for the faculty member in question. Also in conjunction with the Dean of CEPS, two mentors (one an expert in teaching technology-based subject matter and the other an expert in connecting with students) were chosen to work with the faculty member. It is the belief of the department that this would have formed an effective program for dealing with this concern. In this case, the solution was not fully tested as the faculty member resigned shortly after the program was put together.

The section concludes with the presentation of summary information for two questions from the Student Evaluation of Instruction (SEOI) form follow. Question 25 (Table 14) looks at the intellectual challenge of the courses surveyed and question 29 (Table 15) looks at the student opinion of instructor effectiveness. Appendix K has a copy of the university SEOI form.

Table 14. SEOI Question 25 summary data, last five years

Average Response to Question on Student Opinion of Intellectual Challenge

		Fall	Winter	Spring
1999-00	**Computer Science**		4.2	4.2
	The Sciences		4.3	4.3
	CWU			4.3
2000-01	**Computer Science**	4.2	4.2	4.4
	The Sciences	4.3	4.3	4.3
	CWU	4.2	4.3	4.3
2001-02	**Computer Science**	4.2	4.0	3.9
	The Sciences	4.2	4.2	4.2
	CWU	4.2	4.2	4.2
2002-03	**Computer Science**	4.1	4.0	4.0
	The Sciences	4.2	4.2	4.3
	CWU	4.1	4.2	4.2
2003-04	**Computer Science**	4.1	4.0	4.2
	The Sciences	4.3	4.3	4.2
	CWU	4.2	4.2	4.2

Table 15. SEOI Question 29 summary data, last five years

Average Response to Question on Student Opinion of Instructor Effectiveness				
		Fall	**Winter**	**Spring**
1999-00	**Computer Science**	3.9	3.8	4.0
	The Sciences	4.2	4.2	4.3
	CWU	4.3	4.3	4.3
2000-01	**Computer Science**	3.9	3.9	3.8
	The Sciences	4.3	4.3	4.3
	CWU	4.3	4.3	4.3
2001-02	**Computer Science**	3.8	3.9	3.8
	The Sciences	4.2	4.3	4.3
	CWU	4.3	4.3	4.3
2002-03	**Computer Science**	3.9	3.7	4.1
	The Sciences	4.3	4.2	4.4
	CWU	4.3	4.3	4.3
2003-04	**Computer Science**	4.1	4.1	4.1
	The Sciences	4.3	4.3	4.4
	CWU	4.3	4.3	4.4

D. Scholarship per T/TT FTEF – Report scholarly activities including grant writing (both funded & unfunded, specify funding agency) per tenured and tenure-track FTEF

Surely, one of the major accomplishments of the computer science faculty is its success in the scholarship arena. Given the speed with which the computer science discipline evolves, bringing scholarly work to the professional community is highly important. Publications in journals and strong national and international conferences are both extremely important in this effort. Over the last five years, the faculty have produced 42 peer-reviewed journal or conference publications, an average of 8.4 journal or conference publications per T/TT FTEF. The faculty have authored six book chapters or books during this time, an average of 1.2 per T/TT FTEF. This means that faculty members have produced an average 9.6 total publications per T/TT FTEF. In addition, the faculty have made 30 conference or invited presentations, an average of 6.0 presentations per T/TT FTEF. This level of scholarship is clearly well beyond what is expected for teaching institutions.

The picture for successfully obtaining external grants is just as strong. During the five years under consideration, the faculty have been particularly successful by generating over $1.2 million in external funding, over $240,000 per T/TT FTEF. This funding program has developed over the last five years and appears to be stable.

Table 16. Trends in Computer Science grant funding.

Academic Year	Internal	External	Total
99 – 00	$ 0	$ 0	$ 0
00 – 01	$6,975	$130,536	$137,511
01 – 02	$6,000	$192,067	$198,067
02 – 03	$5,709	$280,936	$286,645
03 – 04	$3,500	$210,835	$214,335
04 – 05	$ 0	$390,321	$390,321

Just as important, this funding targets the diverse needs of computer science programs. Major government research grants support our strong interdisciplinary scholarship activities for both faculty and student research. In addition, judicious use of these funds and associated overhead have allowed the department to establish a major research lab. Major support from the National Science Foundation has provided scholarships for students. The scholarship program has fueled major recruitment efforts of the department. In addition, we have participated in the National Science Foundation Science Technology and Mathematics Enhancement Program (NSF STEP), which includes a series of activities aimed at increasing enrollment/retention in the Sciences. Small grants received from Microsoft and Boeing have provided access to needed software and hardware.

