Department of Psychology

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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.

Statement of Community Standards

The Department of Psychology at Carnegie Mellon University strives to be a community that is academically and intellectually rigorous, as well as being diverse, inclusive, and respectful to all of its members. We aspire to promote a collegial professional environment in which all individuals can thrive and do their best work with community support and free from harassment, intimidation, or disrespect. We embrace and champion the following values:

Courtesy and Respect for Individuals

Excellence in the workplace requires an environment that promotes courtesy and civility towards every community member. Courtesy and civility require having mutual respect for one another. Therefore we expect all members of our community to take individual responsibility for:

- Viewing threats, hate speech, and harassment as totally unacceptable in an environment of free exchange of ideas amongst individuals.
- Encouraging all individuals to be respectful of others' views and opinions when expressing their own.
- Communicating with each other in ways that are clear, relevant, timely, constructive, and respectful.
- Making efforts to welcome and get to know all members of our community.
- Taking care of our common spaces rather than assuming that others will do it for us.

Diversity and Inclusion in Our Community

Academic excellence is built on a thriving and diverse community – something that is not possible without respectful treatment of all community members and intentional elimination of barriers to inclusion across groups. Therefore we expect all members of our community to take individual responsibility for:

- Providing mentoring and support for our colleagues.
- Prioritizing recruitment of people from diverse backgrounds into our community.
- Making efforts to be aware of the barriers faced by individuals and, whenever possible, making accommodations to remove or mitigate these barriers.
- Recognizing that with greater power within the academic hierarchy comes greater accountability for our actions and interactions.
- Making efforts to include our colleagues in intellectual and social gatherings during the workday whenever possible and appropriate.

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. Using the outcomes tool (https://www.cmu.edu/career/outcomes/post-grad-dashboard.html)created by CMU's Career & Professional Development Center, students have the opportunity to explore where some of our recent graduates have accepted employment and their positions.

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 (https://www.cmu.edu/dietrich/psychology/cs/) 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 & 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 research projects where they may register and receive credit for freshmen research experience course 85-198 Research Training: Psychology, 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. To compliment students research experience, the department requires 85-509 Research in Psychology Practicum, a 1 unit, pass/fail course which provides students with an opportunity to frame their research experience in a broader professional and scholastic perspective. More information on research labs that are recruiting can be found here (https://www.cmu.edu/dietrich/psychology/undergraduate/current-students/research-and-internships/research-opportunities/).

There is university and departmental funding (https://www.cmu.edu/dietrich/psychology/undergraduate/current-students/research-and-internships/undergrad-research-grants.html) 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 (https://www.upmc.com/locations/hospitals/western-psychiatric/?gclsrc=aw.ds&&utm_kxconfid=sws256pg0&utm_source=GOOGLE&utm_medium=cpc&u+western+psychiatric&utm_advertiserid=700000001754524&gclid=EAIaIQobChMI-7Hg6vyD8gIV 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 experience is available in the department-run CMU Children's School (http://www.cmu.edu/dietrich/psychology/centers-and-facilities/).

If you would like to learn more about the BA and BS in Psychology, please reach out to Crista Crittenden ccritten@andrew.cmu.edu for more information.

Bachelor of Arts in Psychology

Mathematics   10-20 units

21-111-21-112 Calculus I-II	20

or

21-120	Differential and Integral Calculus [*]	10

*Students who place out of 21-120 with AP credit will have successfully completed the calculus requirement

Statistics Sequence   9 units

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

Psychology Surveys   27 units

85-102	Introduction to Psychology [*]	9

Survey Courses - Complete Two		Units
85-104	Psychopathology	9
85-211	Cognitive Psychology	9
or 85-213	Human Information Processing and Artificial Intelligence	
85-219	Foundations of Brain and Behavior	9
85-221	Principles of Child Development	9
85-241	Social Psychology	9
85-251	Personality	9

* Introduction to Psychology cannot be substituted; AP credit does not count towards this requirement

Research Methods   18 units

Complete two courses.

