Department of Psychology

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http://www.cmu.edu/dietrich/psychology/

Can newborn infants perceive the world as we do, or is it just a 'blooming buzzing confusion'? Do personality, beliefs and social factors influence health? How do scientists and young children make discoveries, and what abilities make these insights possible? How does brain activity reveal differences in thinking? Can computers think the way people do?

The Major in Psychology

Psychology is a discipline that embraces both biological and social sciences. It is a science concerned with establishing principles and laws regarding the ways in which people think and behave through the scientific study of human behavior.

The orientation of the Carnegie Mellon Psychology curriculum is toward developing highly skilled and knowledgeable graduates. About half of our graduates go on to graduate or professional school. The remainder seek to expand their problem-oriented analytic skills to qualify themselves for job opportunities beyond those typically open to liberal arts students.

For the student who is majoring in Psychology, Cognitive Science or Neuroscience, studying with faculty who are on the leading edge of research on questions like the above can be a very exciting experience.

The Psychology Department at Carnegie Mellon has long been noted as one of the pioneering Psychology Departments in the world, particularly in such areas as cognitive psychology, cognitive science, social psychology, developmental psychology, cognitive neuroscience, and health psychology. The Psychology Department offers 5 majors: B.A. and B.S. degrees in Psychology, as well as a B.S. degree in Cognitive Science and together with the Department of Biological Sciences, a unified B.S. double major in Psychology and Biological Sciences, and an Intercollege major in Neuroscience.

Advanced Courses

Advanced psychology courses exist within four areas (cognitive, cognitive neuroscience, developmental, social and health psychology.) Any advanced content course or seminar in psychology or any psychology course higher than 85-349. Exceptions for the advanced course requirement are: 85-480, 85-482, 85-483, 85-506, 85-507, 85-508, 85-601, 85-602, 66-501, 66-502.

Psychology Breadth, Depth, and Application Electives

Three courses from at least two of the Breadth, Depth and Application Categories. Please Consult the psychology department undergraduate website for approved Breadth Electives.

Depth


Application

85-198 Research Training: Psychology 9
85-294 Teaching Assistantship Var.
85-480 Internship in Clinical Psychology Var.
85-482 Internship in Psychology Var.
## Bachelor of Science in Psychology

### Mathematics
- Calculus I-II: 21-111-21-112 10-20 units
- or: Differential and Integral Calculus: 21-120 * 10 units

### Natural Science Requirement (B.A. 18 units of which include 9 units of Gen Ed Science)
- The B.A. in psychology requires one course beyond the General Education requirement in natural science.
- These courses can be selected from the following areas:
  - 03-XXX Biology *
  - 09-XXX Chemistry
  - 33-XXX Physics

### Breadth
- Any 200 level Psychology survey course.
  - 85-261 Psychopathology 9 units
  - 85-271 Animal Minds 9 units

### Computer Science Requirement
- 15-110 Principles of Computing 10 units
- or 88-300 Programming and Data Analysis for Social Scientists

### Statistics Sequence
- 36-309 Experimental Design for Behavioral & Social Sciences 9 units
- or 85-309 Statistical Concepts and Methods for Behavioral and Social Science

### Psychology Surveys
- 85-102 Introduction to Psychology * 9 units
- 85-211 Cognitive Psychology 9 units
- or 85-213 Human Information Processing and Artificial Intelligence
- 85-219 Biological Foundations of Behavior 9 units
- 85-221 Principles of Child Development 9 units
- 85-241 Social Psychology 9 units
- 85-251 Personality 9 units

### Research Methods
- Complete two courses.
  - 85-310 Research Methods in Cognitive Psychology 9 units
  - 85-314 Cognitive Neuroscience Research Methods 9 units
  - 85-320 Research Methods in Developmental Psychology 9 units
  - 85-330 Analytic Research Methods 9 units
  - 85-340 Research Methods in Social Psychology 9 units

### Advanced Courses
- Advanced psychology courses exist within four areas (cognitive, cognitive neuroscience, developmental, social and health psychology.) Any advanced content course or seminar in psychology or any psychology course higher than 85-349. Exceptions for the advanced course requirement are: 85-480, 85-482, 85-484, 85-506, 85-507, 85-508, 85-601, 85-602, 66-501, 66-502.

### Psychology Breadth, Depth, and Application Electives
- Three courses from at least two of the Breadth, Depth and Application Categories. Please consult the psychology department undergraduate website for approved Breadth Electives.

### Depth

### Application
- 85-198 Research Training: Psychology 9 units
- 85-294 Teaching Assistantship 9 units
- 85-480 Internship in Clinical Psychology 9 units
- 85-482 Internship in Psychology 9 units
- 85-484 Practicum in Child Development 9 units
- 85-507 Research in Psychology 9 units
- 85-508 Research in Psychology 9 units
- 85-601 Senior Thesis 9 units
- 85-602 Senior Thesis 9 units
- 66-501 Dietrich College Senior Honors Thesis I 9 units
- 66-502 Dietrich College Senior Honors Thesis II 9 units

### Breadth
- Any 200 level Psychology survey course.
  - 85-261 Psychopathology 9 units
  - 85-271 Animal Minds 9 units

### Additional Major in Psychology

In order to complete an additional major in Psychology, a student must fulfill all of the Psychology major requirements within the department –
in other words, the breadth requirement, computing requirement, three survey courses at the 200-level, two research methods courses, and two advanced courses. These courses must include at least 81 units, plus calculus prerequisites and the 36-200 statistics course or equivalent and 36-309. In addition, B.S. candidates must take the three-course science requirement and B.A. candidates complete one science course beyond the GenEd requirement.

