Department of Psychology

Michael Tarr, Department Head
Erik Thiessen, Director of Undergraduate Education in Psychology
Baker Hall 342D

Emilie O’Leary, Undergraduate Coordinator
Baker Hall 339, emilie@andrew.cmu.edu
http://www.cmu.edu/dietrich/psychology/index.html

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?

These are some of the questions that psychologists at Carnegie Mellon are trying to answer.

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.

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.

 Majors in the department are expected not only to learn about findings already established by psychologists, but also to become proficient in the investigation and analysis of behavior. This includes observing behavior, formulating hypotheses, designing experiments to test these hypotheses, running experiments, performing statistical analysis, and writing reports.

The department has many resources for students to use in acquiring these skills. For instance, students interested in child development may be involved in the child development laboratory and observational facilities which are a part of the Carnegie Mellon Children’s School which operates under the department’s aegis. Students interested in health or clinical psychology might have opportunities to do internships in applied settings, and all Psychology majors have access to extensive computer facilities for data analysis and simulation work. The department also has a state of the art set of undergraduate research laboratories and computer clusters, and through the Scientific Imaging 6 Brain Research Center, a magnet is in use for conducting brain imaging studies using fMRI.

In addition to formal class work, students are encouraged to participate in elective research projects where they may register and receive credit for freshmen research experience course, 85-506 Readings in Psychology, Fall research experience in 85-507 Research in Psychology or Spring research experience in 85-508 Research in Psychology. In the research in psychology course, the student may work on an ongoing research projects or develop and carry out a new research project with a faculty member.

There is university and departmental funding available to help support student-initiated research projects and student travel to present research results at scientific meetings and conferences. In the Readings courses, the student reads extensively on a particular topic. The faculty member and student meet to discuss the readings, and the student writes a paper on the topic selected. The Psychology Department Website (http://www.cmu.edu/dietrich/psychology), provides descriptions of faculty research interests (http://www.cmu.edu/dietrich/psychology/research-areas) that the student can use in determining who should be approached to supervise a particular research or reading project.

Students interested in gaining field work experience via a number of internship opportunities available to them can receive credit through 85-482 Internship in Psychology, 85-480 Internship in Clinical Psychology or 85-484 Practicum in Child Development. Clinical internships are available with a variety of clinical settings including the prestigious Western Psychiatric Institute and Clinic (the teaching hospital of the Department of Psychiatry at the University of Pittsburgh Medical School). During the internship, students get first-hand experience with different clinical populations. Developmental Practicum experiences is available in the department of CMU Children’s School (http://www.cmu.edu/dietrich/psychology/centers-and-facilities).

Psychology Curriculum

Mathematics 19-20 units

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-111-21-112</td>
<td>Differential Calculus - Integral Calculus</td>
<td>20</td>
</tr>
<tr>
<td>or</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21-201-21-122</td>
<td>Differential and Integral Calculus - Integration and Approximation</td>
<td>20</td>
</tr>
<tr>
<td>or</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21-201-21-256</td>
<td>Differential and Integral Calculus - Multivariate Analysis</td>
<td>19</td>
</tr>
</tbody>
</table>

*Students who place out of 21-120 with AP credit are only required to successfully complete 21-122 or 21-256 instead of the full two semester sequence.

*21-124 may be substituted for 21-122 for those interested in Neuroscience or Biology.

Statistics Sequence 18 units

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>36-201</td>
<td>Statistical Reasoning and Practice</td>
<td>9</td>
</tr>
<tr>
<td>36-309</td>
<td>Experimental Design for Behavioral and Social Sciences</td>
<td>9</td>
</tr>
</tbody>
</table>

*In certain circumstances, 36-202 can be a substitute for 36-309 with prior approval.

Breadth Requirement 36 units

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>85-102</td>
<td>Introduction to Psychology</td>
<td>9</td>
</tr>
</tbody>
</table>

Survey Courses - Complete Three

Survey Courses - Complete Three

<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>or 85-213</td>
<td>Human Information Processing and Artificial Intelligence</td>
<td>9</td>
</tr>
<tr>
<td>85-219</td>
<td>Biological Foundations of Behavior</td>
<td>9</td>
</tr>
<tr>
<td>85-221</td>
<td>Principles of Child Development</td>
<td>9</td>
</tr>
<tr>
<td>85-241</td>
<td>Social Psychology</td>
<td>9</td>
</tr>
<tr>
<td>85-251</td>
<td>Personality</td>
<td>9</td>
</tr>
</tbody>
</table>

* A fourth survey course can be taken in place of Introduction to Psychology

Research Methods* 18 units

Research Methods*

<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>
<tr>
<td>85-320</td>
<td>Research Methods in Developmental Psychology</td>
<td>9</td>
</tr>
<tr>
<td>85-330</td>
<td>Analytic Research Methods</td>
<td>9</td>
</tr>
<tr>
<td>85-340</td>
<td>Research Methods in Social Psychology</td>
<td>9</td>
</tr>
</tbody>
</table>

* Prerequisites for all Research Methods courses: 36-309 or equivalent, and corresponding survey course.

