Cognitive Science at Oswego
→ Writing Across the Curriculum Plan

Goals

Upon completion of the degree requirements in either of the Baccalaureate of Arts or Baccalaureate of Sciences degree programs in Cognitive Science, a graduate will be able to:

1. Demonstrate understanding of vocabulary relating to basic concepts in cognitive science by using it effectively in expository compositions.
2. Concisely state, explain and debate, from diverse perspectives, the "computational/representational assumption" which underlies and unifies the field of cognitive science.
3. Discuss origins and consequences of the "big ideas" in cognitive science, either by summarizing from one source or by synthesizing from a number of sources.
4. Present technical descriptions of software systems, linguistic models, and psychological experiments by means of texts which appeal to multiple levels of abstraction.
5. Produce written narratives to accompany statistical techniques, computational explorations, and anthropological investigations.
6. Demonstrate skills of conceptual and analytical expression through incremental revision and editing techniques.
7. Summarize various classical papers relating to cognitive science.
8. Write an essay on some controversial topic or emerging discipline associated with the field of cognitive science which identifies and explores relevant ideas and issues from an interdisciplinary perspective.
9. Contextualize, by means of narrative description from an interdisciplinary perspective, a program or system of the student's own creation which serves to investigate some cognitive phenomenon in computational terms.
10. Maintain a journal, or "scientists notebook."
11. Present the results of an original research project in 2-dimensional terms (poster form) which at once features points of perceptual interest for the "casual" reader and lines of reasoned exposition for the "interested" reader.
12. Present the results of an original research project in a professional format.

Objectives

- **Behavior: Specific Writing Experiences**

  In pursuing the cognitive science major each student will engage in a variety of writing experiences, including one or more of the following:

  - conceptual expositions
  - methodological explanations
  - idea summaries
  - contextualizations of formal systems
  - reports on statistical and computational studies
  - review articles
  - position papers
  - poster presentations
  - research papers

- journal writing tasks

- **Conditions: Generic Writing Experiences**

  All students in the cognitive science major will be required to write frequently as part of their course work, and will receive extensive feedback on their writing, with some opportunity for submitting rough drafts and rewriting (reworking and refining) earlier drafts. Students will be provided with plenty of examples of the kind of writing expected along with clear instructions for the writing component of all assignments.

- **Criteria for Writing Experiences**

  Each cognitive science major must take five courses, each with a significant writing component, from three categories which are being identified as "introductory," "writing to learn," and "advanced." Specifically, students are required to take one particular "introductory" writing course, three particular "writing to learn" courses, and one particular "advanced" course.

  - **Introductory** - All students take the gateway course.

    - **Cog166 - Introduction to Cognitive Science** Students need to be able to communicate effectively, in writing, ideas pertaining to the fundamental assumptions, methodologies, ideas, questions, and findings of cognitive science. To this end they need to learn the basic vocabulary of cognitive science, and they need to learn to wield this vocabulary effectively. The "gateway" course for the cognitive science major, Cog166, helps to improve student writing skills in these respects. Typically, the course includes a number of relevant writing assignments. For example, one semester it included all of the following assignments. It included a glossary generation assignment in which students synthesize definitions from multiple sources [Goal 1]. It included an essay writing assignment which used a selection of glossary terms to illuminate the standard characterization of the field in terms of its defining assumptions and methodologies [Goal 2]. It included a biography project in which students reported on a cognitive science pioneer and his or her main contributions to the field [Goal 3]. It included a series of short essays which critically examined various ideas and issues which relate to cognitive science [Goal 3]. It featured technical writing assignments which described computer programs or knowledge representations or models of cognitive processes such as memory, attention, or planning [Goal 4].

  - **Writing to Learn** - Students are required to take three courses, Psy280, either Ant344 or Cas444, and either Cog366/Csc366 or Cog356.

    - **Psy280 - Analysis of Psychological Data** Students of cognitive science need to be able to perform "write-ups" for scientific experiments. In Psy280, students learn statistical techniques which are central to behavioral experimentation and produce written narratives based on experimentation which explain the rationale for the use of particular techniques, which report on results of analyses, and which offer interpretations of these results [Goals 5 and 12]. This is done in APA format, and constitutes elements of the "Methods," "Results," and "Discussion" sections of a journal manuscript.
    - **Ant344 - Language and Culture** Students of cognitive science also should to be able to present in-depth reviews of books and other materials in a mature and measured manner. In Ant344, students are required to prepare an extended book review with revisions and editing after review by the instructor [Goal 6].
    - **Cas444 - Semiotics and the Study of Meaning** Students in this course write a topical term paper from a semiotic perspective with revisions and editing after review by the instructor [Goal 6].

