New Course Request

Check Appropriate Boxes:

- Undergraduate credit [X]
- Graduate credit [ ]
- Professional credit [ ]

2. Academic Subject Code: COGS

3. Course Number: 240  
   (must be cleared with University Enrollment Services)
4. Instructor: Scheessele

5. Course Title: Philosophical Foundations of the Cognitive and Information Sciences
   Recommended Abbreviation (Optional)  
   (Limited to 32 Characters including spaces)

6. First time this course is to be offered (Semester/Year): Spring 2007
7. Credit Hours: Fixed at 4 or Variable from to
8. Is this course to be graded S–F (only)? Yes [X]
9. Is variable title approval being requested? Yes [X]

10. Course description (not to exceed 50 words) for Bulletin publication: See attached IU Bloomington Bulletin

11. Lecture Contact Hours: Fixed at 4 or Variable from to

12. Non-Lecture Contact Hours: Fixed at 0 or Variable from to

13. Estimated enrollment: 25 of which 0 percent are expected to be graduate students.

14. Frequency of scheduling: Annually  
   Will this course be required for majors? Req for minor - No major

15. Justification for new course: Consistency with IU Bloomington's introductory Cognitive Science

16. Are the necessary reading materials currently available in the appropriate library? YES

17. Please append a complete outline of the proposed course, and indicate instructor (if known), textbooks, and other materials.

18. If this course overlaps with existing courses, please explain with which courses it overlaps and whether this overlap is necessary, desirable, or unimportant. Replaces PHIL-P200, PHIL-P383, and PSY-P390 when they are offered as Introduction to Cognitive Science.

19. A copy of every new course proposal must be submitted to departments, schools, or divisions in which there may be overlap of the new course with existing courses or areas of strong concern, with instructions that they send comments directly to the originating Curriculum Committee. Please append a list of departments, schools, or divisions thus consulted.

Submitted by:  

[Signature]  
Department Chairman/Division Director  
Date 09/25/06

[Signature]  
Dean of Graduate School (when required)  
Date

Approved by:  

[Signature]  
Dean  
Date 09/25/06

Chancellor/Vice-President  
Date

University Enrollment Services  
Date

After School/Division approval, forward the last copy (without attachments) to University Enrollment Services for initial processing, and the remaining four copies and attachments to the Campus Chancellor or Vice-President.

UPS 724

University Enrollment Services Final—White; Chancellor/Vice-President—Blue; School/Division—Yellow; Department/Division—Pink; University Enrollment Services Advance—White
TO: Michael Scheessele
FROM: Susan Thomas, Chair of Senate Curriculum Committee, 2006-2007
RE: COGS-Q240, Foundations of Cognitive Science
DATE: September 20, 2006

The Senate Curriculum Committee met on Tuesday, September 19, 2006 to review several course proposals carried forward from the spring. The COGS-Q240 Foundations of Cognitive Science was reviewed by the committee and is being sent back for revisions to the course request form. As a matching course the information from the existing course must match the information on the form. The committee noted discrepancies with the course description, and title. While there is some flexibility with the course description, the titles must be the same (i.e. Philosophical Foundations of the Cognitive and Information Sciences vs. Foundations of Cognitive Science). A copy of information on the existing course should also be included with the requests for a new course to IU South Bend.

The committee also noted a possibility that this is meant to be a different course than the existing Q240 course offered in Bloomington, in which case the suggestion is made to re-submit as a new course and request a new course number.

With the recommended changes to the paperwork, the Committee feels this will be a good addition to the curriculum and would also like to suggest that this course be submitted as one that could be taken to fulfill the general education requirement.