85-310	Research Methods in Cognitive Psychology	9
85-314	Cognitive Neuroscience Research Methods	9
85-320	Research Methods in Developmental Psychology	9
85-330	Analytic Research Methods	9
85-340	Research Methods in Social Psychology	9

Advanced Courses   18 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 85-349. 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   27 Units

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

Any Psychology course between 85-300-85-499.
  Exceptions for the course requirement are: 85-480, 85-482, 85-484, 85-506, 85-507, 85-508, 85-601, 85-602, 66-501, 66-502.

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.
85-484	Practicum in Child Development	Var.
85-507	Research in Psychology	Var.
85-508	Research in Psychology	Var.
85-601	Senior Thesis	9
85-602	Senior Thesis	9
66-501	Dietrich College Senior Honors Thesis I	9
66-502	Dietrich College Senior Honors Thesis II Must receive a B or higher; 9 units min	9
99-270	Summer Undergraduate Research Apprenticeship	9

Breadth

Any 200 level Psychology survey course.

85-104	Psychopathology	9
85-105	Hack Your Life	9
85-106	Animal Minds	9
85-107	The Psychology of Video Games	9

or

Choose from a list of courses found outside of the department with departments including Biological Sciences, History, English, HCI, Philosophy, Social Decision Sciences and Statistics. The elective list may change and for the most up to date list please contact either Crista Crittenden ccritten@andrew.cmu.edu or Emilie O'Leary at emilier@andrew.cmu.edu .

Computer Science Requirement

15-110	Principles of Computing	10
or 88-300	Programming and Data Analysis for Social Scientists	
or 15-112	Fundamentals of Programming and Computer Science	

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

* Given the growing relevance of biology to psychology, it is strongly recommended to take a course in Biological Sciences

Bachelor of Science in Psychology

Mathematics   10-20 units

21-111-21-112 Calculus I-II	20

or

21-120	Differential and Integral Calculus [*]	10

***Students who place out of 21-120 with AP credit will have successfully completed the calculus requirement**

Statistics Sequence   9 units

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

Psychology Surveys   27 units

85-102	Introduction to Psychology [*]	9

Survey Courses - Complete Two		Units
85-104	Psychopathology	9
85-211	Cognitive Psychology	9
or 85-213	Human Information Processing and Artificial Intelligence	
85-219	Foundations of Brain and Behavior	9
85-221	Principles of Child Development	9
85-241	Social Psychology	9
85-251	Personality	9

* Introduction to Psychology cannot be substituted; AP credit does not count towards this requirement

Research Methods   18 units

Complete two courses.

85-310	Research Methods in Cognitive Psychology	9
85-314	Cognitive Neuroscience Research Methods	9

85-320	Research Methods in Developmental Psychology	9
85-330	Analytic Research Methods	9
85-340	Research Methods in Social Psychology	9

Advanced Courses   27 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 85-349. 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   27 Units

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

Any Psychology course between 85-300–85-499. Exceptions for the course requirement are: 85-480, 85-482, 85-484, 85-506, 85-507, 85-508, 85-601, 85-602, 66-501, 66-502.

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.
85-484	Practicum in Child Development	Var.
85-507	Research in Psychology	Var.
85-508	Research in Psychology	Var.
85-601	Senior Thesis	9
85-602	Senior Thesis	9
66-501	Dietrich College Senior Honors Thesis I	9
66-502	Dietrich College Senior Honors Thesis II Must receive a B or higher; 9 units min	9

Breadth

Any 200 level Psychology survey course.

85-104	Psychopathology	9
85-106	Animal Minds	9
85-107	The Psychology of Video Games	9

or

Choose from a list of courses found outside of the department with departments including Biological Sciences, History, English, HCI, Philosophy, Social Decision Sciences and Statistics. The elective list may change and for the most up to date list please contact either Crista Crittenden ccritten@andrew.cmu.edu or Emilie O'Leary at emilier@andrew.cmu.edu

Computer Science Requirement   10 units

15-110	Principles of Computing	10
or 88-300	Programming and Data Analysis for Social Scientists	
or 15-112	Fundamentals of Programming and Computer Science	

NATURAL SCIENCE REQUIREMENT (B.S. 27 UNITS OF WHICH INCLUDE 9 UNITS OF GEN ED SCIENCE)

The B.S. in psychology requires two courses beyond the General Education requirement in natural science.