Concentrations within the Psychology Major

Students who wish to focus their Psychology program on a specific area can do so either by the careful selection of Psychology elective courses focusing on their area of interest or by pursuing one of the following concentrations. Students must obtain a concentration form from the Undergraduate Program Coordinator, Emilie O'Leary, receive approval from their psychology faculty advisor, then returning the signed copy to Emilie in Baker Hall 339. The completion of a concentration will be recognized in the Psychology Graduation Program.

Health-Psychology Concentration

For Psychology majors who wish to have a focus of their study on Health Psychology, the following courses should be selected as part of their Psychology Major in conjunction with their Psychology advisor's approval.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>03-121</td>
<td>Modern Biology</td>
<td>9</td>
</tr>
<tr>
<td>03-132</td>
<td>Basic Science to Modern Medicine</td>
<td>9</td>
</tr>
<tr>
<td>03-133</td>
<td>Neurobiology of Disease</td>
<td>9</td>
</tr>
</tbody>
</table>

As part of the psychology breadth requirement:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>85-219</td>
<td>Biological Foundations of Behavior</td>
<td>9</td>
</tr>
<tr>
<td>85-241</td>
<td>Social Psychology</td>
<td>9</td>
</tr>
</tbody>
</table>

As part of the psychology Research Methods requirements:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>85-340</td>
<td>Research Methods in Social Psychology</td>
<td>9</td>
</tr>
</tbody>
</table>

As part of the advanced coursework in psychology requirement, at least two of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>85-442</td>
<td>Health Psychology</td>
<td>9</td>
</tr>
<tr>
<td>85-443</td>
<td>Social Factors and Well-Being</td>
<td>9</td>
</tr>
<tr>
<td>85-446</td>
<td>Psychology of Gender</td>
<td>9</td>
</tr>
<tr>
<td>85-501</td>
<td>Stress, Coping and Well-Being</td>
<td>9</td>
</tr>
<tr>
<td>85-362</td>
<td>Seminar on Addiction</td>
<td>9</td>
</tr>
</tbody>
</table>

As part of the Breadth, Depth and Application requirement, at least one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>85-480</td>
<td>Internship in Clinical Psychology</td>
<td>9</td>
</tr>
<tr>
<td>85-507</td>
<td>Research in Psychology</td>
<td>9</td>
</tr>
<tr>
<td>85-508</td>
<td>Research in Psychology</td>
<td>9</td>
</tr>
<tr>
<td>85-482</td>
<td>Internship in Psychology</td>
<td>9</td>
</tr>
</tbody>
</table>

or an additional advanced psychology seminar from the list above

Cognitive-Neuroscience Concentration

For Psychology majors who wish to have a focus of their study on Cognitive Neuroscience, the following courses should be selected as part of their Psychology Major in conjunction with their Psychology advisor's approval.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>03-121</td>
<td>Modern Biology</td>
<td>9</td>
</tr>
<tr>
<td>03-363</td>
<td>Systems Neuroscience</td>
<td>9</td>
</tr>
<tr>
<td>03-366</td>
<td>Biochemistry of the Brain</td>
<td>9</td>
</tr>
</tbody>
</table>

As part of the psychology Breadth requirement:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>85-211</td>
<td>Cognitive Psychology</td>
<td>9</td>
</tr>
<tr>
<td>85-219</td>
<td>Biological Foundations of Behavior</td>
<td>9</td>
</tr>
</tbody>
</table>

As part of the Research Methods requirement:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>85-310</td>
<td>Research Methods in Cognitive Psychology</td>
<td>9</td>
</tr>
<tr>
<td>85-314</td>
<td>Cognitive Neuroscience Research Methods</td>
<td>9</td>
</tr>
</tbody>
</table>

As part of the advanced coursework in psychology requirement, at least two of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>85-356</td>
<td>Music and Mind: The Cognitive Neuroscience of Sound</td>
<td>9</td>
</tr>
<tr>
<td>85-359</td>
<td>Introduction to Music Cognition Research</td>
<td>9</td>
</tr>
<tr>
<td>85-370</td>
<td>Perception</td>
<td>9</td>
</tr>
<tr>
<td>85-385</td>
<td>Auditory Perception: Sense of Sound</td>
<td>9</td>
</tr>
<tr>
<td>85-406</td>
<td>Autism: Psychological and Neuroscience Perspectives</td>
<td>9</td>
</tr>
<tr>
<td>85-407</td>
<td>Neuroscience of Concepts</td>
<td>9</td>
</tr>
<tr>
<td>85-414</td>
<td>Cognitive Neuropsychology</td>
<td>9</td>
</tr>
<tr>
<td>85-419</td>
<td>Introduction to Parallel Distributed Processing</td>
<td>9</td>
</tr>
<tr>
<td>85-429</td>
<td>Cognitive Brain Imaging</td>
<td>9</td>
</tr>
<tr>
<td>85-435</td>
<td>Neural and Cognitive Models of Adaptive Decisions</td>
<td>9</td>
</tr>
</tbody>
</table>