The course requests as well as documentation pulled on the existing course are enclosed.


http://www.cogs.indiana.edu/academic/undercourses.html
Q240 Philosophical Foundations of the Cognitive and Information Sciences (4 cr.) N & M
Foundational introduction to the cognitive and information sciences. The primary themes are: (1) causal issues such as functional and computational architecture (e.g., modularity, effectiveness, and implementation, analog/digital), neuroscience, and embodied dynamics; and (2) semantic issues such as meaning, representation, content, and information flow. The role of both themes in logic, perception, computation, cognition, and consciousness. Throughout, an emphasis on writing, analysis, and exposition.
09/27/05

Dear Curriculum Committee members,

I would like to import IU Bloomington’s introductory cognitive science course, COGS-Q 240 Foundations of Cognitive Science. The other three courses, any of which currently satisfy the introductory cognitive science course requirement for the cognitive science minor, would no longer be needed in this capacity. (These other three courses are PHIL-P 200, PHIL-P 383, and PSY-P 390. They are ‘variable topic’ courses for their respective majors, so they would not go away – they would simply no longer be offered with ‘intro cognitive science’ as the topic.)

The Cognitive Science committee has approved this change and also approves offering this new course each year, alternating between the Philosophy, Psychology, and Computer Science departments in any 3-year cycle. It has been proposed that Computer Science teach it first.

Please let me know if you need any further information in evaluating this proposal.

Sincerely,

[Signature]

Michael R. Scheessele
Assistant Professor – Computer & Information Science
Chair – Cognitive Science committee
Dear Chairs,

The Cognitive Science Committee would like to import IU Bloomington's introductory cognitive science course, COGS-Q 240 Foundations of Cognitive Science. The other three courses, any of which currently satisfy the introductory cognitive science course requirement for the cognitive science minor, would no longer be needed in this capacity. (These other three courses are PHIL-P 200, PHIL-P 383, and PSY-P 390. They are ‘variable topic’ courses for their respective majors, so they would not go away – they would simply no longer be offered with ‘intro cognitive science’ as the topic.)

The Cognitive Science committee has approved this change and also approves offering this new course each year (currently the intro course is offered every two years), alternating between the Philosophy, Psychology, and Computer Science departments in any 3-year cycle (currently the intro course alternates between Philosophy and Psychology only). It has been proposed that Computer Science teach it first, in the '06-'07 academic year.

Please let me know if you need any further information in evaluating this proposal. If you support this proposal, please sign below and then forward to the next person on the list. If you are the last to sign, please return to me. Thank you for your consideration.

Sincerely,

Michael R. Scheessele
Assistant Professor – Computer & Information Science
Cognitive Science committee
(Ann Greens is the new Cognitive Science committee chair. I am just finishing up this piece of business from my term as chair.)

cc: Louise Collins
    Hossein Hakimzadeh
    John McIntosh
    Ann Greens
    Michael Kinyon

I support the above proposal by the CLAS Cognitive Science Committee to make COGS Q-240 the new required introductory course for the Cognitive Science minor. Further, I support the offering of this course each year, where rotation of the courses rotates between Philosophy, Psychology, and Computer Science in any 3-year cycle.

Louise Collins, Chair Philosophy Date: 11/9/2005
Hossein Hakimzadeh, Chair C.S. Date: 11/11/2005
John McIntosh, Chair Psychology Date: 11/14/2005
Sample Syllabus

General Course Description: This course is an introduction to cognitive science, a field of inquiry in which researchers from many disciplines (such as philosophy, psychology, linguistics, computer science, and neuroscience) work together to answer questions about the mind that have puzzled people for centuries. We will examine the basic concerns, methods, and results of contemporary cognitive science, with respect to things such as: (1) memory, perception, mental concepts and categories, reasoning, and problem solving; (2) language acquisition and understanding, and the nature of meaning; (3) neuroscience and what it can teach us about the nature of the mind; and (4) consciousness and the subjectivity of experience.

Required Texts: There are two required texts for this course: (1) How the Mind Works (HMW), by Steven Pinker (Norton, 1997), and (2) Mapping the Mind (MM), by Rita Carter (University of California Press, 1998).

Assignments: Students will have three non-cumulative exams, each worth 30% of the grade, except the lowest scoring exam, which will be worth 20%, and a term project, which will be worth 20%. The term project will be a research paper or some other project of similar depth.

Reading Schedule

Introduction

August 26 – Introduction: What is cognitive science?