E. Service per T/TT FTEF –

1. Report the number of department faculty memberships on university, college, department, Center for Teaching and Learning, State-level committees per tenured and tenure-track FTEF in the preceding calendar year.

Service forms an important part of the professional life of the faculty in the computer science department. As noted in section I.D, the Computer Science Department consists of five full-time faculty members, the department uses a committee-of-the-whole approach to its committees (Curriculum, Personnel, and Search), an average of three departmental committees per T/TT FTEF. Over the last five years, the faculty have participated on 16 college committees, an average of 3.2 committees per T/TT FTEF. During the same period, the faculty have participated on 40 university committees including the Faculty Senate, an average of 8.0 committees per T/TT FTEF.

2. Report the number of department faculty leadership positions in professional organizations per tenured-and-tenure-track FTEF for the preceding calendar year.

Computer Science faculty are also highly active in providing service to the professional community. For the five year period under review, the faculty helped organize 26 conference or workshop program, an average of 5.2 per T/TT FTEF. The faculty have also been active reviewers for journals and conferences during this period, reviewing for 72 journals or conference, an average of 14.4 T/TT FTEF.

The faculty also share their expertise with the community, participating in 20 organizations or projects over the review period, an average of four projects per T/TT FTEF.

IV. Students – For five years

A. Numbers of majors/program

Table 17. Number of Majors Computer Science

	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004
BS Program	88	96	93	85	82

Note. Institutional Research has been involved in high priority projects this fall so data in this table was generated from information the Computer Science Department.

B. Numbers served in general education, education, supporting courses

Table 18. General Education and Supporting Courses – Head Count

	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004
CS 101	386	357	399	502	425
CS 105	202	199	215	185	228
Support	103	143	84	96	86

Note. Institutional Research has been involved in high priority projects this fall so data in this tables was generated from information from the Computer Science Department. Unfortunately, due to these circumstances, the information presented in the support row has been estimated.

CS 101 meets the Computer Literacy requirement of General Education. CS 105 meet the Logic Requirement of General Education. Various computer languages courses meet requirements for a number of departments.

C. Student accomplishments (include SOURCE, McNair Scholars, career placement information, disaggregate data for undergraduate and graduate students, etc.) List those graduate students working in field; those placed in doctoral programs. Provide one masters project; two will be randomly selected during site visit.

As noted in several sections, computer science students have been successfully involved in undergraduate research. In the period under review, 19 students made presentations at SOURCE. Another 13 students had publications in national conference proceedings or journals. Seventeen students made presentations at regional or national conferences. Twenty-five (not including new awards for AY04-05) of our students received NSF CSEMS scholarships and one of our students was a McNair Scholar. In this period, 169 students have been members of 33 senior project teams. Appendix F contains one of the documents produced (software requirements) by one of the senior project teams as an example of this work. All completed projects are available for review in the Computer Science Department Office.

As noted in section II.F.3, collection of student job placement information has been inconsistent. From the small amount of information we have, we find that graduates continue to be employed in the field, but the time required to find such employment has risen significantly. Employers range from Microsoft and Microsoft contractors to small businesses and consulting industries.

D. Advising services for students

The department believes that advising is a major component of the success of the program. To that end, pre-major students (indeed all students) are required to be advised every term. As part of this advising process, pre-major students develop a graduation plan and have progress toward meeting the entry requirements reviewed each term. Students who are not making significant progress can then be advised in a proactive manner. In any case, during the term in which they plan complete entry requirements, students must submit a formal application to the department office. This application is reviewed at the end of the term after grades are posted. Students that fail to meet the entry requirements, are dropped from more advanced courses, and asked to meet with the department chair to review their situation and discuss future plans (which may include redoing an entry course if appropriate).

Once students are accepted to the major, they interact with one of the full-time faculty members. Faculty are assigned to advise students in focus areas that correspond with their professional expertise. Table 19 shows the current assignment of faculty as advisors. Students are required to meet with their advisors at least once per term to review their progress and plan courses for their focus areas.