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

* Given the growing relevance of biology to psychology, it is strongly recommended to take at least one course in Biological Sciences

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, 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 36-309/85-309 . In addition, psychology additional major candidates must complete one science course beyond the GenEd requirement if required for college.

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. Concentrations are not a required part of the major.

Please reach out to Crista Crittenden ccrittenden@andrew.cmu.edu to declare the concentration. The declared concentration will appear in Stellic. 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.

As part of the natural science requirement, choose two of the following		Units
03-121	Modern Biology	9
03-132	Basic Science to Modern Medicine	9
03-133	Neurobiology of Disease	9
03-135	Structure and Function of the Human Body	9

As part of the psychology breadth requirement:

| 85-219 | Foundations of Brain and 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:

85-358	Pro-Social Behavior	9
85-422	Clinical Psychology: Science and Practice	9
85-442	Health Psychology	9
85-443	Social Factors and Well-Being	9
85-446	Psychology of Gender	9

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

85-480	Internship in Clinical Psychology	9
85-507	Research in Psychology	9
85-508	Research in Psychology	9
85-482	Internship in Psychology	9

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 be 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 natural science requirement, choose two of the following		Units
03-121	Modern Biology	9
03-363	Systems Neuroscience	9
03-366	Neuropharmacology: Drugs, Brain and Behavior	9

As part of the psychology Breadth requirement:

| 85-211 | Cognitive Psychology | 9 |
| 85-219 | Foundations of Brain and 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:

85-351	What is Attention?	9
85-356	Expertise: The cognitive (neuro)science of mastering almost any skill	9
85-359	Introduction to Music Cognition Research	9

85-370	Perception	9
85-382	The Psychology and Neuroscience of Consciousness	9
85-385	Auditory Perception: Sense of Sound	9
85-407	How the Brain Makes Meaning	9
85-408	Visual Cognition	9
85-414	Cognitive Neuropsychology	9
85-419	Introduction to Parallel Distributed Processing	9
85-432	Data Science for Psychology and Neuroscience	9
85-435	Biologically Intelligent Exploration	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.
88-342	The Neuroscience of Decision Making	9
Or an additional advanced psychology seminar from the list above		

Learning 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.

As part of the B.S. science requirement, choose one of the following		Units
03-125	Evolution	9
03-121	Modern Biology	9
03-365	Neural Correlates of Learning and Memory	9

As part of the psychology Breadth requirement:		
85-211	Cognitive Psychology	9
85-221	Principles of Child Development	9

As part of the psychology Research Methods Requirement:		
85-310	Research Methods in Cognitive Psychology	9
85-320	Research Methods in Developmental Psychology	9

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

85-343	Children, Race, and Racism	9
85-351	What is Attention?	9
85-354	Infant Language Development	9
85-360	Origins of Intelligence	9
85-363	Attention, Its Development and Disorders	9
85-375	Crosscultural Psychology	9
85-394	Development in Context: Applying Theory and Research to Support Thriving	9
85-407	How the Brain Makes Meaning	9
85-408	Visual Cognition	9
85-418	Infant development: Inside the mind of babies	9

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

85-294	Teaching Assistantship	Var.
85-484	Practicum in Child Development	Var.
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
05-291	Learning Media Design	12
05-418	Design Educational Games	12
57-331	Principles of Education	9
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:		Units
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:

85-351	What is Attention?	9
85-356	Expertise: The cognitive (neuro)science of mastering almost any skill	9
85-359	Introduction to Music Cognition Research	9
85-360	Origins of Intelligence	9
85-363	Attention, Its Development and Disorders	9
85-370	Perception	9
85-385	Auditory Perception: Sense of Sound	9
85-395	Applications of Cognitive Science	9
85-407	How the Brain Makes Meaning	9
85-408	Visual Cognition	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
85-435	Biologically Intelligent Exploration	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	Game 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:		Units
85-104	Psychopathology	9
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
85-358	Pro-Social Behavior	9
85-375	Crosscultural Psychology	9
85-377	Attitudes and Persuasion	9
85-442	Health Psychology	9
85-443	Social Factors and Well-Being	9
85-444	Relationships	9
85-446	Psychology of Gender	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.