August 28 – The Emerging Landscape (MM, Chapter 1; handout)

September 2 – Labor Day (no class)

Computation and Consciousness

September 4 – Thinking Machines, part 1 (HMW, Chapter 2, pages 59-88)

September 9 – Thinking Machines, part 2 (HMW, Chapter 2, pages 89-118)

September 11 – Thinking Machines, part 3 (HMW, Chapter 2, pages 118-148)

September 16 – The Great Divide (MM, Chapter 2)

September 18 – Higher Ground (MM, Chapter 8)

Evolution of the Mind/Brain

September 23 – Revenge of the Nerds, part 1 (HMW, Chapter 3, pages 149-179)

September 25 – Revenge of the Nerds, part 2 (HMW, Chapter 3, pages 179-210)
September 30 – **Exam 1**

**Vision**

October 2 – *A World of One’s Own* (MM, Chapter 5)

October 7 – *The Mind’s Eye* (HMW, Chapter 4, pages 211-241)

October 9 – *The Mind’s Eye* (HMW, Chapter 4, pages 241-267)

October 14 – *The Mind’s Eye* (HMW, Chapter 4, pages 268-298)

**Concepts, Language, Reasoning, and Memory**

October 16 – *Crossing the Chasm* (MM, Chapter 6)

October 21 – *States of Mind* (MM, Chapter 7)

October 23 – *Good Ideas* (HMW, Chapter 5, pages 299-329)

October 28 – *Good Ideas* (HMW, Chapter 5, pages 329-362)

October 30 – **Exam 2**

**Emotions and Drives**

November 4 – *A Changeable Climate* (MM, Chapter 4)

November 6 – *Hotheads, part 1* (HMW, Chapter 6, pages 363-393)

November 11 – *Hotheads, part 2* (HMW, Chapter 6, pages 393-424)

November 13 – *Beneath the Surface* (MM, Chapter 3)

**Social Relationships**

November 18 – *Family Values* (HMW, Chapter 7, pages 425-455)

November 20 – *Family Values* (HMW, Chapter 7, pages 455-487)

November 25 – *Family Values* (HMW, Chapter 7, pages 486-520)
Creativity, Meaning, and Humor

November 27 – The Meaning of Life (HMW, Chapter 8, pages 521-543)

December 2 – The Meaning of Life (HMW, Chapter 8, pages 544-565)

December 4 – Conclusion

Exam 3: Monday, December 9, 11:30-1:30
Cognitive Science

Faculty

Introduction

Major in Cognitive Science—B.A.
Major in Cognitive Science—B.S.
Minor in Cognitive Science
Departmental Honors Program
Course Descriptions
Courses Related to Cognitive Science

Faculty

Director of Cognitive Science and Chancellor's Professor of Psychological and Brain Sciences

Robert Goldstone

Arthur F. Bentley Professor of Political Science

Elinor Ostrom

Barbara Jacobs Chair in Education

Donald J. Cunningham, Thomas M. Duffy

Chancellor's Professor of Economics and Henry H.H. Remak Professor of West European Studies

Roy Gardner

Chancellor's Professor of Linguistics

Daniel Dinnsen

Chancellor's Professor and Chair of Psychological and Brain Sciences

Linda B. Smith

Chancellor's Professor of Psychology

James C. Craig, David B. Pisoni, Steven Sherman
College Professor of Cognitive Science and Computer Science
Douglas Holstader