Table 19. Advising Assignments

Focus Area	Advisor
Pre-major Students Entering Freshmen	Jim Schwing
Transfer Students	Boris Kovalerchuk
Artificial Intelligence	Razvan Andonie Boris Kovalerchuk
Computer Systems	Grant Eastman
Information Systems	Grant Eastman
Scientific Computing	Razvan Andonie Jim Schwing
Software Design / Engineering	Ed Gellenbeck
Web Programming	Ed Gellenbeck

E. Other student services offered through the department including any professional societies or faculty-led clubs or organizations

The department does sponsor a student chapter of the ACM (one of two societies for computer professionals). The activities of the club include presentations from Career Services, presentations from former graduates, technical presentations, special interest groups, contest participation and supervision, and service to the department. Perhaps the most outstanding activity of the club is the service it provides by offering tutoring to students in the entry level programming classes.

There are also several minor services the department can offer students. First the building is housed in a former demonstration grade school. Students are able to request access to lockers. Next, the department participates in Microsoft's academic licensing program which allows students free access to all of Microsoft's programming development software and related products. Finally, the department has access to two conference rooms providing ample space and time for students and faculty to schedule meetings for their research projects.

V. Library and technological resources

A. Describe program's general and specific requirements for library resources in order to meet its educational and research objectives. Indicate ways in which the present library resources satisfy and do not satisfy these needs.

As with most technical disciplines, communications, both written and oral, continues to be one of the most difficult areas for our students. With this in mind, the department has developed four required courses that contain a major writing/presentation component. CS 325, Technical Writing in Computer Science uses a writing professional to present the aspects of technical writing tailored to the computer science discipline. The senior project capstone courses, CS 480 & 481, require that each team generate professional documents such as software requirements, design, test plan and user manual. Project teams also make formal, required progress reports. CS 489, the Senior Colloquium, requires students to write and present a research paper. In addition, at least nine of the junior/senior level classes require research papers and/or research presentations. In most circumstances, faculty require some of the references to come from non-internet sources. Generally speaking the library holdings are adequate for these needs. Library journal holdings can be found in Appendix L.

It is interesting, but not surprising, that most of the new research in computer science is kept in digital libraries. As can be seen by the list of holdings, access to these journals is electronic. Of most interest to the students and faculty are the digital libraries kept by the ACM and the IEEE Computer Society. Faculty subscriptions give access to those electronic journals not held by the library; thus it seems that student/faculty research projects have the necessary access to current research.

B. Describe information literacy proficiencies expected of students at the end of major coursework.

1. What instruction in information literacy is provided?

Naturally, it is no surprise that computer science students must demonstrate significant information literacy proficiency. Every class has as part of its goals expanding the students' information literacy proficiency in some way. Consider three examples. Introductory programming students make extensive use of programming IDE's, ranging from simple text editors to professional industry standards. Our goal is to have students confident in the ability to learn new IDE's as the need arises. Senior project students need to be familiar with project scheduling software, word processing templates for group documents and CASE tool software for UML design documents. Students in the Web development focus area need to be familiar with a variety of scripting languages, both text-based and IDE development platforms, Internet server administration, and databases used over the Web.

2. How are these proficiencies assessed?

Virtually across the board in these classes, students are assigned content-projects that required demonstration of the literacy proficiencies to get the content-based projects completed.

VI. Reflections

A. What has gone well in the department? What accomplishments have occurred in the past five years?

Since specific numbers have been given in the prior sections, this section will highlight the essence of the Computer Science Department accomplishments.

Students and Curriculum

- Computer science students have been successfully involved in student research as measured by their participation in SOURCE, national conference and journal publications, regional and national conference presentations.
- The curriculum went through a major review and revision based on the recommendations of Curriculum 2001.
- New courses have been added to the curriculum.
- A new focus area has been initiated.
- The department has responded to a growing general education need by expanding the number of CS 101 and CS 105 sections offered.
- Major NSF grants, CSEMS scholarships and STEP grants, support students, student recruitment and student diversity.
- The department has instituted a proactive advising program. Pre-majors' progress is actively reviewed quarterly. Majors are matched with an advisor based on student focus area and faculty expertise. Students meet regularly with this advisor to ensure degree progress is being made.

Faculty

- Faculty scholarship levels as measured by peer-reviewed publications and presentations are extremely high for a small, teaching oriented department.
- The faculty external grant program has grown over the review period and now is another measure of the success of faculty scholarship.
- Judicious used of equipment and overhead funds generated by these grants has allowed the department to build and staff the state-of-the-art Imaging Research Lab.
- Faculty service to the college and university is strong.
- Faculty professional service as measured by reviewing and conference and workshop organization is strong.
- The department hosted the 2003 CCSC-NW regional conference.
- The department has successfully implemented a process that allows faculty to identify a role which best utilizes their interests and talents.
- The faculty are compatible and work well together for and with the students. This characteristic is extremely important in a small department.