As part of the Breadth, Depth and Application requirement, at least one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>85-507</td>
<td>Research in Psychology</td>
<td>Var.</td>
</tr>
<tr>
<td>85-508</td>
<td>Research in Psychology</td>
<td>Var.</td>
</tr>
<tr>
<td>88-342</td>
<td>The Neuroscience of Decision Making</td>
<td>9</td>
</tr>
</tbody>
</table>

Or an additional advanced psychology seminar from the list above

Behavior and Developmental Psychology Concentration

For Psychology majors who wish to have a focus of their study be on Behavior and Developmental Psychology, the following courses should be selected as part of their Psychology Major in conjunction with their Psychology advisor's approval.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>03-121</td>
<td>Modern Biology</td>
<td>9</td>
</tr>
<tr>
<td>03-364</td>
<td>Developmental Neuroscience</td>
<td>9</td>
</tr>
<tr>
<td>03-365</td>
<td>Neural Correlates of Learning and Memory</td>
<td>9</td>
</tr>
</tbody>
</table>

As part of the psychology Breadth requirement:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>85-211</td>
<td>Cognitive Psychology</td>
<td>9</td>
</tr>
<tr>
<td>85-221</td>
<td>Principles of Child Development</td>
<td>9</td>
</tr>
</tbody>
</table>

As part of the psychology Research Methods Requirement:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>85-310</td>
<td>Research Methods in Cognitive Psychology</td>
<td>9</td>
</tr>
<tr>
<td>85-320</td>
<td>Research Methods in Developmental Psychology</td>
<td>9</td>
</tr>
</tbody>
</table>

As part of the advanced coursework in psychology requirement, at least two of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>85-350</td>
<td>Psychology of Prejudice</td>
<td>9</td>
</tr>
<tr>
<td>85-352</td>
<td>Evolutionary Psychology</td>
<td>9</td>
</tr>
<tr>
<td>85-354</td>
<td>Infant Language Development</td>
<td>9</td>
</tr>
<tr>
<td>85-363</td>
<td>Attention, Its Development and Disorders</td>
<td>9</td>
</tr>
<tr>
<td>85-390</td>
<td>Human Memory</td>
<td>9</td>
</tr>
<tr>
<td>85-408</td>
<td>Visual Cognition</td>
<td>9</td>
</tr>
<tr>
<td>85-406</td>
<td>Autism: Psychological and Neuroscience Perspectives</td>
<td>9</td>
</tr>
<tr>
<td>85-438</td>
<td>Educational Goals, Instruction, and Assessment</td>
<td>9</td>
</tr>
</tbody>
</table>

As part of the Breadth, Depth and Application requirement, at least two of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>85-294</td>
<td>Teaching Assistantship</td>
<td>Var.</td>
</tr>
<tr>
<td>85-484</td>
<td>Practicum in Child Development</td>
<td>Var.</td>
</tr>
<tr>
<td>85-507</td>
<td>Research in Psychology</td>
<td>Var.</td>
</tr>
<tr>
<td>85-508</td>
<td>Research in Psychology</td>
<td>Var.</td>
</tr>
<tr>
<td>76-420</td>
<td>The Cognition of Reading and Writing</td>
<td>9</td>
</tr>
<tr>
<td>05-418</td>
<td>Design Educational Games</td>
<td>12</td>
</tr>
<tr>
<td>57-331</td>
<td>Principles of Education</td>
<td>9</td>
</tr>
</tbody>
</table>

Or an additional advanced psychology seminar from the list above

Cognitive Psychology Concentration

For Psychology majors who wish to have a focus of their study be on Cognitive Psychology and/or Cognitive Modeling, the following courses should be selected as part of their Psychology Major in conjunction with their Psychology advisor's approval.
As part of the B.S. science requirement:  
03-121 Modern Biology 9

As part of the psychology Breadth requirement:  
85-211 Cognitive Psychology 9

As part of the psychology Research Methods requirement:  
85-310 Research Methods in Cognitive Psychology 9

As part of the advanced coursework in psychology requirement, at least two of the following:  
85-356 Music and Mind: The Cognitive Neuroscience of Sound 9  
85-359 Introduction to Music Cognition Research 9  
85-370 Perception 9  
85-385 Auditory Perception: Sense of Sound 9  
85-390 Human Memory 9  
85-395 Applications of Cognitive Science 9  
85-406 Autism: Psychological and Neuroscience Perspectives 9  
85-407 Neuroscience of Concepts 9  
85-412 Cognitive Modeling 9  
85-414 Cognitive Neuropsychology 9  
85-419 Introduction to Parallel Distributed Processing 9  
85-421 Language and Thought 9  
85-429 Cognitive Brain Imaging 9  
85-435 Neural and Cognitive Models of Adaptive Decisions 9

As part of the Breadth, Depth and Application requirement, at least one of the following:  
85-507 Research in Psychology Var.  
85-508 Research in Psychology Var.  
76-420 The Cognition of Reading and Writing: Introduction to a Social/Cognitive Process 9  
05-391 Designing Human Centered Software 12  
05-413 Human Factors 9  
80-305 Decision Theory 9  
80-380 Philosophy of Language 9  
80-484 Language and Thought 9

Or an additional advanced psychology seminar

Social-Personality Psychology Concentration

For Psychology majors who wish to have a focus of their study be on Social and/or Personality Psychology, the following courses should be selected as part of their Psychology Major in conjunction with their Psychology advisor's approval.