Distinguished Scholar of Psychology
William Estes

John F. Mee Chair of Management
Philip Podsakoff

Linda and Jack Gill Chair of Neuroscience
J. Michael Walker

Luther Dana Waterman Professor of Psychology
Richard M. Shiffrin

Martha Lea and Bill Armstrong Chair in Teacher Education
Frank K. Lester

Oscar R. Ewing Professor of Philosophy
J. Michael Dunn

Rudy Professor of Economics
George von Furstenberg

Rudy Professor of Psychology and Sociology
Stanley Wasserman

Rudy Professor of Psychology
James T. Townsend

Victor H. Yngve Associate Professor of Information Science
Javed Mostafa

Professors

Colin Allen (History and Philosophy of Science), Geoffrey P. Bingham (Psychological and Brain Sciences), Curtis Bonk (School of Education), Arthur Bradley (School of Optometry), Jerome Busemeyer (Psychological and Brain Sciences), Phil Connell (Speech and Hearing Sciences), James C. Craig (Psychological and Brain Sciences), Donald Cunningham (School of Education, School of Informatics, Semiotic Studies), Stuart Davis (Linguistics), Daniel Dinnsen (Linguistics), Thomas Duffy (School of Education), J. Michael Dunn...
(School of Informatics, Philosophy, Computer Science), William Estes (Psychological and Brain Sciences), Steven Franks (Slavic Languages and Literatures, Linguistics), Roy Gardner (Economics), Preston Garraghty (Psychological and Brain Sciences), Judith Gierut (Speech and Hearing Sciences), Robert Goldstone (Psychological and Brain Sciences), Andrew Hanson (Computer Science), Jeffrey Hart (Political Science), Beverly Hartford (Linguistics), Julia Heiman (Psychological and Brain Sciences), Douglas Hofstadter (Computer Science), Diane Kewley-Port (Speech and Hearing Sciences), Marianne Kielian-Gilbert (Jacobs School of Music), Eugene Kintgen (English), John Kruuschke (Psychological and Brain Sciences), Annie Lang (Telecommunications), David Leake (Computer Science), Frank Lester Jr. (School of Education), David MacKay (Kelley School of Business, Geography), Daniel Maki (Mathematics), Eugene McGregor (School of Public and Environmental Affairs), Michael McRobbie (Computer Science, Philosophy, School of Informatics), Lawrence Moss (Mathematics), Robert Nosofsky (Psychological and Brain Sciences), Timothy O'Connor (Philosophy), Elinor Ostrom (Political Science, School of Public and Environmental Affairs), Christopher Peebles (Anthropology), David Pisoni (Psychological and Brain Sciences), Philip Podsakoff (Kelley School of Business), Robert Port (Computer Science, Linguistics), Paul Purdon (Computer Science), Charles Reigeluth (School of Education), Yvonne Rogers (School of Informatics), Thomas Schwen (School of Education), Steven Sherman (Psychological and Brain Sciences), Richard M. Shiffrin (Psychological and Brain Sciences), Marty Siegel (School of Education, School of Informatics), Elliot R. Smith (Psychological and Brain Sciences), Linda B. Smith (Psychological and Brain Sciences), Larry Thibos (School of Optometry), Maynard Thompson (Mathematics), William Timberlake (Psychological and Brain Sciences), Peter Todd (School of Informatics), James T. Townsend (Psychological and Brain Sciences), Dirk VanGucht (Computer Science), Alessandro Vesprignani (School of Informatics, Physics), George von Furstenberg (Economics), J. Michael Walker (Psychological and Brain Sciences), Stanley Wasserman (Psychological and Brain Sciences, Sociology), Arlington Williams (Economics), Wayne Winston (Kelley School of Business), Larry Yaeger (School of Informatics)

Professors Emeriti

Ivor Davies (School of Education), S. Lee Guth (Psychological and Brain Sciences), Alfred Strickholm (School of Medicine), Charles S. Watson (Speech and Hearing Sciences)

Associate Professors

Joyce Alexander (School of Education), Thomas Busey (Psychological and Brain Sciences), Joseph Clements (Linguistics, Spanish and Portuguese), Kenneth de Jong (Linguistics), Theodore Frick (School of Education), Michael Gasser (Computer Science), Lisa Gershkoff-Stowe (Speech and Hearing Sciences), Ed Hirt (Psychological and Brain Sciences), Eric Isaacson (Jacobs School of Music), Yoshihisa Kitagawa (Linguistics), Emilia Martins (Biological), Filippo Menczer (School of Informatics, Computer Science), Jonathan Mills (Computer Science), Javed Mostafa (School of Informatics), Laura Murray (Speech and Hearing Sciences), John Paolillo (School of Informatics), Jonathan Plucker (School of Education), Christopher Raphael (School of Informatics), Gregory J. E. Rawlins (Computer Science), Luis Rocha (School of Informatics), Dennis Serafin (Philosophy), Bruce Solomon (Mathematics), Ola Sporns (Psychological and Brain Sciences), Julie Stout (Psychological and Brain Sciences), Frederick Unverzagt (School of Medicine)