Staff

- The office staff, senior secretary LaVelle Clerf, is friendly and helpful. Faculty and students respect and appreciate her knowledge and assistance. As point of first contact for many new students and parents, LaVelle presents the perfect contact.

- The systems engineer, Fred Stanley, keeps our ever-expanding laboratory facilities in good working order. As personal comment from the chair, I have seen many other departmental setups, but I have never seen one run so smoothly with so little external help.

Facilities

- One new and one expanded general instructional lab.
- One new special purpose lab meeting the needs of three activities, networking, Linux access, and data mining instruction.
- New equipment and software for the labs on a regular basis.
- The new Imaging Research Lab.
- Improved funding strategies for instructional labs: equipment grants, software grants, student fee, excellent cooperation between the department, the Dean's Office and ITS.

B. What challenges exist? What has the department done to meet these challenges?

This section will look at the perceived challenges of the Computer Science Department and a look at what has been and is being done to meet these challenges.

Students and Curriculum

- Due to the ever-changing nature of computer science, the greatest challenge is to maintain a solid core set of courses and to augment these courses with a strong set of supplemental courses to meet the diverse desires and needs of our students. The department will continue the annual review process. The department will also continue to commit development resources to keep faculty active in issues related to curriculum development, particularly in national and regional conferences and special interest groups.
- The department is experiencing the effects of the national trend with decreasing major enrollment. The department is working with the Admissions Office to develop a recruiting strategy. Components of the strategy will include high school and community college visits and promotion of our scholarship and undergraduate research programs.
- The preparation and general level of the incoming students is of continuing concern to the faculty. Through the recruiting efforts described above, we hope to help increase the level of incoming students. The introduction of the CS 112, Foundations of Computer Science course has helped increase students' preparedness. Programs like the mentoring program with Computer Science Scholarship recipients have also been useful in addressing these concerns. One objective would be to identify resources to help expand this program.

Staff

- Over the last five years, the department has added a major research lab, and has added and expanded several instructional labs; yet the department still has a single systems engineer to keep these systems running. The department will work to hire a student assistant. This is less than an ideal solution. With the size of the labs, it is time to look for resources to share the hiring of an additional engineer.

Facilities

- Continue to maintain instructional labs with state-of-the-art equipment. The department continues to work with ITS, particularly the director and supervisor of labs, to ensure that lab equipment is rolled over in a timely fashion (the current cycle is three to four years).

- Build instructional equipment into the labs and classrooms. The department will continue to write for local grants and write requests as appropriate. The department is looking into the possibility of utilizing some of the student lab fees to build instructional media into the instructional labs.
- Build and maintain research labs for faculty research and undergraduate research projects. The Writing Center will vacate a room on the second floor of Hebeler. The department is working with the Dean in an attempt to obtain this space to help meet this need.
- Despite recent changes in air exchange systems, summer working conditions in the parts of Hebeler housing computer science faculty remains intolerably hot. The department will continue to work with the Dean to find options for alleviating this condition.

Budget

- As with most of the rest of the university, the goods and services budget has been frozen for many years in the face of increasing costs. Increased overhead funds from grant funding has allowed the department to address some issues that would otherwise be impossible.

C. Describe ways the department or unit might increase quality, quantity, and/or efficiency. Provide evidence that supports the promise for outstanding performance.

Programs

- Maintaining the currency of the undergraduate program will be a primary factor in its quality. Here it is important to carry out all of the annual assessment activities described above in section II. In addition, the faculty will review new changes proposed for the MFT (to take place in 2005) and will adjust the program accordingly.
- There has been a nationwide decline in the number of undergraduate computer science majors. Given the figures in section IV above, the undergraduate computer science program at Central has not been immune from this trend. On the other hand, we believe that, at the present, the department is in a good position to capitalize on recruiting using advantages like the high percentage of students participating in undergraduate research and the NSF scholarship funds. This will impact the quantity of students to whom the program is delivered.
- It is a major goal (Goal VI) of the department to build an interdisciplinary research “Area of Distinction” and an associated Masters Degree program in geospatial information technologies. Succeeding at this goal will have a major impact on the quality of the program. A clear theme in the success of the department and programs over the last five years is the increasing quality and quantity of faculty and student scholarship. It is important to act now to build on this success.