Advanced Courses 18 units

Advanced psychology courses exist within four areas (cognitive, cognitive neuroscience, developmental, social and health psychology.) Any advanced psychology 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, 85-506, 85-507, 85-508, 85-601, 85-602, 66-501, 66-502.

Computer Science Requirement 10 units

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-110</td>
<td>Principles of Computing</td>
<td>10</td>
</tr>
</tbody>
</table>
Natural Science Requirement (B.A. 18 units, B.S. 36 units, both of which include 9 units of GenEd Science)

The Psychology major requires (for B.S. candidates) three additional natural science courses (with two in the same science) beyond the College's General Education natural science requirement. For the B.A. the requirement is 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

*Given the growing relevance of biology to psychology, it is strongly recommended that, for the B.S., a minimum of two courses in biology be included as part of the natural science requirement.

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 36-201 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 Brochure.

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.

As part of the B.S. science requirement: 03-121 Modern Biology 9 units
Plus one additional Biology course

As part of the psychology breadth requirement:
85-219 Biological Foundations of Behavior 9
85-241 Social Psychology 9

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:
85-353 Mindfulness: Science and Practice 9
85-442 Health Psychology 9
85-443 Social Factors and Well-Being 9
85-446 Psychology of Gender 9
85-501 Stress, Coping and Well-Being 9

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.

As part of the B.S. Science requirement: 03-121 Modern Biology 9
36-363 Systems Neuroscience 9

As part of the psychology Breadth requirement:
85-211 Cognitive Psychology 9
85-219 Biological Foundations of Behavior 9

As part of the Research Methods requirement:
85-310 Research Methods in Cognitive Psychology 9
85-314 Cognitive Neuroscience Research Methods 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
85-370 Perception 9
85-406 Autism: Psychological and Neuroscience Perspectives 9
85-414 Cognitive Neuropsychology 9
85-419 Introduction to Parallel Distributed Processing 9
85-429 Cognitive Brain Imaging 9

Developmental Psychology Concentration

For Psychology majors who wish to have a focus of their study on Developmental 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 B.S. science requirement: 03-121 Modern Biology 9

As part of the psychology Breadth requirement:
85-221 Principles of Child Development 9

As part of the psychology Research Methods Requirement:
85-320 Research Methods in Developmental Psychology 9

As part of the advanced coursework in psychology requirement, at least two of the following:
85-354 Infant Language Development 9
85-363 Attention, Its Development and Disorders 9
85-375 Crosscultural Psychology 9
85-406 Autism: Psychological and Neuroscience Perspectives 9
85-418 Contributions of Psychological Research to Education 9
85-423 Cognitive Development 9
85-425 Child Psychopathology and Treatment 9

Additional course requirement, one of the following:
85-484 Practicum in Child Development Var.
03-364 Developmental Neuroscience 9

Cognitive Psychology Concentration

For Psychology majors who wish to have a focus of their study 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
85-314 Cognitive Neuroscience Research Methods 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
85-370 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
85-412 Cognitive Modeling 9
Cognitive Neuropsychology 9
Introduction to Parallel Distributed Processing 9
Language and Thought 9
Learning in Humans and Machines 9
Cognitive Brain Imaging 9

Social-Personality Psychology Concentration
For Psychology majors who wish to focus a part of their study 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: Units
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:
85-352 Evolutionary Psychology 9
85-358 Pro-Social Behavior 9
85-375 Crosscultural Psychology 9
85-377 Attitudes and Persuasion 9
85-433 Social Factors and Well-Being 9
85-444 Relationships 9
85-446 Psychology of Gender 9
85-501 Stress, Coping and Well-Being 9

Clinical/Counseling Psychology Concentration
For Psychology majors who wish to focus a part of their study 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: Units
85-241 Social Psychology 9
85-251 Personality 9

Required additional coursework:
85-261 Abnormal Psychology 9
85-281 Introduction to Clinical Psychology 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
85-425 Child Psychopathology and Treatment 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 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.ccb/) 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/#bachelorscienceinnervescience).

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 (p. 5) 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 (36-201 or equivalent and if possible, 36-309 ). In addition, candidates should complete before the junior year the two-semester calculus sequence 85-310 and 36-309 and by the Fall semester of their sophomore year complete 21-120 /21-122 and a statistics sequence to enhance and increase research in brain sciences.

