PROGRAM IN SYMBOLIC SYSTEMS

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Both human beings and computers can manipulate symbols. This observation lies at the heart of Symbolic Systems, an interdisciplinary program focusing on the relationship between natural and artificial systems that represent, process and act on information. Computer programs, natural languages, the human mind, and the Internet are all examples of symbolic systems. As such, they all embody concepts whose study forms the core of the Symbolic Systems curriculum: concepts such as computation, representation, communication, and intelligence. A body of knowledge and theory has developed around these notions, from disciplines like philosophy, computer science, linguistics, psychology, statistics, neurobiology, and communication. Since the invention of computers, researchers have been working across these and other disciplines to study questions such as: In what ways are computers and computer languages like humans and their languages? How can the interaction between people and computers be made easier and more beneficial? Can we build computers and robots that think and feel?

The Symbolic Systems Program (SSP) offers an opportunity to explore these issues. The core requirements include courses in symbolic logic, the philosophy of mind, formal linguistics, cognitive psychology, programming, the mathematics of computation, statistical theory, artificial intelligence, and interdisciplinary approaches to cognitive science. The core courses are designed to prepare students with the vocabulary, theoretical background, and technical skills needed for more concentrated study and research at the advanced undergraduate and graduate levels. Most of the courses in SSP are drawn from affiliated departments. Courses designed specifically for the program are aimed at integrating and supplementing topics covered by the department-based offerings. The curriculum includes humanistic approaches to questions about language and intelligence, as well as training in science and engineering.

SSP offers both B.S. and M.S. degree programs. Both programs require students to master a common core of required courses, and to choose an area of specialization.

UNDERGRADUATE PROGRAMS

BACHELOR OF SCIENCE

The program leading to a B.S. in Symbolic Systems provides students with a core of concepts and techniques, drawing on faculty and courses from various departments. The curriculum prepares students for advanced training in the interdisciplinary study of language and information, or for postgraduate study in any of the main contributing disciplines. It is also excellent preparation for employment immediately after graduation.

Symbolic Systems majors must complete a core of required courses plus a concentration consisting of six additional courses. All major courses are to be taken for letter grades unless an approved course is offered satisfactory/no credit only. All core courses must be passed with a grade of 'C-' or better. Students who receive a grade lower than this in a core course must alert the program of this fact, so that a decision can be made about whether the student should continue in the major.

CORE REQUIREMENTS

In order to graduate with a B.S. in Symbolic Systems, a student must complete the following requirements requirements. (Please note that several of these courses have other courses as prerequisites.)

1. *Cognitive Science:* either Symbolic Systems 100, Introduction to Cognitive Science, *or* one of the following.
   - Computer Science 378. Phenomenological Foundations of Cognition, Language and Computation
   - Linguistics 237/Computer Science 224N. Natural Language Processing
   - Philosophy 189. Philosophical Applications of Cognitive Science
   - Psychology 131. Language and Thought
2. *Computer Programming:*
   a) Computer Science 106B, Programming Abstractions, *or* 106X, Programming Methodology and Abstractions (Accelerated); *and*
   b) Computer Science 107, Programming Paradigms
3. *Discrete Structures:* Computer Science 103B, Discrete Structures, *or* 103X, Discrete Structures (Accelerated)
4. *Logic.* Philosophy 160A, First-Order Logic
5. *Statistics/Probability:* one of the following:
   - Electrical Engineering 178. Introduction to Probability and Statistics
   - Management Science and Engineering 120. Probabilistic Analysis
   - Statistics 60/Psychology 10. Introduction to Statistical Methods (Precalculus)
   - Statistics 90. Introduction to Statistical Methods (Postcalculus) for Social Scientists
   - Statistics 116. Theory of Probability
6. *Philosophical Foundations:* Philosophy 80, Mind, Matter, and Meaning

7. *Cognitive Psychology:* Psychology 40, Introduction to Cognitive Psychology
8. *Formal Linguistics:*
   a) Linguistics 120, Introduction to Syntax; *and*
   b) Linguistics 130A, Introduction to Linguistic Meaning; *or* one Linguistics course from the following:
      130B. Introduction to Lexical Semantics
      230A. Introduction to Semantics and Pragmatics
9. *Artificial Intelligence:* Computer Science 121, Introduction to Artificial Intelligence, *or* 221, Artificial Intelligence: Principles and Techniques
10. *Turing Computability:**† one of the following.
    Computer Science 103B. Discrete Structures
    Computer Science 154. Introduction to Automata and Complexity Theory
    Philosophy 160B. Computability and Logic
    Symbolic Systems 100. Introduction to Cognitive Science
11. *Advanced Small Seminar:** an upper-division, limited-enrollment seminar drawing on material from other courses in the core. Courses listed under Symbolic Systems Program offerings with numbers between SSP 201 and 209 are acceptable, as are other courses which will be announced at the beginning of each academic year.