As part of the Psychology Breadth requirement:  
85-241 Social Psychology 9  
85-251 Personality 9

As part of the Psychology Research Methods requirement:  
85-340 Research Methods in Social Psychology 9

As part of the advanced coursework in psychology requirement, at least two of the following:  
85-350 Psychology of Prejudice 9  
85-357 Navigating Race and Identity in America: The Role of Psychology in Racial Intera 9  
85-358 Pro-Social Behavior 9  
85-375 Crosscultural Psychology 9  
85-377 Attitudes and Persuasion 9  
85-443 Social Factors and Well-Being 9  
85-444 Relationships 9  
85-446 Psychology of Gender 9  
85-501 Stress, Coping and Well-Being 9

As part of the Breadth, Depth and Application requirement, at least one of the following:  
85-507 Research in Psychology Var.  
85-508 Research in Psychology Var.  
85-482 Internship in Psychology Var.  
05-320 Social Web 12

Or an additional advanced psychology seminar from the list above

Clinical/Counseling Psychology Concentration

For Psychology majors who wish to have a focus of their study be on Clinical/Counseling Psychology, the following courses should be selected as part of their Psychology Major in conjunction with their Psychology advisor's approval.

As part of the Psychology Breadth requirement at least one of the following:  
85-241 Social Psychology 9  
85-251 Personality 9  

Required additional coursework:  
85-261 Psychopathology 9  
85-422 Clinical Psychology: Science and Practice 9  
85-480 Internship in Clinical Psychology Var.

As part of the Psychology Research Methods requirements:  
85-340 Research Methods in Social Psychology 9

As part of the advanced coursework in psychology requirement, at least two of the following:  
85-375 Crosscultural Psychology 9  
85-377 Attitudes and Persuasion 9  
85-406 Autism: Psychological and Neuroscience Perspectives 9  
85-414 Cognitive Neuropsychology 9  
85-442 Health Psychology 9  
85-443 Social Factors and Well-Being 9  
85-444 Relationships 9  
85-446 Psychology of Gender 9  
85-501 Stress, Coping and Well-Being 9

Neuroscience Major

The Psychology Department at Carnegie Mellon University has a major focus on the role of the brain and nervous system in cognition and behavior, including biological approaches involving the health impact that arises from the interaction of behavior with the nervous, endocrine, and immune systems. These interests are manifested in faculty research (http://www.cmu.edu/dietrich/psychology/research-areas/), departmental and university centers that operate from or heavily involve the department (e.g., the Center for Cognitive Brain Imaging (http://www.ccbi.cmu.edu/), and the Center for the Neural Basis of Cognition (http://www.cnbc.cmu.edu/)) as well as undergraduate coursework (http://www.cmu.edu/dietrich/psychology/undergraduate/) and graduate coursework.

For undergraduates, there are a number of ways in which students with an interest in these approaches can pursue that interest in an organized fashion. Major requirements for the Bachelor of Science in Neuroscience can be found under Intercollege Programs (http://coursecatalog.web.cmu.edu/servicesandoptions/intercollegeprograms/#bachelorofscienceinneurosciencetext).

Carnegie Mellon University recently launched BrainHub - an initiative designed to leverage its core strengths in cognitive science, engineering, and computer science, and our emerging excellence in biological sciences, to harness the technology that helps the world explore brain and behavior. Students will be able to take advantage of exciting opportunities such as lectures hosted on various topics, newly funded CMU campus research projects trying to answer pressing questions in brain science and the many global partnerships with other institutions all with the same motivating goal to enhance and increase research in brain sciences.

Finally, for any interested student, there is a Minor in Cognitive Neuroscience (http://coursecatalog.web.cmu.edu/dietrichcollegeofhumanitiesandsocialsciences/departmentofpsychology/#minortext) available through the Psychology department.

The Major in Cognitive Science

The Psychology Department offers a B.S. degree in Cognitive Science. The field of cognitive science has grown out of increasingly active interaction among psychology, linguistics, artificial intelligence, philosophy, and neuroscience. All of these fields share the goal of understanding intelligence. By combining these diverse perspectives, students of cognitive science are able to understand cognition at a deep level. Because this
major is administered by the Psychology Department, it focuses on human cognition and the experimental study of the human mind as illuminated by the techniques of the above disciplines.

Cognitive Science Curriculum

The Cognitive Science major is only offered as a B.S. degree. Candidates should complete before the junior year the two-semester calculus sequence 21-120/21-256 (or alternatively 21-120/21-122) and a statistics sequence (36-200 or equivalent and if possible, 36-309). In addition, candidates complete 15-112 Fundamentals of Programming and Computer Science, as their departmental computing course.