Assistant Professors

Sasha Barah (School of Education), Eli Blevis (School of Informatics), Katy
Associate Scientist

Gary Kidd (Speech and Hearing Sciences)

Director of Technology

Ruth Eberle

Academic Advising

Jody K. Ferguson, Eigenmann Hall 817, (812) 855-4858, ferguson@indiana.edu

Return to Top

Introduction

The Department of Cognitive Science (COGS) explores the nature of intelligent systems. At its core, the program focuses on formal theories of mind and information. The field is inherently interdisciplinary, with contributions from computer science, psychology, philosophy, neuroscience, linguistics, biology, anthropology, and other fields. Both natural intelligence in humans and artificial intelligence fall within the scope of inquiry. The field deals with aspects of complex cognition, computational models of thought processing, knowledge representation, dynamics of real-world engagement, and emergent behavior of large-scale interacting systems.

Goals of the Cognitive Science Program include a better understanding of mind, learning and teaching, cognitive skills, and the development of intelligent systems designed to augment human capacities in constructive ways.

The Cognitive Science Program is structured to give students fundamental skills, applicable in a wide variety of information-related careers: psychology, neuroscience, artificial intelligence, telecommunications, information processing, medical analysis, data representation and information retrieval, education, scientific research, human-computer interaction, multimedia, knowledge management, and information policy. The skills also have wide applicability in technical and expository writing, mathematical analysis, experimental techniques, and computer programming.

Students interested in a cognitive science degree are encouraged to take advantage of services and opportunities that complement their academic study: advising, colloquium series, internships, research, the Student Organization for Cognitive Science (SOCS), and a free technical report series.

Return to Top
Major in Cognitive Science-B.A.

The underlying aim of the program is twofold: (1) to give students a solid grounding in the formal and conceptual tools needed to understand and conduct research in cognitive science; and (2) to foster depth in a particular area. Students must satisfy four requirements. First, they must demonstrate mastery of fundamental skills by completing a set of four coordinated cognitive science core courses. Second, they must concentrate in a particular aspect of cognitive science by completing a sequence of three courses within a particular area of study. Third, they must demonstrate a breadth of knowledge across other contributing areas of cognitive science. Finally, they must complete a senior seminar course that will serve as a capstone for the degree program.

Requirements

In addition to the degree requirements for the B.A. degree in the College of Arts and Sciences, including the requirement for a minimum of 25 College of Arts and Sciences credit hours in the major subject area, students must complete the following:

1. **CORE**: The four-course sequence: Q240, Q250, Q270, and Q320. (NOTE: Credit will not be given for both COGS Q260 and Q320.) For COGS Q320, students may substitute either COGS Q351 and CSCI C212 or CSCI B351 and CSCI C212. Students choosing to use CSCI substitutes must plan enough COGS courses to meet the minimum hours required for a COGS major. See advisor for details.

2. **CONCENTRATION**: Three courses in one of the following areas: cognition, computation, foundations, informatics, language, logic, and neuroscience. Of these three courses, at least two must be at or above the 200 level, and at least one at or above the 300 level. The following courses are preapproved for the seven concentrations:

   - **Cognition** Psychological and Brain Sciences P325, P329, P330, P335, P350, P424, P435, P436, P443; Speech and Hearing Sciences S302, S378.
   - **Computation** Computer Science C211, C212, C241, C311, C335, C341, C343, B351/Q351 (or their honors equivalents).
   - **Foundations** Philosophy P310, P312, P320, P360, P366.
   - **Informatics** Informatics I200, I210 (or Computer Science A201), I211 (or Computer Science A202), I300, I320; Computer Science A346.
   - **Logic** Philosophy P250, P251, P350, P352.
   - **Neuroscience** Cognitive Science Q301; Psychological and Brain Sciences P326, P407, P410, P411, P423, P426.