* A course taken to fulfill one of these requirements can also be counted toward another requirement, as part of either the core or a student's concentration (see below).

† Computer Science 103X does *not* fulfill this requirement.

CONCENTRATION AREAS

In addition to the core requirements listed above, the Symbolic Systems major requires each student to complete a concentration consisting of six courses that are thematically related to each other. Students select concentrations from the list below or design others in consultation with their advisers.

Applied Logic
Artificial Intelligence
Cognition
Computer Music
Decision Making
Learning
Human-Computer Interaction
Natural Language
Neural Systems
Philosophical Foundations

MINORS

Students may minor in Symbolic Systems by completing either item 1 or item 2 below.

1. One course in each of the following core areas (please note that several of these courses have prerequisites):
   a) *Cognition:* Symbolic Systems 100* or Psychology 40
   b) *Logic and Computation:* Philosophy 159 or 160A, or Computer Science 103B, 103X, or 154
   c) *Computer Programming:* Computer Science 106B, 106X, or 107
   d) *Philosophical Foundations:* Symbolic Systems 100* or Philosophy 80
   e) *Formal Linguistics:* Linguistics 120, 130A, or 130B
   f) *Artificial Intelligence:* Computer Science 121 or 221
2. Symbolic Systems 100, plus an interdisciplinary SSP concentration listed in the program booklet available from the program office, or on the SSP web page at http://www.stanford.edu/dept/symbol/. To qualify, the selection of courses used for the minor must be interdisciplinary; i.e., it must either include courses from at least three departments, or include more than one course from each of two departments.

*SSP 100 may not be counted for both areas a and d.

UNDERGRADUATE RESEARCH

The program strongly encourages all SSP majors to gain experience in directed research by participating in faculty research projects or by pursuing independent study. In addition to the Symbolic Systems Honors Program (see below) the following avenues are offered.

1. *Summer Internships:* students work on SSP-related faculty research projects. Application procedures are announced in the winter quarter for SSP majors.
2. *Research Assistantships:* other opportunities to work on faculty research projects are typically announced to SSP majors as they arise during the academic year.
3. *Independent Study:* under faculty supervision, students work on independent projects. For course credit they may enroll in Symbolic Systems 196.

Contact SSP for more information on any of these possibilities, or visit the program's web site at http://www.stanford.edu/dept/symbol. In addition, the Undergraduate Research Opportunities office on campus offers numerous grants and scholarships supporting student research projects at all levels; see http://uro.stanford.edu.

HONORS PROGRAM

Seniors in SSP who are in good academic standing can graduate with Honors by completing an honors thesis under the supervision of a faculty member. Course credit for the honors project may be obtained by registering for Symbolic Systems 190 (Honors Tutorial) for any quarters while a student is working on an honors project. Juniors who are interested in doing an honors project during their senior year are strongly advised to take Symbolic Systems 91 (Junior Honors Seminar). Symbolic Systems 191 (Senior Honors Seminar) is recommended for honors students during the senior year. Contact SSP or visit the program's web site for more information on the honors program, including deadlines and policies.

COTERMINAL MASTER'S DEGREES

Many SSP majors also complete coterminal M.S. or M.A. degrees in affiliated departments. In addition to the Symbolic Systems M.S. program (see below), the Department of Philosophy offers a special Symbolic Systems track for interdisciplinary graduate level work.

GRADUATE PROGRAMS

The university's basic requirements for the M.S. and Ph.D. degrees are discussed in the "Graduate Degrees" section of this bulletin.

MASTER OF SCIENCE

The M.S. degree in Symbolic Systems is designed to be completed in the equivalent of one academic year by coterminal students or returning students who already have a B.S. degree in Symbolic Systems. Admission to the program is currently limited to Stanford undergraduates or those who have completed the B.S. in Symbolic Systems at Stanford. Admission is competitive, providing a limited number of students with the opportunity to pursue course and project work, in consultation with a faculty adviser who is affiliated with the Symbolic Systems Program. The faculty adviser may impose requirements beyond those described here.