        - **Cog366/Csc366 - Computational Modeling of Cognitive Processes** Students of cognitive science need to be able to summarize key ideas found in source papers, clarify issues of controversy which fuel debate within the field, explain emergent sciences and technologies which impact on the field, and convey work that they are engaged in which endeavors to illuminate aspects of cognition through computational investigation. In this practical cornerstone course for the cognitive science major, students write at least one paper which summarizes a key source paper within the field [Goal 7], they write at least one paper which addresses an intellectual issue of controversy or emergence within the field [Goal 8], and they produce a rather lengthy companion document to a program which computationally models some cognitive process [Goal 9].
        - **Cog356 - Generative Processes and Formal Systems** Students of cognitive science need to be able to summarize key ideas found in source papers, clarify issues of controversy which fuel debate within the field, explain theories which drive the field, and describe formal systems in meaningful terms of abstraction. In this theoretical cornerstone course for the cognitive science major, students write at least one paper which summarizes a key source paper within the field [Goal 7], they write at least one paper which addresses an intellectual issue of controversy or emergence within the field [Goal 8], and they produce a rather lengthy companion document to a generative process or a formal system. [Goal 9].

    - **Advanced** - All students are required to take the Capstone Course.

        - **Cog468 - Cognitive Science Capstone Seminar** Students of cognitive science need to know what it means to do research in the field and they should be reasonably comfortable with and competent in presenting their research in both informal and formal settings. To this end, the ”capstone ” course for cogntive science majors, Cog468 “Cognitive Science Cap- stone Seminar,” calls upon students to perform three significant activities involving writing. Students are required to maintain a “scientists notebook,” or “work journal” in support of an individual research project that the students designs and pursues under the guidance of the course instructor or another professor associated with the cognitive science program at Oswego [Goal 10]. Students are required to present their work in the form of “poster presentation” at an appropriate forum (perhaps Quest or the very modest Oswego Cognitive Science Day Conference which the class will organize and administer) [Goal 11]. Finally, students are required to write a paper that is more or less consistent with submission specifications for the annual conference of the Cognitive Science Society, the premier venue for sharing original research in the cognitive science community [Goal 12].

Courses

In essence, the plan is based on our conviction that taking the following courses will assure a sound writing experience for students majoring in Cognitive Science at Oswego:

- **Introductory**

  Cog166: Introduction to Cognitive Science

- **Writing to Learn**

    - Psy280: Analysis of Psychological Data

    - Either:
        - Ant344: Language and Culture, or

        - Cas444: Semiotics and the Study of Meaning

    - Either:
        - Cog366/Csc366: Computational Models of Cognitive Processing, or
        - Cog356: Generative Processes and Formal Systems

- **Advanced**

  Cog468: Cognitive Science Capstone Seminar

The brief catalog description of each of these courses is as follows:

- **Cog166 - Introduction to Cognitive Science**

  This course will introduce the fundamental questions, findings and methods of cognitive science. The computational approach to cognition and the notion of abstract mental representation are introduced within the interdisciplinary framework of the field. Basic knowledge of cognition, computation, and evolution is surveyed. Symbol systems are described and their role in standard representations is discussed. Artificial neural networks are proposed as a model of both the brain and the mind. Linguistic models are introduced and philosophical challenges are discussed.

- **Psy280 - Analysis of Psychological Data**

  Basic techniques of descriptive and inferential statistics and their applications to research in psychology.

- **Ant344 - Language and Culture**

  Linguistic diversity and change; cultural emphases in language and relation to world view.

- **Cas444 - Semiotics and the Study of Meaning**

  Semiotics is the study of signs and sign systems in the world of meaning we share through communication. This course is an introduction to the methods and theories of semiotics and its concern with the "life of signs," signs as individual entities, as they operate within larger groups of signs called codes, and as codes, in turn, operate within cultures. The importance of this topic for human life makes the subject appropriate for students from all disciplines, undergraduate and graduate.

- **Cog366/Csc366 - Computational Models of Cognitive Processes**

  Introduction to the computational study of human and machine intelligence. Discussion of computational models, algorithms, and research in neural processing, vision, memory, learning, reasoning, and information processing.

- **Cog356 - Generative Processes and Formal Systems**

  This course will survey Post Production Systems, Context Free Grammars, L-Systems (fractals), Finite State Machines, Turing Machines, Cellular Automata, Hidden Markov Models, Genetic Algorithms, Horn Clause Problem Solving (Resolution Inference) and Lambda Calculus. In short, it will expose the student to formalisms that are commonly used in the computational modeling of cognitive processes.

- **Cog468 - Cognitive Science Capstone Seminar**

  The course will feature individual research projects of a relatively modest scale. Students will have wide

latitude in negotiating a realm of study, as well as the approach to study of the selected topic. The research project must be interdisciplinary to the extent that it draws on at least two contributing disciplines to cognitive science. Furthermore, the project must stand in a justifiable relationship to the computational/representational assumption which unifies the field. Beyond this, the project must be mindful of the constraints of capstone objectives for the arts and sciences, learning outcomes for cognitive science majors, and to the interests and orientation of the professor teaching the course.