   In addition to these preapproved concentrations, other specialized concentrations may be designed by individual students and submitted for approval to the cognitive science undergraduate curriculum committee.

3. **BREADTH**: Three ADDITIONAL courses from at least two different departments, outside of the concentration area. Courses from those departments included on the list at the end of this section are preapproved. The cognitive science undergraduate curriculum committee must approve courses not on the list on an individual basis.

4. **SENIOR SEMINAR**: Students must complete COGS Q400 Senior Seminar in the Cognitive and Information Sciences.
Major in Cognitive Science-B.S.

Requirements

Students must complete the following fundamental skills and distribution requirements:

1. Writing, same as B.A. degree.
2. Mathematics: three courses, with at least one course at the 300 level or above, from the following: MATH M118, M119, M120, any 200 level or higher (includes PSY K300 and equivalent statistics courses).
3. Foreign Language: three semesters in the same language, or equivalent proficiency.
4. Arts and Humanities: two courses (includes COLL E103 or Honors equivalent).
5. Social and Historical Studies: two courses (includes COLL E104 or Honors equivalent).
6. Natural and Mathematical Sciences: two courses (includes COLL E105 or Honors equivalent).

Major Requirements

1. **CORE:** The four-course sequence: Q240, Q250, Q270, Q320. (Note: Credit will not be given for both COGS Q250 and Q320.) For COGS Q320, students may substitute either COGS Q351 and CSCI C212 or CSCI B351 and CSCI C212. Students choosing to use CSCI substitutes must plan enough COGS courses to meet the minimum hours required for a COGS major. See advisor for details.

2. **CONCENTRATION:** Three courses in one of the following areas: cognition, computation, informatics, language, logic, and neuroscience. Of these courses, at least two must be at or above the 200 level, and at least one at or above the 300 level.
   - The following courses are preapproved for the six concentrations:
     - **Cognition** Psychological and Brain Sciences P325, P329, P330, P335, P350, P424, P435, P438, P443, Speech and Hearing Sciences S302, S378.
     - **Computation** Computer Science C211, C212, C241, C311, C335, C341, C343, B351/Q351 (or their Honors equivalents).
     - **Informatics** Informatics I200, I210 (or Computer Science A201), I211 (or Computer Science A202), I300, I320; Computer Science A346.
     - **Logic** Philosophy P250, P251, P350, P352.
     - **Neuroscience** Cognitive Science Q301; Psychological and Brain Sciences P325, P407, P410, P411, P423, P426.
   - In addition to these preapproved concentrations, other specialized concentrations may be designed by individual students and submitted for approval to the cognitive science undergraduate curriculum committee.

3. **COGS:** Q301 Brain and Cognition.

4. **COMPUTATION:** Two courses from approved list of courses at the 200-level and above from the Department of Computer Science.

5. **BREADTH:** Three ADDITIONAL courses from at least two different departments outside of the concentration area. Courses from those departments included on the list at the end of this section are preapproved. The cognitive science undergraduate curriculum committee must approve courses not on the list on an individual basis.

6. **SENIOR SEMINAR:** Students must complete Q400 Senior Seminar in the
Minor in Cognitive Science

The minor in cognitive science consists of 19 credit hours, including:

1. **CORE**: The four-course sequence: Q240, Q250, Q270, and Q320.
2. **ELECTIVE**: At least one additional course related to cognitive science, at the 300 level or above, of a minimum of 3 credit hours, from outside the student's major department or program, to be approved by the Cognitive Science Program undergraduate advisor. Note: It is recommended, but not required, that this fifth course be COGS Q301 Brain and Cognition (3 cr.).