Admission to the program as a coterminal student is subject to the policies and deadlines described in the "Undergraduate Degrees" section of this bulletin (see "Coterminal Bachelor's and Master's Degrees"). Applicants to the M.S. program are reviewed each quarter during the academic year. Information on exact deadlines and required procedures for applying are available from the Symbolic Systems Program's Student Services Coordinator in the Linguistics Department office (460-127E).

REQUIREMENTS

A candidate for the M.S. degree in Symbolic Systems must complete a program of 45 units. At least 36 of these must be graded units, passed with an average grade of 3.0 (B) or better. The 45 units may include no more than 21 units of courses from those listed below under Requirements A and B. Furthermore, none of the 45 units to be counted toward the M.S. degree may include units counted toward an undergraduate degree at Stanford or elsewhere. Course requirements are waived only if evidence is provided that similar or more advanced courses have been taken, either at Stanford or another institution. Courses that are waived rather than taken may not be counted toward the M.S. degree.

Each candidate for the M.S. degree must fulfill the following requirements:

REQUIREMENT A

Demonstrated competence in the core requirements for the B.S. degree in Symbolic Systems. Candidates who have gone through the Symbolic Systems undergraduate program will satisfy this requirement in the course of the B.S. degree in Symbolic Systems. Undergraduates in other majors at Stanford who are admitted as candidates for a coterminal Symbolic Systems M.S. degree must complete all of the Symbolic Systems undergraduate core requirements, with the exception of the advanced small seminar requirement.

REQUIREMENT B

1. Completion of two additional skill requirements:
   a) *Computer Programming:* Computer Science 108, Object-Oriented Systems Design; *and*
   b) *Empirical Methods:* one of the following:
      Communication 206. Communication Research Methods
      Linguistics 237/Computer Science 224N. Natural Language Processing
      Psychology 110. Research Methods and Experimental Design
      Psychology 252. Statistical Methods for Behavioral and Social Science (for 3 or more units)
      Psychology 253. Statistical Theory, Models, and Methodology (for 3 units)
      Statistics 161. Introduction to Statistical Methods II
      Statistics 200. Introduction to Statistical Inference
      Statistics 201. Statistical Methods
      a Statistics course numbered higher than 201
2. Completion of three quarters of the Symbolic Systems Program M.S. Seminar (SSP 291).

REQUIREMENT C

Completion of an approved specialization track. All tracks of the Symbolic Systems M.S. program require students to do a substantial project. The course requirements for each track are designed to prepare a student to undertake such a project. The nature of the project depends on the student's focus, but may include software development, user testing, or a combination of these. In all cases, a written thesis or paper describing the project is required. The project normally takes three quarters, and work on the project may account for up to 15 units of a student's program. Each track of the SSP M.S. program has its own core requirements, as well as unit requirements from a set of elective courses. The tracks, and their requirements, are given below.

The Human-Computer Interaction (HCI) Track—

The HCI Core:
Comp. Sci. 161. Design and Analysis of Algorithms;
Comp. Sci. 147. Introduction to HCI Design; *and*
Comp. Sci. 247A. HCI: Interaction Design Studio

For HCI electives, at least 12 additional units of HCI courses, chosen in consultation with the student's adviser. The following are examples of themes around which an elective program might be built: Animation, Business Systems, Computer-Aided Design, Computer Graphics, Data Interfaces, Decision Systems, Design for Disabilities, Design Principles, Dialog Systems, Digital Art, Digital Media, Education Technology, Game Design, History of Computers, Information Retrieval, Intelligent Interfaces, Interaction Design, Internet Design, Medical Informatics, Multimedia Design, Object-Oriented Design, Philosophy of Computation, Social Aspects of Computing, Usability Analysis, Virtual Reality, and Workplace Computing.

The Natural Language Technology (NLT) Track—For the NLT core, in addition to the courses below, students in the NLT track must complete Linguistics 237/Computer Science 224N, Natural Language Processing, which can be used as the empirical methods course for Requirement B above.