Faculty

- The size of the department and the associated teaching load makes it difficult for faculty to conduct significant research activities and provide that breadth of classes that the undergraduate program requires. At the same time, with a faculty of five, it would be impossible to offer a master’s program and it would limit the ability of computer science to participate in an “Area of Distinction.” The addition of one or two faculty members would alleviate these concerns and increase the quality of the program.

Equipment

- Our current facilities are quite constraining. Classrooms and labs do not have built-in projection and computer stations. Set-up and take-down time for portable equipment at the start and end of class reduces the total classroom discussion and presentation time. Computer science courses use computer equipment and related facilities as part of the discipline. Appropriate arrangements for demonstrating and working with the tool of the trade in the classroom would be a significant improvement. Some courses would benefit from having computers available for student use during parts of the lecture period. We have made some accommodations to support these courses, but this reduces lab time for student use and lab time for other courses. A fully functional lecture/lab setting for these courses would have a significant impact on quality, quantity and efficiency.

Evidence of Successes

As all this information has been described in detail in the sections above, we will present five highlights here.

- Student participation in undergraduate research has been highly successful.
- Faculty research and grant activities have seen a significant increase over the last five years – well beyond what is expected for a teaching institution.
- With the cooperation of the Dean and ITS and with the judicious use of resources and grants, the department has kept instructional laboratory hardware and software state-of-the-art. Similarly, the department has expanded and added important new instructional lab space. Wireless networking will be completed in Hebeler Hall by the end of Winter term.
- The department has built a major research lab.
- The department hosted a major regional computer science conference last year.

VII. Future directions

A. What are the current national trends in the discipline? How has the program responded to these trends?

- Increased standardization on Internet protocols and applications
  - Added new Web Development focus area
  - Revised CS 450 to emphasize Internet protocols
  - Added CS 351 & CS 352 (XML)

- Increased importance of open source software
  - Added CS 370 and Linux
  - CS 350 has included PHP

- Increased importance of non-desktop computing devices
  - Accessibility research
  - Inclusion of accessibility content in CS 350, 351, 352, & 446 curriculum
  - CS 352 includes development of software for small-screen devices

- Outsourcing of technical skills
  - Majors are required to combine an appropriate focus area with the core curriculum.

- Fewer computer scientists are being trained in US
    - o CSEMS Scholarships and STEP programs will be used to recruit more students and outreach to underrepresented groups.

- Increased importance of security
    - o This is an important new area where the department is considering the development of a new focus area (much like the Web focus area of the last three years).

- Continued reliance on object-oriented programming paradigm
    - o Java is core language of department
    - o Added C# to CS 351, 352 and CS 446

- Increased importance of component-based programming
    - o Use of .NET components in CS 351 and CS 446

- Images and video already occupy more than 80% of storage capacity and it will grow.
    - o Expanding computer graphics and vision classes

- Advances in data processing
    - o Offering and expanding classes such as Data Mining and Computational Intelligence

- Pervasive Computing
    - o Pervasive computing is the next generation computing environments with information & communication technology everywhere, for everyone, at all times. Information and communication technology will be an integrated part of our environments. The curriculum must move in the direction of teaching for this environment.

- Alternative Programming Techniques
    - o A current example of this would be extreme programming. The department must integrate experiences such as this into the curriculum.

B. How do faculty members set goals for professional development? How does the faculty envision the balance of teaching, service, research and creative activities?

The faculty support the concept that continued professional growth requires period review. To this end, all computer science tenure/tenure-track faculty agree to participate in an annual review – reappointment, tenure, promotion, or post-tenure – as appropriate. The precise documents generated and associated procedures are detailed in the Computer Science Department Policy Manual, Appendix C. Perhaps one of the most important aspects of this process is the annual review of previous goals and the setting of next year's goals. Since the department as a committee of the whole conducts these reviews, it allows the department to buy into the goals of individual faculty.

Let us turn to the balancing of teaching, service, research and creative activities. As noted several times above, the review process has allowed faculty to define roles that best utilize their capabilities while supporting the overall mission of the department. Recall of the five current faculty members, two make their contribution to the undergraduate program their primary emphasis, two have chosen a role that emphasizes their research interests, while the chair's time is divided fairly evenly among administration, teaching and scholarship activities. None the less, it is unanimously difficult for each of the faculty to find that desired balance while responding to the instructional needs of the undergraduate program. Note that this is probably exacerbated by the fact that each computer science graduate has a program that requires a minimum of 106 quarter hours.