Departmental Honors Program

Students who, in addition to fulfilling the requirements for the major in cognitive science, also carry out an independent project and an honors thesis may be eligible for honors in cognitive science. Application for admission to the cognitive science honors program may be made during the sophomore or junior year to the director of undergraduate studies in cognitive science. Students must have a minimum cumulative grade point average of 3.3 to be eligible for consideration and must maintain this minimum average to graduate with honors. Students must take Q499. The honors thesis must be certified by a committee of at least three faculty members. The committee director and at least one other member must be Cognitive Science Program faculty. Students who wish to combine honors projects in cognitive science and another department or program may apply to both areas, and every attempt will be made to accommodate such a plan.

Course Descriptions

**Q240 Philosophical Foundations of the Cognitive and Information Sciences (4 cr.) N & M** A foundational introduction to the cognitive and information sciences. The primary themes are: (1) causal issues such as functional and computational architecture (e.g., modularity, effectiveness, and implementation, analog/digital), neuroscience, and embodied dynamics; and (2) semantic issues such as meaning, representation, content, and information flow. The role of both themes in logic, perception, computation, cognition, and consciousness. Throughout, an emphasis on writing, analysis, and exposition.

**Q250 Mathematics and Logic for the Cognitive and Information Sciences (4 cr.) N & M P**: Mastery of two years of high school algebra or the equivalent. An introduction to the suite of mathematical and logical tools used in the cognitive and information sciences, including finite mathematics, automata and computability theory, elementary probability, and statistics, together with short introductions to formal semantics and dynamical systems. Credit will not be given for both COGS Q250 and INFO I201.

**Q270 Experiments and Models in Cognition (4 cr.) N & M P**: Mastery of two
years of high school algebra or the equivalent. R: PSY K300 or equivalent familiarity with statistics. This course develops tools for studying mind and intelligence, including experimental techniques, and mathematical and computational models of human behavior. Topics include neural structures for cognition, attention, perception, memory, problem solving, judgment, decision making, and consciousness. Students will design and analyze laboratory experiments and apply formal models to the results.

Q301 Brain and Cognition (3 cr.) N & M R: PSY P101. An introduction to the neural mechanisms underlying complex cognition, and a survey of topics in neuroscience related to cognition. The course provides a solid background in human biopsychology. If Q301 is not offered in a given year, PSY P423 Human Neuropsychology may be substituted for this course.

Q320 Computation in the Cognitive and Information Sciences (4 cr.) N & M P: One semester of computer programming or equivalent experience, and mastery of two years of high school algebra or the equivalent. R: CSCI A201 or C212. Students will develop their computer programming skills and learn to write programs that simulate cognitive processes and run experiments with human subjects. The nature of computation, the relation between computation and intelligence, and a selection of approaches from artificial intelligence will be explored. Credit not given for both Q260 and Q320.

Q351 Introduction to Artificial Intelligence and Computer Simulation (3 cr.) N & M P: CSCI C211 or consent of instructor. A survey of techniques for machine intelligence and their relation to human intelligence. Topics include modeling techniques, neural networks and parallel processing systems, problem-solving methods, knowledge representation, expert systems, vision, heuristics, production systems, speech perception and natural language understanding. Students who have completed both C463 and C464 are exempted from taking this course. Credit not given for both COGS Q351 and CSCI B351.

Q400 Senior Seminar in Cognitive and Information Sciences (2 cr.) P: Four classes from Q240, Q250, Q260, Q270, and Q301. This course is intended for students who have completed or nearly completed their cognitive science course work. Students will apply previously acquired analytic, computational, mathematical, and experimental skills to independent research projects. Discussion and research topics may include consciousness, representation, artificial life, modularity, neural networks, functionalism and embodiment, dynamical systems, learning and innateness, human-computer interaction, cognitive neuroscience, robotics, and adaptive systems.

Q450 Topics in the Cognitive and Information Sciences (3 cr.) In-depth special topics not ordinarily covered in other departmental courses. Topics vary with instructor and semester. May be repeated once with a different topic for a maximum of 6 credit hours.