1) An in-depth theory of English grammar course, e.g. Linguistics 221A, Foundations of English Grammar
2) A graduate-level semantics course (if not already taken as part of Requirement A), e.g. Linguistics 232A, Lexical Semantics, or 230B, Semantics and Pragmatics
3) A two-course sequence in Computational Linguistics:
   Linguistics 238. Introduction to Computational Linguistics, *and*
   Linguistics 239A. Parsing and Generation

The NLT Electives (at least 8 units from the following list):

Comp. Sci. 145. Introduction to Databases
Comp. Sci. 147. Introduction to HCI Design
Comp. Sci. 161. Design and Analysis of Algorithms
Comp. Sci. 221. Artificial Intelligence: Principles and Techniques
Comp. Sci. 222. Knowledge Representation
Comp. Sci. 224M. Multi-Agent Systems
Comp. Sci. 228. Probabilistic Models in Artificial Intelligence
Comp. Sci. 229. Statistical Learning
Comp. Sci. 329. Topics in Artificial Intelligence
Ling. 205. Phonetics
Ling. 221B. Studies in Universal Grammar
Ling. 222A. Lexical Foundations of Syntax
Ling. 224A. Introduction to Formal Universal Grammar
Ling. 227A. Optimality Theory Syntax
Ling. 230B. Semantics and Pragmatics
Ling. 233X. Semantics Seminar
Ling. 234. Introduction to Discourse Analysis
Ling. 235. Mathematical Linguistics
Ling. 237D. NLP Reading Seminar
Ling. 239B. Computational Semantics
Ling. 239MT. Machine Translation
Psych. 132. Language Processing
Psych. 205. Foundations of Cognition
Psych. 214. Psycholinguistics
Psych. 244. Learning and Inference in Humans and Machines
SSP 115. Spoken Language Understanding Systems

The Individually Designed Option—Students wishing to design their own M.S. curriculum in Symbolic Systems must present a project plan as part of their application. This plan must be endorsed by the student's adviser prior to admission to the Symbolic Systems M.S. program. The application must also specify at least 20 units of coursework that the student will take in support of the project.

Students are admitted under this option only if they present well-developed plans whose interdisciplinary character makes them inappropriate for any departmental master's program, but appropriate for Symbolic Systems.

COURSES

18Q. Stanford Introductory Seminar: Language and the Development of Mind—(Enroll in Psychology 18Q.)
3 units, Aut (A. Fernald)

20. Probabilistic Analysis—(Enroll in Management Science and Engineering 120.)
5 units, Aut (Shachter)

30. Introduction to Perception—(Enroll in Psychology 30.)
3 units, Aut (Heeger)

40. Introduction to Cognitive Psychology—(Enroll in Psychology 40.)
4 units, Win (Tversky)

50. Introduction to Human Neuropsychology—(Enroll in Psychology 50.)
4 units, Win (Gabrieli)

60. Introduction to Statistical Methods: Precalculus—(Enroll in Statistics 60 or Psychology 10.)
5 units, Aut (Walther)
Win (Thomas)
Spr (Switzer)

80. Mind, Matter, and Meaning—(Enroll in Philosophy 80.) (WIM)
5 units, Aut (Lawlor),
Spr (Bratman)

100. Introduction to Cognitive Science—(Same as Philosophy 190.) The history, foundations, and accomplishments of the cognitive sciences, including presentations by leading Stanford researchers in artificial

intelligence, linguistics, philosophy, and psychology. Overview of the issues addressed in the Symbolic Systems major.
4 units, Spr (Taylor, Greeno)

103B. Discrete Structures—(Enroll in Computer Science 103B.)
3 units, Win (Staff)
Spr (Sahami)

103X. Discrete Structures (Accelerated)—(Enroll in Computer Science 103X.)
4 units, Win (Dill)

106B. Programming Abstractions—(Enroll in Computer Science 106B.)
5 units, Aut (Staff)
Win (Plummer)
Spr (Shackelford)

106X. Programming Methodology and Abstractions (Accelerated)—(Enroll in Computer Science 106X.)
5 units, Aut, Spr (Zelenski)

107. Programming Paradigms—(Enroll in Computer Science 107.)
5 units, Aut, Spr (Cain)

108. Object-Oriented Systems Design—(Enroll in Computer Science 108.)
4 units, Aut, Win (Parlante)

110. Research Methods and Experimental Design—(Enroll in Psychology 110.)
5 units, Win (M. Lepper)

115. Spoken Language Understanding Systems—Review of spoken language technology. Speech recognition, language modeling, and language understanding algorithms. Voice application development process. Usability issues and the design of voice user interfaces for dialog systems.
4 units, Win (Cohen)

