

# Virginia Tech, College of Engineering Department of Computer Science

## Plan for Spoken, Visual, and Written Communication for Majors

### A. Goals and Objectives

The Department of Computer Science believes that the ability to communicate effectively in a variety of modes is essential for its graduates to be successful in their professional life. The department has the following goals and related objectives for its undergraduate program:

1. To produce graduates who can communicate effectively in writing. In particular, graduates should be able to:
  - a. Write appropriately in a variety of formats including memos, reports, documentation, and business letters.
  - b. Analyze and interpret technical information and present the analysis and interpretation in writing, in a logical, well organized way.
  - c. Analyze the audience and articulate the purpose for which a particular piece of writing is intended, and write in a way appropriate for that audience and purpose.
2. To produce graduates who can communicate effectively orally. In particular, graduates should be able to:
  - a. Prepare and deliver a formal oral presentation of technical information in a clear, well-organized manner with appropriate attention to the level of technical competence of the audience.
  - b. Demonstrate effective day-to-day communication with coworkers, team members, and supervisors.
3. To produce graduates who can enhance their oral and written communication through the use of graphics. In particular, graduates should be able to:
  - a. Create graphs, charts, and diagrams as commonly used by computer scientists.
  - b. Create documents, accessible through the Web, containing either professional information about the student him- or herself, or technical material about a topic related to computer science.

### B. Curriculum Elements for Achieving these Goals

These goals are to be achieved over the course of a student's four years at Virginia Tech. The specific courses that will lead students to these objectives by teaching and reinforcing the necessary skills are listed below. The component – sspoken, visual, written – contributed by each specific course, is indicated in square brackets. The effective academic year for these courses to begin meeting this communication requirement are indicated in parentheses

If a course is currently required, it is designated in curly brackets as required, otherwise as optional. All the optional courses, except CS 4944 Senior Seminar, meet some current CS degree requirement that allows a selection among several courses.

Freshman Year (2005/6)

EngE 1024 Engineering Explorations [s,v,w] {r}  
EngE 1104 Digital Explorations [s,v,w] {r}  
Engl 1105 – 6 Freshman English [s,w] {r}

Sophomore Year (2006/7)

CS 1706 Object-Oriented Development II [v,w] {r}  
CS 2704 Object-Oriented Design [v,w] {r}

Junior Year (2007/8)

CS 3604 Professionalism in Computer Science [s,w] {r}  
Comm 2004 Public Speaking [s,v,w] {r}  
One of:  
CS 3704 Intermediate Software Design [s,v,w] {r or 3724}  
CS 3724 Human-Computer Interaction [s,v,w] {r or 3704}

Junior or Senior Year (2007 – 2009)

Engl 3764 Technical Writing [w] {o}

Senior Year (2008/9)

CS 4944 Senior Seminar [s,v,w] {o}  
One of:  
CS 4204 Computer Graphics [s,v,w] {o}  
CS 4214 Simulation and Modeling [s,v,w] {o}  
CS 4624 Multimedia, Hypertext & Information Access [s,v,w] {o}  
CS 4634 Design of Information [s,v,w] {o}  
CS 4704 Software Engineering [s,v,w] {o}  
CS 4804 Introduction to Artificial Intelligence [w] {o}  
CS 4974 Independent Study [w] {o}  
CS 4994 Undergraduate Research [w] {o}

Three changes to current degree requirements will be necessary to implement these proposed communication requirements. 1) Engl 3764 will go from being optional to required. 2) Selection of a course to meet one of the two current CS 4000-level Senior Electives will be restricted to the 4000-level courses listed above. 3) The Senior Seminar, CS 4944, will become required of all students in their senior year. Student portfolios, begun in the sophomore year, will be completed and submitted, and exit interviews will be conducted within the context of this one-credit course.

Under the current Core Curriculum Writing Intensive requirement, the department requires its students to take one writing intensive course outside the major selected from one of the humanities or social sciences departments previously located in the College of Arts and

Sciences. In the 2004 calendar year, 55% of graduates met this requirement by selecting Engl 3764 Technical Writing. Another 14% took one of the other English courses currently designated as writing intensive, for a total of 69% taking English courses to meet the current Writing Intensive requirement.

The department received such positive feedback from its students about the relevance and helpfulness for their writing of the Technical Writing course that it is now proposing to require Engl 3764 as part of this plan for ensuring that CS students develop appropriate professional writing skills. The department head of Computer Science has spoken with the chair of the Department of English about having Engl 3764 be required for all Computer Science majors beginning with freshmen entering Virginia Tech in Fall 2005. Deans Niles and Aref have been made aware of this request. A decision is pending.

Transition. Students who entered the university prior to Fall 2005 will continue to meet the Writing Intensive requirement as currently defined on checksheets through 2008. The new communication requirements outlined above will first appear on the checksheet for students graduating 2009. Transfer students who enter in Fall 2005 or later, but who graduate prior to 2009, will meet the current Writing Intensive requirement.

Phasing of Course Revisions. All of the CS courses listed above already exist and most already incorporate, as currently taught, the spoken/visual/written components necessary to meet the department's stated goals. However, except for CS 3604, 4974, and 4994, these courses do not currently address in their official syllabi the specific issue of communication skills. The syllabi for these courses, in particular the learning objectives, need to be revised appropriately. The revisions will be completed no later than the date indicated below.

CS 1706 – Spring 2006

CS 2704 – Fall 2006

CS 3704, 3724, 4204, 4214, 4624, 4634, 4704, 4804 – Spring 2007

### C. Assessment Plan

1. Individual instructors will assess the performance on specific assignments in their courses.
2. In their senior year, students must present a portfolio that contains at least one example of graded written work from all of the courses taken to fulfill the communication requirement, starting with the sophomore-year courses. (Since students in Engineering do not enter the major until their sophomore year, it would be impractical to require submission of work done prior to the student knowing which major s/he would enter and saving work from the freshman year.) The submitted examples should display a variety of writing formats, including at least four of the following: business letter, resume, user/project documentation, system design document, proposal, participation (at least 3 non-trivial contributions) in a technical, public, on-line discussion for a CS class. Many CS courses routinely run an on-line discussion group dedicated to that class.

The portfolio should also contain the written supporting materials for an oral presentation, Powerpoint slides, or other similar documentation of oral presentations from at least two different Computer Science courses – one presentation the exclusive work of the student, one the result of a group presentation.

The portfolio should additionally contain one example of graphical work the student has done. This could be graphics or charts used in an oral presentation, charts and graphs included in a written report, or a URL for a Web site created by the student and containing either professional information about the student him- or herself or technical material about a topic related to computer science.

Portfolio evaluation will be coordinated by the department's Undergraduate Program Committee. All materials in the portfolio created for a class must include the grade earned.

The department is considering using the e-portfolio facility currently under development by a consortium of universities, including Virginia Tech, as the means for students to submit the required portfolio materials. Since materials will only be collected beginning with a student's sophomore year, a decision about using e-portfolios is being delayed until Spring 2006 to see if the e-portfolio software incorporates by then the features that would be necessary not only to collect and analyze but also to securely preserve submissions. This facility does not currently exist and the software is not yet very stable.

3. In the senior year, each student will have an oral exit interview, coordinated by the Undergraduate Program Committee, in which the student will be expected to present prepared comments about her or his educational experiences in the Computer Science program and be prepared to answer follow-up questions.