Because of the number and sequential nature of required courses, prospective Cognitive Science majors are encouraged to begin course work for the major prior to junior year. In particular, completion of calculus, 36-200, and 85-211 or 85-213 before the junior year will enable students to complete 85-310 and 36-309 and by the Fall semester of their sophomore or junior year, and if interested, to then take advantage of research opportunities in the department.

*The 3-Semester sequence 21-111/21-112/21-256 may be substituted by students who have already taken 21-111 before deciding on the major.

Computing Prerequisite

10 units

15-112 Fundamentals of Programming and Computer Science

Mathematics

29-30 units

21-111-21-112 Calculus I-II

or

21-120 Differential and Integral Calculus *

21-127 Concepts of Mathematics

*Students who place out of 21-120 will have fulfilled the calculus requirement.

Statistics Sequence

18 units

36-200 Reasoning with Data

36-309 Experimental Design for Behavioral & Social Sciences

or 85-309 Statistical Concepts and Methods for Behavioral and Social Sciences

Computational/Cognitive Modeling Core

29-31 units

Two of the following:

15-122 Principles of Imperative Computation

15-150 Principles of Functional Programming

15-251 Great Ideas in Theoretical Computer Science

Plus one of the following:

85-412 Cognitive Modeling

85-419 Introduction to Parallel Distributed Processing

85-435 Neural and Cognitive Models of Adaptive Decisions

Cognitive Psychology Core

27 units

85-211 Cognitive Psychology

or 85-213 Human Information Processing and Artificial Intelligence

85-310 Research Methods in Cognitive Psychology

or 85-314 Cognitive Neuroscience Research Methods

Plus two of the following (one of which must be 85-3xx or 85-4xx):

85-219 Biological Foundations of Behavior

85-359 Introduction to Music Cognition Research

85-370 Perception

85-390 Human Memory

85-395 Applications of Cognitive Science

85-408 Visual Cognition

85-414 Cognitive Neuropsychology

85-421 Language and Thought

80-301 Meaning in Language

80-310 Formal Logic

80-314 Causal Discovery, Statistics, and Machine Learning

80-315 Modal Logic

80-383 Language in Use

Cognitive Science Concentration

(3 courses, concentration approval required)

These three courses are chosen in conjunction with your advisor to form a coherent area of concentration from the course list under 'Cognitive Science Concentration’ in the current Undergraduate Catalog. Before proceeding with the choice of courses, students must fill out the concentration form, obtained from Emilie O’Leary in Baker Hall 339, with a description of the concentration area and the planned set of three courses. Courses not represented on the list may, with pre-approval of advisor and department, be used to satisfy part of this requirement. The three courses are not required to be within any single category below but be coherent within the major and the focus may vary across disciplinary boundaries. Courses taken for the major requirements can not be double counted in the concentration.

Computer Science

36 units

16-385 Computer Vision

15-453 Formal Languages, Automata, and Computability

10-601 Introduction to Machine Learning (Master’s)

05-410 User-Centered Research and Evaluation

05-432 Personalized Online Learning

Psychology

85-219 Biological Foundations of Behavior

85-352 Evolutionary Psychology

85-354 Infant Language Development

85-370 Perception

85-375 Crosscultural Psychology

85-380 In Search of Mind: The History of Psychology

85-390 Human Memory

85-392 Human Expertise

85-395 Applications of Cognitive Science

85-406 Autism: Psychological and Neuroscience Perspectives

85-412 Cognitive Modeling

85-414 Cognitive Neuropsychology

85-419 Introduction to Parallel Distributed Processing

85-421 Language and Thought

85-423 Cognitive Development

85-426 Learning in Humans and Machines

85-429 Cognitive Brain Imaging

Philosophy

80-210 Logic and Proofs

80-211 Logic and Mathematical Inquiry

80-220 Philosophy of Science

80-254 Analytic Philosophy

80-255 Pragmatism

80-270 Problems of Mind and Body: Meaning and Doing

80-310 Formal Logic

80-311 Undecidability and Incompleteness

80-314 Causal Discovery, Statistics, and Machine Learning

Linguistics

80-180 Nature of Language

80-280 Linguistic Analysis

80-281 Language and Thought

80-315 Modal Logic

76-385 Introduction to Discourse Analysis
Decision Sciences

88-302 Behavioral Decision Making 9
88-380 Dynamic Decisions 9
88-388 Psychological Models of Decision Making 9
88-402 Modeling Complex Social Systems 9

Neurosciences

03-362 Cellular Neuroscience 9
03-363 Systems Neuroscience 9
42-202 Physiology 9
15-386 Neural Computation 9
15-883 Computational Models of Neural Systems 12

Science Requirement

The Cognitive Science program requires two additional science courses beyond the college’s one course Science General Education requirement.

These can be selected from any one of the following areas.

03-xxx Biology  *
09-xxx Chemistry
33-xxx Physics

* Those interested in a cognitive neuroscience focus are recommended to take biology courses, including if possible, 03-362, or 03-363.