116. Theory of Probability—(Enroll in Statistics 116.)
3-5 units, Aut (Siegmund)
Spr (Taylor)
Sum (Staff)

120. Introduction to Syntax—(Enroll in Linguistics 120.)
4 units, Aut (Sag, Wasow)

121. Introduction to Artificial Intelligence—(Enroll in Computer Science 121.)
3 units, Win (Latombe)

130A. Introduction to Linguistic Meaning—(Enroll in Linguistics 130A.)
4 units, Win (Filip)

130B. Introduction to Lexical Semantics—(Enroll in Linguistics 130B.)
4 units, Spr (Levin)

131. Language and Thought—(Enroll in Psychology 131.)
4 units, Aut (Clark)

139P. Prolog for Natural Language Processing—An introduction to Prolog and its use in computational linguistics.
1 unit, Aut (Dowding)

141. Cognitive Development—(Enroll in Psychology 141.)
3 units, Aut (Markman)

145. Cognition in Interaction Design—Analysis of interactive systems from the standpoint of human cognition. Topics include skill acquisition, complex learning, reasoning, language, perception, methods in usability testing, special computational techniques such as intelligent and adaptive interfaces, and design for people with cognitive disabilities. Students conduct analyses of real world problems of their own choosing and one major redesign/analysis project of an important interactive system.
4 units, Spr (Shrager)

146. Designing Culture: The Technological Imagination at Work—(Same as Feminist Studies 301.) Investigation of the relation between critical culture theory and the design of new media, with the aim of provoking multidisciplinary collaborations among humanists and technologists, cultural critics and new media designers, and digital culture workers.
3-4 units, Win (Balsamo)

147. Introduction to Human-Computer Interaction Design—(Enroll in Computer Science 147.)
3-4 units, Aut (Winograd)

148. Development of Language Understanding—(Enroll in Psychology 148/247.)
3 units, Win (A. Fernald)

150. Computers and Social Decisions—Issues in the design of systems for interactive and collective decision making. Topics: theories of games and social choice; qualitative and quantitative procedures for making collective decisions; psychological effects of presentation and framing on expressions of preference; features of dialogue systems and online communities; the "ideal speech situation" and related notions; online voting; the digital divide; privacy, security, and trust.
3 units, Spr (Davies)

154. Introduction to Automata and Complexity Theory—(Enroll in Computer Science 154.)
4 units, Win (Batzoglou)
Spr (Van Glabbeek)

160A. First-Order Logic—(Enroll in Philosophy 160A.)
4 units, Win (Visser)

160B. Computability and Logic—(Enroll in Philosophy 160B.)
4 units, Spr (Rathjen)

178. Introduction to Probabilistic Systems Analysis—(Enroll in Electrical Engineering 178.)
3 units, Win (Gray)

181. Philosophy of Language—(Enroll in Philosophy 181.)
4 units, Aut (Crimmins)

183. Meaning and Experience—(Enroll in Philosophy 183/283.)
4 units, not given 2001-02

184. Theory of Knowledge—(Enroll in Philosophy 184.)
4 units, Win (Philpott)

186. Philosophy of Mind—(Enroll in Philosophy 186.)
4 units, Spr (Hills)

187. Philosophy of Action—(Enroll in Philosophy 187/287.)
4 units, Win (Bratman)

189. Philosophical Applications of Cognitive Science—(Enroll in Philosophy 189.)
4 units, not given 2001-02

201. Senior Seminar—Core seminar for program majors. Integrates themes from core course work with contemporary cross-disciplinary research in learning, computation, and formal systems. (Please note: This course is being replaced by advanced small seminars offered as Symbolic

Systems courses numbered 202-209, and other courses approved at the beginning of each academic year for credit toward the advanced small seminar requirement in the undergraduate SSP core. Please check with the SSP office early in the academic year 2001-2002 to find out the exact list of courses that will count for the old senior seminar requirement and for the new advanced small seminar requirement.)