*Students who place out of 21-120 are only required to successfully complete 21-111 before deciding on the major.

Computing Prerequisite
15-112 Fundamentals of Programming and Computer Science 12

Mathematics
21-120-21-122 Differential and Integral Calculus - Integration and Approximation 20
21-120-21-256 Differential and Integral Calculus - Multivariate Analysis 19
21-127 Concepts of Mathematics 10

Statistics Sequence 18 units
36-201 Statistical Reasoning and Practice 9
36-309 Experimental Design for Behavioral and Social Sciences 9

Computational/Cognitive Modeling Core 29–31 units
Two of the following: Units
15-122 Principles of Imperative Computation 10
15-150 Principles of Functional Programming 10
15-251 Great Ideas in Theoretical Computer Science 12

Plus one of the following: Units
85-412 Cognitive Modeling 9
85-419 Introduction to Parallel Distributed Processing 9
85-426 Learning in Humans and Machines 9

Cognitive Psychology Core 27 units
85-211 Cognitive Psychology 9
or 85-213 Human Information Processing and Artificial Intelligence
85-310 Research Methods in Cognitive Psychology 9

Plus two of the following (one of which must be 85-3xx or Units
85-4xx):
85-219 Biological Foundations of Behavior 9
85-370 Perception 9
85-390 Human Memory 9
85-395 Applications of Cognitive Science 9
85-408 Visual Cognition 9
85-414 Cognitive Neuropsychology 9
80-381 Meaning in Language 9
80-310 Formal Logic 9
80-314 Logic and Artificial Intelligence 9
80-315 Modal Logic 9
80-316 Causation Probability & AI 9
80-383 Language in Use 9

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 9
15-453 Formal Languages, Automata, and Computability 9
10-601 Introduction to Machine Learning (Master's) 12
05-410 User-Centered Research and Evaluation 12
05-432 Personalized Online Learning 12

Psychology
85-219 Biological Foundations of Behavior 9
85-352 Evolutionary Psychology 9
85-354 Infant Language Development 9
85-370 Perception 9
85-375 Crosscultural Psychology 9
85-380 In Search of Mind: The History of Psychology 9
85-390 Human Memory 9
85-392 Human Expertise 9
85-395 Applications of Cognitive Science 9
85-406 Autism: Psychological and Neuroscience Perspectives 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

85-423 Cognitive Development 9
85-426 Learning in Humans and Machines 9
85-429 Cognitive Brain Imaging 9

Philosophy
80-210 Logic and Proofs 9
80-211 Logic and Mathematical Inquiry 9
80-220 Philosophy of Science 9
80-254 Analytic Philosophy 9
80-255 Pragmatism 9
80-270 Philosophy of Mind 9
80-310 Formal Logic 9
80-311 Undecidability and Incompleteness 9
80-314 Logic and Artificial Intelligence 9

Linguistics
76-385 Introduction to Discourse Analysis 9
80-280 Linguistic Analysis 9

Decision Sciences
88-302 Behavioral Decision Making 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 (in the same science) beyond the college's two-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
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. Students in the joint Science and Humanities Scholars (SHS) program can complete the SHS educational core and choose either departmental order for their diploma.

Depending on a student's home college (DC or MCS), General Education (GenEd) requirements will be different. GenEd requirements for DC (http:// coursescatalog.web.cmu.edu/dietrichcollegeofhumanitiesandsocialsciences/ #hampssgeneraleducationprogram160) and MCS (http://
Dependent of Psychology

Degree Requirements:

**Biological Sciences**

<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>or 03-151</td>
<td>Honors Modern Biology</td>
<td></td>
</tr>
<tr>
<td>03-220</td>
<td>Genetics</td>
<td>9</td>
</tr>
<tr>
<td>03-231/232</td>
<td>Biochemistry I</td>
<td>9</td>
</tr>
<tr>
<td>03-320</td>
<td>Cell Biology</td>
<td>9</td>
</tr>
<tr>
<td>03-343</td>
<td>Experimental Techniques in Molecular Biology</td>
<td>12</td>
</tr>
<tr>
<td>03-411</td>
<td>Topics in Research</td>
<td>1</td>
</tr>
<tr>
<td>03-412</td>
<td>Topics in Research</td>
<td>1</td>
</tr>
<tr>
<td>03-xxx</td>
<td>General Biology Elective 1</td>
<td>9</td>
</tr>
<tr>
<td>03-3xx</td>
<td>Advanced Biology Elective 1</td>
<td>18</td>
</tr>
</tbody>
</table>