Thus, when planning annual faculty teaching schedules, faculty supervision of the senior project teams is always added on top of the usual teaching load. The same is true for faculty involved in student research. The department tracks this effort with an eye toward providing course release for these accumulated hours. Such opportunities are extremely rare. Yet it is precisely such opportunities that can spur faculty scholarship efforts.

C. What is your five year vision of the department?

Programs

- The department will build a master's degree program and participate in building an interdisciplinary "area of distinction" both in the area of geospatial information technologies.

- The department will continue to review and adjust its curriculum in order to adjust to the changes in computing technology. New courses will be developed and current courses will evolve to meet these needs.

- The department will develop two or three additional undergraduate focus areas, supported by appropriate courses, in the manner the department developed the new Web Development focus area – one suggestion: computer security.

- The department will encourage increased student involvement in academic service learning projects. As a result, students should have an increased appreciation and commitment to the community service. This point was assessed as somewhat below average by the IR surveys. This would have the positive side effect of increasing the visibility and good will toward our department.

- The department will grow the undergraduate program to 40 graduates per year. This target number would allow us to offer two sections of required upper-division courses per year (class sizes of 20 students each) and to consistently offer specialized electives that can attract class sizes of between 10 to 20 students.

- The department will work with Career Services to dramatically increase their support for graduating CS seniors by arranging interviews and career information sessions with Washington employers.

Faculty

- The department will strive to get two additional faculty positions – one whose focus is the undergraduate program and one whose focus is in research and the master's program.

- The department will use additional faculty to even the instructional workload and increase efforts in undergraduate research and other scholarship activities.

Facilities

- The department will work to build separate, secure research lab space for every faculty member. This would allow us to obtain equipment and software without the risk of it walking out the building or being used by general students for non-research purposes.

- The department would like to expand to use all the space on the second floor of Hebeler. Remodeling some or all of this space is essential – not only to improve communications but especially to address the continuing problem of air conditioning faculty offices that face east.

- The department will work to have class and lab space remodeled to include presentation media. At least one of the lab spaces should be further remodeled to provide support as a fully functional teaching lab.

D. If faculty or staff retirements are anticipated, how would replacement positions be targeted to optimize departmental goals?

Currently there are no anticipated retirements. We will consider next the more general question of targeting replacement positions should they occur for any reason.

This is a small department, five full-time tenure/tenure-track positions. It has clearly worked to the advantage of all to allow the faculty to define roles that best utilize their capabilities. This has provided an important balance and supports the teaching, scholarship and administrative needs of the department. Now that this balance has been achieved, it would be important to maintain it. Thus in replacing a faculty member with an emphasis in instruction, it would be our priority to find a faculty member with a similar interest. On the other hand, in replacing a research oriented faculty member, we would look for someone with a research orientation and one who was compatible with the departmental research efforts.

Let us take a step beyond the question. In a perfect world, the program would need two new faculty positions to maximize quality and quantity goals listed above. The department would use one position to support the quality and growth of the undergraduate program and one position to build a master's program and help grow an "area of distinction."

E. What new or reallocated resources are required to pursue these future directions?

Personnel

- One or two new full-time faculty positions.

- Help for our systems engineer.

Facilities

- Separate, secure research lab space for every faculty member.

- Presentation media in our instructional spaces, classrooms and labs.

- A fully functional teaching lab.

- Remodel of space in Hebeler.

Equipment

- Continued cooperation with the Dean and ITS to keep laboratory hardware and software state-of-the-art.

VIII. Suggestions for the program review process or contents of the self-study?

Section III.C states the following.

C. Departmental teaching effectiveness – report a five-year history of the "teaching effectiveness" department means as reported on SEOIs, indexed to the university mean on a quarter-by-quarter basis.

It is well known that SEOIs are one highly questionable way of evaluating teaching effectiveness, yet this is the only measure requested and the data provided by Institutional Research is related to only one question (#29) on that evaluation. We took a more expansive view of this most important question and we note that many other sections ask for a more complete review of the topic in question. Perhaps the question should be cast more broadly.