Additional Major in Cognitive Science

In order to complete a double major in Cognitive Science, a student must fulfill the major requirements as listed under the Cognitive Science major. These include the programming requirement (15-112), the Mathematics and Statistics prerequisites, Computational/Cognitive Modeling Core, The Cognitive Psychology Core, the Cognitive Science Concentration Requirement, and the Supplementary Science Requirement. Students will be assigned a department advisor to help plan their program of studies in Cognitive Science.

Unified Double Major in Psychology & Biological Sciences

Veronica Hinman, Department Head, Biological Sciences

Michael Tarr, Department Head, Psychology

This major is intended to reflect the interdisciplinary nature of current research in the fields of biology and psychology, as well as the national trend in some professions to seek individuals broadly trained in both the social and natural sciences.

Note: Students entering from the Dietrich College of Humanities and Social Sciences will earn a Bachelor of Science in Psychology and Biological Sciences. Students in the Mellon College of Science will earn a Bachelor of Science in Biological Sciences and Psychology.

Depending on a student’s home college (DC or MCS), General Education (GenEd) requirements will be different. GenEd requirements for DC (http://coursecatalog.web.cmu.edu/dietrichcollegeofhumanitiesandsocialsciences/#hampssgeneraleducationprogram160) and MCS (http://coursecatalog.web.cmu.edu/melloncollegeofscience/) are found on their respective Catalog pages.

Degree Requirements:

<table>
<thead>
<tr>
<th>Biological Sciences</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>03-151</td>
<td>Honors Modern Biology</td>
</tr>
<tr>
<td>or 03-121</td>
<td>Modern Biology</td>
</tr>
<tr>
<td>03-220</td>
<td>Genetics 9</td>
</tr>
<tr>
<td>or 03-221</td>
<td>Genomes, Evolution, and Disease: Introduction to Quantitative Genetic Analysis</td>
</tr>
<tr>
<td>03-231</td>
<td>Honors Biochemistry</td>
</tr>
<tr>
<td>03-320</td>
<td>Cell Biology</td>
</tr>
<tr>
<td>03-343</td>
<td>Experimental Techniques in Molecular Biology</td>
</tr>
<tr>
<td>03-411</td>
<td>Topics in Research</td>
</tr>
<tr>
<td>03-412</td>
<td>Topics in Research</td>
</tr>
<tr>
<td>03-xxx</td>
<td>General Biology Elective 1</td>
</tr>
<tr>
<td>03-xx</td>
<td>Advanced Biology Elective 1</td>
</tr>
<tr>
<td>Total Biology units</td>
<td>78</td>
</tr>
</tbody>
</table>

1 Please see description and requirements for electives under the B.S. in Biological Sciences section of this Catalog.

<table>
<thead>
<tr>
<th>Mathematics, Statistics, Physics and Computer Science</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-120</td>
<td>Differential and Integral Calculus</td>
</tr>
<tr>
<td>21-124</td>
<td>Calculus II for Biologists and Chemists</td>
</tr>
<tr>
<td>or 21-122</td>
<td>Integration and Approximation</td>
</tr>
<tr>
<td>36-247</td>
<td>Statistics for Lab Sciences</td>
</tr>
<tr>
<td>or 36-200</td>
<td>Reasoning with Data</td>
</tr>
<tr>
<td>36-309</td>
<td>Experimental Design for Behavioral &amp; Social Sciences</td>
</tr>
<tr>
<td>or 85-309</td>
<td>Statistical Concepts and Methods for Behavioral and Social Science</td>
</tr>
<tr>
<td>33-121</td>
<td>Physics I for Science Students 2</td>
</tr>
<tr>
<td>or 33-141</td>
<td>Physics I for Engineering Students</td>
</tr>
<tr>
<td>15-110</td>
<td>Principles of Computing</td>
</tr>
<tr>
<td>or 15-112</td>
<td>Fundamentals of Programming and Computer Science</td>
</tr>
<tr>
<td>or 02-201</td>
<td>Programming for Scientists</td>
</tr>
<tr>
<td>99-101</td>
<td>Computing @ Carnegie Mellon</td>
</tr>
<tr>
<td>Total Science units</td>
<td>63-65</td>
</tr>
</tbody>
</table>