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

**Chemistry**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>09-207</td>
<td>Techniques in Quantitative Analysis</td>
<td>9-12</td>
</tr>
<tr>
<td>or 09-221</td>
<td>Laboratory I: Introduction to Chemical Analysis</td>
<td></td>
</tr>
<tr>
<td>09-208</td>
<td>Techniques for Organic Synthesis and Analysis</td>
<td>9-12</td>
</tr>
<tr>
<td>or 09-222</td>
<td>Laboratory II: Organic Synthesis and Analysis</td>
<td></td>
</tr>
</tbody>
</table>

**Mathematics, Statistics, Physics and Computer Science**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-120</td>
<td>Differential and Integral Calculus</td>
<td>10</td>
</tr>
<tr>
<td>21-122</td>
<td>Integration and Approximation</td>
<td>10</td>
</tr>
<tr>
<td>or 21-124</td>
<td>Calculus II for Biologists and Chemists</td>
<td></td>
</tr>
<tr>
<td>36-247</td>
<td>Statistics for Lab Sciences</td>
<td>9</td>
</tr>
<tr>
<td>or 36-201</td>
<td>Statistical Reasoning and Practice</td>
<td></td>
</tr>
<tr>
<td>36-309</td>
<td>Experimental Design for Behavioral and Social Sciences</td>
<td>9</td>
</tr>
<tr>
<td>33-121</td>
<td>Physics I for Science Students 2</td>
<td>12</td>
</tr>
<tr>
<td>15-110</td>
<td>Principles of Computing</td>
<td>10-12</td>
</tr>
<tr>
<td>or 15-112</td>
<td>Fundamentals of Programming and Computer Science</td>
<td></td>
</tr>
<tr>
<td>or 02-201</td>
<td>Programming for Scientists</td>
<td></td>
</tr>
<tr>
<td>99-10x</td>
<td>Computing at Carnegie Mellon</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total Science units** 63-65

**Chemistry**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>09-105</td>
<td>Introduction to Modern Chemistry I</td>
<td>10</td>
</tr>
<tr>
<td>09-106</td>
<td>Modern Chemistry II</td>
<td>10</td>
</tr>
<tr>
<td>09-217</td>
<td>Organic Chemistry I</td>
<td>9</td>
</tr>
<tr>
<td>or 09-219</td>
<td>Modern Organic Chemistry</td>
<td></td>
</tr>
<tr>
<td>09-218</td>
<td>Organic Chemistry II</td>
<td>9</td>
</tr>
<tr>
<td>or 09-220</td>
<td>Modern Organic Chemistry II</td>
<td></td>
</tr>
<tr>
<td>09-207</td>
<td>Techniques in Quantitative Analysis</td>
<td>9-12</td>
</tr>
<tr>
<td>or 09-221</td>
<td>Laboratory I: Introduction to Chemical Analysis</td>
<td></td>
</tr>
<tr>
<td>09-208</td>
<td>Techniques for Organic Synthesis and Analysis</td>
<td>9-12</td>
</tr>
<tr>
<td>or 09-222</td>
<td>Laboratory II: Organic Synthesis and Analysis</td>
<td></td>
</tr>
</tbody>
</table>

**Total Chemistry units** 56-62

**Total Elective units** 69-84

**Minimum number of units required for degree:** 360

**Minors in Psychology and Cognitive Neuroscience**

**Minor in Psychology** 72 units

I. Introductory course

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>85-102</td>
<td>Introduction to Psychology</td>
<td>9</td>
</tr>
</tbody>
</table>

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

II. Area Survey courses

Complete two courses.

<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>or 85-213</td>
<td>Human Information Processing and Artificial Intelligence</td>
<td></td>
</tr>
<tr>
<td>85-219</td>
<td>Biological Foundations of Behavior</td>
<td></td>
</tr>
<tr>
<td>85-221</td>
<td>Principles of Child Development</td>
<td>9</td>
</tr>
<tr>
<td>85-241</td>
<td>Social Psychology</td>
<td>9</td>
</tr>
<tr>
<td>85-251</td>
<td>Personality</td>
<td>9</td>
</tr>
</tbody>
</table>

III. Statistics

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>36-201</td>
<td>Statistical Reasoning and Practice</td>
<td>9</td>
</tr>
<tr>
<td>36-309</td>
<td>Experimental Design for Behavioral and Social Sciences</td>
<td>9</td>
</tr>
</tbody>
</table>