Appendix A

Area of Distinction Prospectus

Area of Distinction for Geospatial Data Analysis

Mission Statement

The mission of the Center for Excellence for Geospatial Data Analysis (CEGDA) is to conduct multidisciplinary research into the collection and analysis of geospatial data, to encourage and support the creation of innovative theories and their applications to projects that have significant potential value, and to provide exemplary dissemination, training and support in the use and advancement of this research for the university, the region, and the state.

CEGDA Goals

1. To promote and conduct research in the area of geospatial data analysis in a variety of disciplines, and to encourage cross-disciplinary collaborations in the development of new approaches and methodologies.

2. To promote appropriate partnerships between scholars and researchers from education, government and the private sector for the study of innovative theories and their applications.

3. To provide an environment in which individuals can obtain assistance and support to seek innovative solutions for appropriate projects.

4. To support the education of students at both the undergraduate and graduate levels through interdisciplinary courses and programs.

5. To secure funding from external sources to support and promote the CEGDA mission.

6. To develop a community of resourceful individuals, including faculty, students, and outside partners, which advances the role of geospatial data analysis and its resulting applications for the university, the region, and the state?

7. To disseminate research findings and information gained through Center projects to the University community and the wider public.

8. To remain a source of information about and assistance with emerging technologies and their applications.

Participants

- Departments
  - Computer Science
  - Geography
  - Geology
  - Mathematics

- Existing Centers and Labs
  - Center for Spatial Information
  - Geographic Information Systems Laboratory
  - Geodesy Laboratory
  - PANGA
  - Visualization Research Laboratory

Appendix B

Master of Science Prospectus

Appendix C

Computer Science Department Policy Manual

Appendix D

Report on Engineering Technology

to

Technology Accreditation Commission
of the
Accreditation Board for Engineering and Technology

Appendix E

Computer Science Major – Student Learning Outcomes

Graduation Requirements : Learning Outcomes

- Graduates will have a reasonable level of understanding of each of the subject areas that define the discipline as well as the interrelationships that exist among them: algorithms, architecture, artificial intelligence and robotics, data structures, database and information retrieval, human-computer interaction, operating systems, programming languages, and software engineering.
- Graduates will have the ability to utilize appropriate theoretical constructs: definitions, and axioms, theorems, proofs, and interpretation of results.
- Graduates will have the ability to utilize appropriate abstractive constructs: hypothesis formation, data collection, modeling and prediction, experimental design, and analysis of results.
- Graduates will have the ability to utilize appropriate design constructs: requirements analysis and specification, design, implementation, and testing.
- Graduates will be exposed to ethical and societal issues associated with the computing field.
- Graduates will be familiar with recent technological and theoretical developments, general professional standards, and have an awareness of their own strengths and limitations as well as those of the discipline itself.
- Graduates will be aware of the history of computing, including those major developments and trends - economic, scientific, legal, political, and cultural - that have combined to shape the discipline.
- Graduates will be able to appreciate the intellectual depth and abstract issues that will continue to challenge researchers in the future. They should have a strong foundation on which to base lifelong learning and development.
- Graduates will have the necessary background for entry into graduate study.
- Graduates will have the ability to communicate effectively.

Appendix F

Senior Project Extract

Requirements Specification

Appendix G

Computer Science Department: Exit Survey – Written Portion

Appendix H

Student Survey Results from Institutional Research

Appendix I

Computer Science Department Faculty Full Curriculum Vitae

Razvan Andonie, Associate Professor, Sep. 2003 – present
Isabelle Bichindaritz, Assistant Professor, Sep. 2000 – Aug. 2002
Barry Donahue, Professor, Sep. 1999 – Aug. 2000
Grant Eastman, Associate Professor, Sep. 2000 – present
Ed Gellenbeck, Associate Professor
Boris Kovalerchuk, Professor
Jim Schwing, Professor

Appendix J

Computer Science Department Faculty Structured Performance Records

Accomplishments for the period under review: Sep. 1999 – Aug. 2004

Razvan Andonie, Associate Professor, Sep. 2003 – present
Isabelle Bichindaritz, Assistant Professor, Sep. 2000 – Aug. 2002
Barry Donahue, Professor, Sep. 1999 – Aug. 2000
Grant Eastman, Associate Professor, Sep. 2000 – present
Ed Gellenbeck, Associate Professor
Boris Kovalerchuk, Professor
Jim Schwing, Professor

Appendix K

University Student Evaluation of Instruction Form

Appendix L

Library Holdings