2 units, not given 2001-02

202. The Rationality Debate—Evidence and perspectives on whether or not the human mind is generally rational. Normative frameworks for rationality such as probability and utility theory are contrasted with descriptive, experimental studies. Opposing views are represented through readings from several disciplines, including psychology, statistics, philosophy, and economics. Prerequisites: Statistics 116 or 90, or familiarity with the basic theory of probability. Recommended: Psychology 40. Limited enrollment.

2-3 units, Win (Davies)

203. Grammar and Connectionism—(Same as Linguistics 126/226). Open to seniors and graduate students, or other students with instructor's consent. Seminar. Some researchers view connectionist models of language as incompatible with the sorts of grammatical descriptions traditional in linguistics. Others argue that they can characterize the same phenomena at different levels, but are not fundamentally in conflict. The recent work by Smolensky and Legendre arguing for the latter position.

4 units, Spr (Wasow)

210. Introduction to Statistical Inference—(Enroll in Statistics 200.)

3-4 units, Win (Siegmund)

211. Statistical Methods for Meta-Analysis—(Enroll in Statistics 211.)

3 units, Win (Olkin)

216. Communication Research Methods—(Enroll in Communication 106/206.)

5 units, Aut (Leets)

221. Artificial Intelligence: Principles and Techniques—(Enroll in Computer Science 221.)

4 units, Aut (Koller)

221A. Foundations of English Grammar—(Enroll in Linguistics 221A.)

4 units, Win (Sag)

230A. Introduction to Semantics and Pragmatics—(Enroll in Linguistics 230A.)

4 units, Win (Peters)

230B. Semantics and Pragmatics—(Enroll in Linguistics 230B.)

1-4 units, Spr (Filip)

232A. Lexical Semantics—(Enroll in Linguistics 232A.)

4 units, Aut (Levin)

237. Natural Language Processing—(Enroll in Linguistics 237, Computer Science 224N.)

4 units, Spr (Manning)

238. Introduction to Computational Linguistics—(Enroll in Linguistics 138/238.)

4 units, Aut (Kay)

239A. Topics in Computational Linguistics: Parsing and Generation—(Same as Linguistics 239A.) A detailed examination of algorithms used for morphological and syntactic parsing and generation with special attention to finite-state morphology, the implementation of unification grammars, and chart-based techniques. Prerequisite: knowledge of Prolog or 139P/239P.

1-4 units, Win (Moore, Dowding)

239B. Topics in Computational Semantics—(Same as Linguistics 239B.) From syntactic output to question answering. How to get from the syntactic outputs provided by parsing with a unification-based grammar to logical representations of meaning, sufficient to support tasks such as question answering against a limited-domain knowledge base. Implementation in Prolog of components that could be included in simple question-answering system. Complements 239A.

1-4 units, Spr (Crouch)

239P. Prolog for Natural Language Processing—(see 139P.)

1 unit, Aut (Dowding)

247A. Human-Computer Interaction: Interaction Design Studio—(Enroll in Computer Science 247A.)

3-4 units, Win, Spr (Staff)

252. Statistical Methods for Behavioral and Social Sciences—(Enroll in Psychology 102/252.)

1-6 units, Aut (Thomas)

253. Statistical Theory, Models, and Methodology—(Enroll in Psychology 103/253.)

1-3 units, Win (Thomas)

261. Design and Analysis of Algorithms—(Enroll in Computer Science 161.)

4 units, Aut (Boneh)
Win (Guibas)

378. Phenomenological Foundations of Cognition, Language, and Computation—(Enroll in Computer Science 378.)

3-4 units, Spr (Winograd)

RESEARCH

91. Junior Honors Seminar—Strongly recommended for students planning to do an honors project during the following year. Defining a topic, choosing an adviser, considering overall goals. Resources at Stanford and some experiences of seniors are discussed with guest lecturers.

2 units, Spr (Davies)

190. Senior Honors Tutorial—Under the supervision of their faculty honors adviser, students work on their senior honors project. Can be repeated for credit.

1-5 units, any quarter (Staff)

191. Senior Honors Seminar—Strongly recommended for seniors doing an honors project. Under the leadership of the Symbolic Systems program coordinator, students meet, discuss, and present their honors project.

2 units, Win (Davies)

196. Independent Study—Independent work under the supervision of a faculty member. Can be repeated for credit.

1-15 units, any quarter (Staff)

291. Master's Program Seminar—Can be repeated for credit.

1 unit, Aut, Win, Spr (Staff)