

Department of Computer Science

Plan for Writing Across the Curriculum

(For: Computer Science BA and BS)

I. Goals:

At the completion of degree requirements in either the BA or BS in Computer Science major, a graduate will be able to:

- Summarize findings of computational experimentation.
- Keep detailed logs of activities leading to the design of a software system.
- Synthesize information about a software system intended for its users.
- Present a technical description of a software system.
- Write a substantive essay supporting a particular position or point of view.
- Write concise and complete statements explaining concepts, problems, and solutions related to solving computing problems.

II. Objectives:

A. Behavior: Specific Writing Experiences

Each student in Computer Science will be engaged in writing throughout the curriculum as they develop and learn about systems. Developing software and experimenting with algorithms require writing journals and reports. Writing to defend validity of systems and to verify their correctness is an integral part of their development process.

B. Conditions

Students will be provided with ample examples of the kind writing expected along with clear instructions about the writing component of all assignments with some opportunities for rewrites.

C. Criteria for Writing Experiences:

Each student must take five courses with substantive writing component. Three types of courses are identified: **Introductory**, **Writing to Learn**, and **Advanced**. Student must take the two courses that we identify as Introductory, the course that we categorize as Writing to Learn, and a pair of courses from a list of approved courses that are of the Advanced type.

1. Introductory.

Students need to take courses that help them achieve competence in writing complete and concise statements. Courses that require the writing of mathematical proofs and the use of symbolic and written languages to communicate simple and coherent ideas serve as the foundation for communicating complex systems. The two courses required in the Computer Science core and cognates that help in improving students skills in that area are **CSC221-Foundation of Computer Science** and **MAT215-Discrete Mathematics**. Both courses require short proofs of theorems and significant use of mathematical symbols in describing and solving problems.

2. Writing to Learn

The course in the Computer Science core that teaches students how to keep logs during the design and programming of software systems is **CSC380-Software Engineering**.

This is the course where students learn to document their software development activities by maintaining logs; they begin to learn to synthesize the process that they go through in developing software. Logs are evaluated regularly by the faculty both for completeness and for determining the progress that the student has made on the projects. This is also the first course where students begin to present their software designs in writing and develop reports that summarize their activities and findings.

3. **Advanced.**

The two remaining courses in this requirement must be at the upper division level with significant writing and frequent feedback. The synthesis of information about systems and algorithms intended for users and practitioners must be an integral part of these courses. It is expected that these courses will include scientific journal reviews and technical presentations as well.

Courses must be chosen from the list of upper division writing courses approved by the Department of Computer Science. Currently, we have approved seven courses that help in satisfying the objectives for the Writing Across Curriculum requirement at the advanced level. We expect additional computer science courses to be updated or new courses developed that will be added to the list of approved courses. Also, we anticipate adding courses to this list from those that satisfy the Intellectual Issues component in the general education program. The Intellectual Issues courses may be selected from courses in natural sciences, mathematics or information science or any other discipline grounded in science and mathematics. As courses are approved for the Intellectual Issues component of the general education program, we will evaluate them for inclusion in the list of our approved writing courses at the advanced level.

Computer Science BA

Students majoring in the Computer Science BA will be expected to take advanced writing courses that either satisfy the Computer Science Upper Division Electives requirement for the major or a requirement from the Intellectual Issues component of the general education program. Historically, the majority of our graduates, over 95%, have taken CSC458 to satisfy the Upper Division Expository Writing requirement under the old general education program. CSC458 is in the list of approved courses for writing in the new general education program as well. We expect that most students majoring in the Computer Science BA will continue to take that course as an elective upper division course for the major and to satisfy the writing requirement. This group of students will take their 2nd Advanced writing course from the remaining courses in the list of approved courses.

Computer Science BS

Students majoring in the Computer Science BS must choose an approved concentration as part of the major's upper division electives requirement. There are two approved concentrations in our BS degree. The Software Systems concentration includes CSC454, CSC458, and CSC480 that are also included in the list of Advanced Writing courses as well. The Artificial Intelligence concentration includes CSC366, CSC416 and CSC466; these courses are also approved as Advanced Writing courses. Students majoring in Computer Science BS automatically satisfy the two remaining courses that must be at the advanced writing category irrespective of the concentration that they choose.

III. Courses:

1. **Introductory.**

Must take both of the following:

CSC221-Foundation of Computer Science

MAT215-Discrete Mathematics.

2. **Writing to Learn**

Must take:

CSC380-Software Engineering

3. **Advanced**

Must take two of the following (This list will be expanded in the future):

CSC366-Computational Models of Cognitive Processes engages students in elements of mind modeling. Narrative constructions from a number of cognitive scientific perspectives will serve to enrich the presentation of representational, functional, and analytical aspects of the computational models of cognitive processes that are studied. These narrative constructions may, for example, conform to the structure of cognitive psychological experiments, the reasoned argument of philosophical investigation, an empirical exploration of theories of linguistic competence and performance, or multi-level descriptions of behaviors associated with artificial intelligence programs.

CSC416-Foundations of Artificial Intelligence features the study of basic tools and techniques associated with the field of Artificial Intelligence (AI), including state space problem solving, problem reduction methodologies, minimax game playing, and productions systems. The application of these tools to particular problem situations provides myriad challenges for expressing the relationships between "real world" circumstances and computational conventions. A number of writing assignments will be cast in terms of these "challenges of expression", the objective of which is a relentless search for a deep appreciation of the classic problems associated with AI research and practice.

Secondarily, throughout the semester readings are assigned which generally discuss fragments of AI from a historical perspective. The premise here is that, as with the learning of a natural language, the learning of an artificial language can be greatly enriched by a close look at (virtual emersion in) the culture in which the language thrives. While Lisp and Prolog, both general purpose programming languages, are among the objects of study in this course, AI is the culture in which these languages thrive. A collection of writing assignments, each of which takes the form of an essay, serves to connect the culture of AI as articulated in these readings with the content of AI as formulated in the lecture material.

CSC454-System Simulation requires significant amount of experimentation with simulation models and summarization of those experiments. This course will require both reports on design techniques used as well as reporting on the simulation results achieved.

CSC458-Systems Analysis and Design concentrates on software specification and design phase. Students write significantly with frequent feedback during the various stages of the development process. The synthesis of information about a

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software system intended for its users is emphasized in this course, as well as, papers and technical presentations including data-flow and object hierarchy diagrams about the designs.

CSC465-Algorithm Analysis and Design has a substantial amount of scientific writing reinforcing students' strength in writing concise and complete statements. Analyzing algorithms is a central theme in this course, which requires strength in writing about the efficiency of algorithms as well as the reports presenting the results of empirical studies of algorithms studied.

CSC466-Topics in Artificial Intelligence is a project oriented course. Writing will be required for a succession of incrementally refined project proposals, for sequences of task development status reports, and for a final project report. Pivotal documents will be rendered in two forms, textually (e.g., in LaTeX) and hypertextually (e.g., in HTML).

CSC480-Software Design focuses on the software design paradigms and extends the techniques established in our **CSC380** course. This course requires a substantial amount of writing intended for users of a software system and technical papers presenting the design details.

IV. Special Circumstances

Since the **CSC221**, **MAT215**, and **CSC380** are required in our BA and BS, no special means should be necessary for transfers or double majors. Any transfer courses articulated with these courses will be expected to meet the same writing objectives. With regards to the two courses at the advanced writing level, we don't expect any courses transferred. For those double majoring in CS and another major, any courses from other disciplines grounded in science and mathematics will be considered in a case by case bases.