2 MCS students must also complete 33-122 Physics II for Biological Sciences & Chemistry Students.

<table>
<thead>
<tr>
<th>Chemistry</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>09-105</td>
<td>Introduction to Modern Chemistry I</td>
</tr>
<tr>
<td>09-106</td>
<td>Modern Chemistry II</td>
</tr>
<tr>
<td>09-217</td>
<td>Organic Chemistry I</td>
</tr>
<tr>
<td>or 09-219</td>
<td>Modern Organic Chemistry</td>
</tr>
<tr>
<td>09-218</td>
<td>Organic Chemistry II</td>
</tr>
<tr>
<td>or 09-220</td>
<td>Modern Organic Chemistry II</td>
</tr>
<tr>
<td>09-207</td>
<td>Techniques in Quantitative Analysis</td>
</tr>
<tr>
<td>or 09-221</td>
<td>Laboratory I: Introduction to Chemical Analysis</td>
</tr>
<tr>
<td>09-208</td>
<td>Techniques for Organic Synthesis and Analysis</td>
</tr>
<tr>
<td>or 09-222</td>
<td>Laboratory II: Organic Synthesis and Analysis</td>
</tr>
<tr>
<td>Total Chemistry units</td>
<td>56-62</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Psychology Courses</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>85-102</td>
<td>Introduction to Psychology</td>
</tr>
<tr>
<td>85-219</td>
<td>Biological Foundations of Behavior</td>
</tr>
<tr>
<td>85-2xx</td>
<td>Survey Psychology Courses</td>
</tr>
<tr>
<td>85-310</td>
<td>Research Methods in Cognitive Psychology</td>
</tr>
<tr>
<td>or 85-340</td>
<td>Research Methods in Social Psychology</td>
</tr>
<tr>
<td>or 85-320</td>
<td>Research Methods in Developmental Psychology</td>
</tr>
<tr>
<td>or 85-314</td>
<td>Cognitive Neuroscience Research Methods</td>
</tr>
<tr>
<td>or 85-330</td>
<td>Analytic Research Methods</td>
</tr>
<tr>
<td>85-xxx</td>
<td>Advanced Psychology Electives</td>
</tr>
<tr>
<td>Total Psychology units</td>
<td>63</td>
</tr>
</tbody>
</table>

* Excluding 85-261 Psychopathology

Additional Advanced Elective 9 units

(Choose one of the following courses)

85-3xx | Advanced Psychology Elective | 9 |
| or 03-xxx | Advanced Biology Elective | 9 |

Additional Laboratory or Research Methods 9-12 units

(Choose one of the following courses)

03-344 | Experimental Biochemistry | 12 |
| 03-345 | Experimental Cell and Developmental Biology | 12 |
| 03-346 | Experimental Neuroscience | 12 |
| 85-310 | Research Methods in Cognitive Psychology | 9 |
| 85-314 | Cognitive Neuroscience Research Methods | 9 |
| 85-320 | Research Methods in Developmental Psychology | 9 |
| 85-340 | Research Methods in Social Psychology | 9 |
Elective Units  
Free Electives  
MCS Nontechnical Breadth or DC General Education Requirements  

Total Elective units  

Minimum number of units required for degree:  360

Minors in Psychology and Cognitive Neuroscience

Minor in Psychology  

72 units

I. Introductory course

85-102  Introduction to Psychology  

*A survey course can be taken in place of 85-102.

II. Area Survey courses

Complete two courses.

85-211  Cognitive Psychology  
85-213  Human Information Processing and Artificial Intelligence  
85-219  Biological Foundations of Behavior  
85-221  Principles of Child Development  
85-241  Social Psychology  
85-251  Personality  

III. Statistics

36-200  Reasoning with Data  
36-309  Experimental Design for Behavioral & Social Sciences  
or 85-309  Statistical Concepts and Methods for Behavioral and Social Science

27 units

Upper Level Courses

Complete three courses from categories IV and V, with at least one course from each.

IV. Research Methods Courses * (minimum 9 units)

85-310  Research Methods in Cognitive Psychology  
85-314  Cognitive Neuroscience Research Methods  
85-320  Research Methods in Developmental Psychology  
85-330  Analytic Research Methods  
85-340  Research Methods in Social Psychology  

* Prerequisites for all Research Methods courses: 36-309 and the appropriate survey course.

V. Advanced Courses (minimum 9 units)

Advanced psychology courses exist within four areas (cognitive, cognitive neuroscience, developmental, social and health psychology.) Any advanced content course or seminar in psychology or any psychology course higher than 85-350. Exceptions for the advanced course requirement are: 85-480, 85-482, 85-484, 85-485, 85-506, 85-507, 85-508, 85-601, 85-602, 66-501, 66-502.

Minor in Cognitive Neuroscience  

63 units

The minor in Cognitive Neuroscience offered by the Department of Psychology is similar to the Neuroscience Minor offered by the Department of Biological Sciences. The differences between the two forms of the minor are determined by one required course, and additionally, by the student's choice of distribution electives. The requirements for the Cognitive Neuroscience Minor include 7 courses: four required courses, and three distribution and elective courses.

Because of the curriculum within this minor may overlap with some degree requirements, no more than 2 courses fulfilling Neuroscience or Cognitive Neuroscience Minor requirements may count towards a student's major or other minor requirements.

Cognitive Neuroscience Curriculum

Required Coursework

03-121  Modern Biology  
03-363  Systems Neuroscience  
85-219  Biological Foundations of Behavior  
85-211  Cognitive Psychology  
or 85-213  Human Information Processing and Artificial Intelligence

Distribution Requirements

Three courses, including at least 1 from each of the following categories

Approaches to Cognitive Neuroscience
85-314  Cognitive Neuroscience Research Methods  
85-412  Cognitive Modeling  
85-414  Cognitive Neuropsychology  
85-419  Introduction to Parallel Distributed Processing  
85-429  Cognitive Brain Imaging  
15-386  Neural Computation  
15-883  Computational Models of Neural Systems  
36-746  Statistical Methods for Neuroscience and Psychology

Cognitive Neuroscience Electives

03-133  Neurobiology of Disease  
03-362  Cellular Neuroscience  
03-364  Developmental Neuroscience  
03-365  Neural Correlates of Learning and Memory  
85-356  Music and Mind: The Cognitive Neuroscience of Sound  
85-370  Perception  
85-385  Auditory Perception: Sense of Sound  
85-390  Human Memory  
85-406  Autism: Psychological and Neuroscience Perspectives

The Honors Program

The Honors Program provides recognition of outstanding performance by students in the Psychology department. Participation enables students to pursue their own research ideas through completion of an honors thesis. The honors thesis is completed during the senior year. By completing a thesis, the student earns 18 units of credit and qualifies for graduation with “College Honors.” To qualify for the Honors Program, the student must maintain a quality point average of at least 3.50 in the major and 3.25 overall. More information on the Honors program can be found here (http://www.cmu.edu/dietrich/undergraduate/programs/shp/).