Q493 Research in the Cognitive and Information Sciences (1-3 cr.) P: Consent of instructor. Active participation in research under faculty supervision. May be repeated for a maximum of 6 credit hours.

Q495 Project in the Cognitive and Information Sciences (1-3 cr.) P: Consent of instructor. Students will conduct a research project in the cognitive and information sciences by designing, conducting, and analyzing an independent experiment; by developing and testing a computer simulation of some aspect of cognition; or by otherwise engaging in a program of original research. Projects must be approved in advance and supervised by the instructor. May be repeated (for the same or a different project) for a maximum of 6 credit hours.

Q496 Internship in Professional Practice (1-6 cr.) P: Sophomore standing or
15 credit hours completed in cognitive science major or minor, and approval by the Cognitive Science Program. Professional work experience in an industry or research organization setting, using skills/knowledge acquired in cognitive science course work. Requires learning contract. Evaluation by site supervisor and Cognitive Science Program. Does not count toward major or minor requirements; elective credit only. May be repeated for a total of 6 credit hours. S/F grading.

Q498 Readings in the Cognitive and Information Sciences (1-3 cr.) P:
Consent of instructor. Tutorial study in specialized topics of the cognitive and information sciences. May be repeated for a maximum of 6 credit hours.

Q499 Honors Research Project in the Cognitive and Information Sciences (3 cr.) P: An Honors Committee approved by the Cognitive Science Program. Methods of research in cognitive science are analyzed. Students present their projects for discussion and analysis. May be repeated for a maximum of 12 credit hours.

Courses Related to Cognitive Science

The following courses in other departments are considered to lie within the scope of cognitive science. Those marked with an asterisk (*) are preapproved to meet concentration requirements. Note that courses taken in the School of Informatics will be outside hours for College of Arts and Sciences students. See advisor for additional breadth course options.

Computer Science

*A201 Introduction to Programming I (4 cr.) N & M
*A202 Introduction to Programming II (4 cr.) N & M
A247 Network Technologies and Administration (4 cr.)
A304 Introductory C++ Programming (2 cr.)
A306 Object-Oriented Programming in C++ (2 cr.)
*A346 User-Interface Programming (3 cr.)
*C211 Introduction to Computer Science (4 cr.) N & M
*H211 Introduction to Computer Science, Honors (4 cr.) N & M
*C212 Introduction to Software Systems (4 cr.) N & M
*H212 Introduction to Software Systems, Honors (4 cr.) N & M
*C241 Discrete Structures for Computer Science (3 cr.) N & M
*H241 Discrete Structures for Computer Science, Honors (3 cr.) N & M
*C311 Programming Languages (4 cr.) N & M
*H311 Programming Languages, Honors (4 cr.) N & M
*C335 Computer Structures (4 cr.) N & M
*H335 Computer Structures, Honors (4 cr.) N & M
B401 Fundamentals of Computing Theory (3 cr.) N & M
*C343 Data Structures (4 cr.) N & M
*H343 Data Structures, Honors (4 cr.) N & M
*B351 Introduction to Artificial Intelligence and Computer Simulation (3 cr.) N & M (cross-listed as COGS Q351)

School of Informatics

I101 Introduction to Informatics (3 cr.)
*I200 Information Representation (3 cr.)
*I210 Information Infrastructure I (4 cr.)
*I211 Information Infrastructure II (4 cr.)
*I300 Human Computer Interaction (3 cr.)
*I320 Distributed Systems and Collaborative Computing (3 cr.)
Linguistics

L103 Introduction to the Study of Language (3 cr.) S & H
L210 Topics in Language and Society (3 cr.) S & H
*L303 Introduction to Linguistic Analysis (3 cr.) N & M
*L306 Phonetics (3 cr.) N & M
*L307 Phonology (3 cr.) N & M
*L308 Morphology (3 cr.) N & M
*L310 Syntax (3 cr.) N & M
*L325 Semantics (3 cr.) N & M
*L430 Language Change and Variation (3 cr.) S & H
L431 Field Methods (3 cr.)
L432 Advanced Field Methods (3 cr.)
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