**Total units** 27

Upper Level Courses

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

<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>or 85-340</td>
<td>Research Methods in Cognitive Neuroscience</td>
<td>9</td>
</tr>
<tr>
<td>85-314</td>
<td>Cognitive Neuroscience Research Methods</td>
<td>9</td>
</tr>
<tr>
<td>85-320</td>
<td>Research Methods in Developmental Psychology</td>
<td>9</td>
</tr>
<tr>
<td>85-330</td>
<td>Analytic Research Methods</td>
<td>9</td>
</tr>
<tr>
<td>85-340</td>
<td>Research Methods in Social Psychology</td>
<td>9</td>
</tr>
</tbody>
</table>

* 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, 85-484, 85-506, 85-507, 85-508, 85-601, 85-602, 66-501, 66-503.
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 students’ 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

<table>
<thead>
<tr>
<th>Course</th>
<th>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>85-219</td>
<td>Biological Foundations of Behavior</td>
<td>9</td>
</tr>
<tr>
<td>85-211</td>
<td>Cognitive Psychology</td>
<td>9</td>
</tr>
<tr>
<td>or 85-213</td>
<td>Human Information Processing and Artificial Intelligence</td>
<td>9</td>
</tr>
</tbody>
</table>

Distribution Requirements

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

Approaches to Cognitive Neuroscience

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>85-314</td>
<td>Cognitive Neuroscience Research Methods</td>
<td>9</td>
</tr>
<tr>
<td>85-421</td>
<td>Cognitive Modeling</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>15-386</td>
<td>Neural Computation</td>
<td>9</td>
</tr>
<tr>
<td>15-883</td>
<td>Computational Models of Neural Systems</td>
<td>12</td>
</tr>
<tr>
<td>36-746</td>
<td>Statistical Methods for Neuroscience and Psychology</td>
<td>12</td>
</tr>
</tbody>
</table>

Cognitive Neuroscience Electives

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>03-133</td>
<td>Neurobiology of Disease</td>
<td>9</td>
</tr>
<tr>
<td>03-362</td>
<td>Cellular Neuroscience</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>
<tr>
<td>85-356</td>
<td>Music and Mind: The Cognitive Neuroscience of Sound</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>85-390</td>
<td>Human Memory</td>
<td>9</td>
</tr>
<tr>
<td>85-406</td>
<td>Autism: Psychological and Neuroscience Perspectives</td>
<td>9</td>
</tr>
</tbody>
</table>

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 Emilie O’Leary at emilier@andrew.cmu.edu.

Faculty

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

MARLENE BEHRMANN, Professor of Psychology – Ph.D., University of Toronto; Carnegie Mellon, 1993–.

SHARON CARVER, Director of Children’s School, Teaching Professor of Psychology – Ph.D., Carnegie Mellon University; Carnegie Mellon, 1993–.

SHELDON COHEN, Robert E. Doherty University Professor of Psychology – Ph.D., New York University; Carnegie Mellon, 1992–.

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

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

KASEY CRESWELL, Assistant 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–.

JOHN R. HAYES, Emeritus Professor of Psychology – Ph.D., Massachusetts Institute of Technology; Carnegie Mellon, 1965–.

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

LAURIE HELLER, Associate 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–.

CHARLES KEMP, Associate Professor – Ph.D., Massachusetts Institute of Technology; Carnegie Mellon, 2008–.

DAVID KLAHR, Walter van Dyke Bingham Professor – Ph.D., Carnegie Mellon University; Carnegie Mellon, 1969–.

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–.

KENNETH KOTOVSKY, Emeritus Professor of Psychology, Director, Undergraduate Studies in Psychology – Ph.D., Carnegie Mellon University; Carnegie Mellon, 1988–.

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

BRIAN MACWHINNEY, Professor of Psychology – Ph.D., University of California, Berkeley; Carnegie Mellon, 1981–.

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

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, Professor of Psychology – Ph.D., University of Texas; Carnegie Mellon, 1978–.

ROBERT S. SIEGLER, Theresa Heinz Professor of Psychology – Ph.D., Carnegie Mellon University; Carnegie Mellon, 2009–.

KENDALL J. STADLER, Associate Professor of Psychology – Ph.D., University of California, Los Angeles; Carnegie Mellon, 2008–.

KENDALL J. STADLER, Associate Professor of Psychology – Ph.D., University of California, Los Angeles; Carnegie Mellon, 2008–.

SHELDON COHEN, Robert E. Doherty University Professor of Psychology – Ph.D., New York University; Carnegie Mellon, 1992–.

ERIK D. THIENESSEN, Associate Professor – Ph.D., University of Wisconsin, Madison; Carnegie Mellon, 2004–.

TIMOTHY VERSTYNE, Assistant Professor – Ph.D., University of California, Berkeley; Carnegie Mellon, 2006–.