A year long departmental senior thesis course exists (66-501 and 66-502) for students interested in pursuing a sizable research project who do not qualify for the honors program. More information can be obtained by contacting Emile O’Leary at emiller@andrew.cmu.edu.

Faculty

JOHN R. ANDERSON, Richard King Mellon University Professor of Psychology and Computer Science - Ph.D., Stanford University; Carnegie Mellon, 1978-

LOUISE BEHRMANN, Thomas S. Baker Univ Professor of Psychology and Cognitive Neuroscience - Ph.D., University of Toronto; Carnegie Mellon, 1993-

JESSICA CANTLON, Ronald J. and Mary Ann Zdrojewski Associate Professor of Developmental Neuroscience - PhD, Duke University; Carnegie Mellon, 2007-

SHARON CARVER, Teaching Professor, Psychology; Associate Dean of Student Affairs, Dietrich College - Ph.D., Carnegie Mellon University; Carnegie Mellon, 1993-

SHELDON COHEN, Robert E. Doherty University Professor of Psychology - Ph.D., New York University; Carnegie Mellon, 1982-

CHANTE COX-BOYD, Associate Teaching Professor - Ph.D., University of North Carolina at Chapel Hill; Carnegie Mellon, 1999-

DAVID CREWSWELL, Associate Professor – Ph.D., University of California, Los Angeles; Carnegie Mellon, 2008-

KASEY CREWSWELL, Associate Professor – Ph.D., University of Pittsburgh; Carnegie Mellon, 2012-

BROOKE C. FEENEY, Professor of Psychology – Ph.D., State University of New York at Buffalo; Carnegie Mellon, 2001-
ANNA FISHER, Associate Professor – Ph.D., The Ohio State University; Carnegie Mellon, 2006–

VICKI S. HELGESON, Professor of Psychology – Ph.D., University of Denver; Carnegie Mellon, 1990–

LAURIE HELLER, Teaching Professor – Ph.D., University of Pennsylvania; Carnegie Mellon, 2009–

LORI L. HOLT, Professor of Psychology – Ph.D., University of Wisconsin; Carnegie Mellon, 1999–

MARCEL A. JUST, D. O. Hebb University Professor of Psychology – Ph.D., Stanford University; Carnegie Mellon, 1972–

ROBERTA KLATZKY, Charles J. Queenan Jr., Professor of Psychology – Ph.D., Stanford University; Carnegie Mellon, 1993–

KENNETH R. KOEDINGER, Professor of HCII – Ph.D., Carnegie Mellon University; Carnegie Mellon, 2001–

MARSHA C. LOVETT, Teaching Professor – Ph.D., Carnegie Mellon University; Carnegie Mellon, 2000–

BRIAN MACWHINNEY, MacWhinney, Brian Teresa Heinz Professor of Cognitive Psych – Ph.D., University of California, Berkeley; Carnegie Mellon, 1981–

BRADFORD MAHON, Associate Professor – PhD, Harvard University ; Carnegie Mellon, 2009–

KODY MANKE, Assistant Teaching Professor – Ph.D, Standford University; Carnegie Mellon, 2016–

BONNIE NOZARI, Associate Professor – PhD, University of Illinois at Urbana-Champaign; Carnegie Mellon, 2011–

DAVID PLAUT, Professor of Psychology – Ph.D., Carnegie Mellon University; Carnegie Mellon, 1994–

DAVID RAKISON, Associate Professor – D.Phil., University of Sussex; Carnegie Mellon, 2000–

LYNNE M. REDER, Professor of Psychology – Ph.D., University of Michigan; Carnegie Mellon, 1978–

MICHAEL F. SCHEIER, Scheier, Mike Walter van Dyke Bingham Professor of Personality and Health Psychology – Ph.D., University of Texas; Carnegie Mellon, 1975–

MICHAEL TARR, Professor & Dept Head and Kavčić-Moura Professor of Cognitive and Brain Science - Ph.D., Massachusetts Institute of Technology; Carnegie Mellon, 2009–

ERIK D. THIESSEN, Associate Professor, Director of Undergraduate Education in Psychology - Ph.D., University of Wisconsin, Madison; Carnegie Mellon, 2004–

TIMOTHY VERSTYNEN, Associate Professor – Ph.D., University of California, Berkeley ; Carnegie Mellon, 2006–

DAN YUROVSKY, Assistant Professor – PhD, Indiana University; Carnegie Mellon, 2012–