One of the following:

03-133	Neurobiology of Disease	9
03-366	Neuropharmacology: Drugs, Brain and Behavior	9
09-303	Hooked: The Molecular Basis of Addiction	6

As part of the Psychology Breadth requirement at least two of the following: Units

85-221	Principles of Child Development	9
85-241	Social Psychology	9
85-251	Personality	9

Required coursework:

85-104	Psychopathology	9
85-422	Clinical Psychology: Science and Practice	9
85-480	Internship in Clinical Psychology	9

As part of the Psychology Research Methods requirements at least one of the following:

85-320	Research Methods in Developmental Psychology	9
85-340	Research Methods in Social Psychology	9

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

85-343	Children, Race, and Racism	9
85-358	Pro-Social Behavior	9
85-363	Attention, Its Development and Disorders	9
85-375	Crosscultural Psychology	9
85-377	Attitudes and Persuasion	9
85-442	Health Psychology	9
85-443	Social Factors and Well-Being	9
85-444	Relationships	9
85-446	Psychology of Gender	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/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 (p. 7) 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 calculus requirement 21-120

(or alternatively 21-111/21-112) and a statistics sequence (36-200 or equivalent and if possible, 36-309/85-309). 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 one of the following 85-310/85-314/85-330and 36-309/85-309 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 Psychology Department (https://www.cmu.edu/dietrich/psychology/undergraduate/current-students/research-and-internships/research-opportunities/) website has more information regarding research for credit opportunities available to undergraduates.

Computing Prerequisite		10 units
15-112	Fundamentals of Programming and Computer Science	12

Mathematics		29-30 units
21-111-21-112 Calculus I-II		20
or		
21-120	Differential and Integral Calculus [*]	10
21-127	Concepts of Mathematics	12

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

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Statistics Sequence		18 units
36-200	Reasoning with Data	9
36-309	Experimental Design for Behavioral & Social Sciences	9
or 85-309	Statistical Concepts and Methods for Behavioral and Social Science	

Computational/Cognitive Modeling Core		29–31 units
Two of the following:		Units
15-122	Principles of Imperative Computation	12
15-150	Principles of Functional Programming	12
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
85-435	Biologically Intelligent Exploration	9

Cognitive Psychology Core		27 units
		Units
85-211	Cognitive Psychology	9
or 85-213	Human Information Processing and Artificial Intelligence	

Plus two of the following, one of which need to be 85-xxx:		Units
85-219	Foundations of Brain and Behavior	9

or 85-106	Animal Minds	
or 80-180	Nature of Language	
85-351	What is Attention?	9
85-359	Introduction to Music Cognition Research	9
85-370	Perception	9
85-375	Crosscultural Psychology	9
85-382	The Psychology and Neuroscience of Consciousness	9
85-385	Auditory Perception: Sense of Sound	9
85-395	Applications of Cognitive Science	9
85-407	How the Brain Makes Meaning	9
85-408	Visual Cognition	9
85-414	Cognitive Neuropsychology	9
85-421	Language and Thought	9
80-381	Meaning in Language	9
80-310	Formal Logic	9
80-315	Modal Logic	9
80-383	Language in Use	9
05-413	Human Factors	9
11-344	Machine Learning in Practice	12

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

16-385	Computer Vision	12
15-453	Formal Languages, Automata, and Computability	9
15-213	Introduction to Computer Systems	12

Psychology

85-219	Foundations of Brain and Behavior	9
85-354	Infant Language Development	9
85-360	Origins of Intelligence	9
85-363	Attention, Its Development and Disorders	9
85-370	Perception	9
85-375	Crosscultural Psychology	9
85-385	Auditory Perception: Sense of Sound	9
85-395	Applications of Cognitive Science	9
85-406	Autism: Psychological and Neuroscience Perspectives	9
85-351	What is Attention?	9
85-356	Expertise: The cognitive (neuro)science of mastering almost any skill	9
85-359	Introduction to Music Cognition Research	9
85-382	The Psychology and Neuroscience of Consciousness	9
85-408	Visual Cognition	9
85-407	How the Brain Makes Meaning	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
85-432	Data Science for Psychology and Neuroscience	9

Philosophy

80-210	Logic and Proofs	9
80-211	Logic and Mathematical Inquiry	9
80-220	Philosophy of Science	9
80-249	AI, Society, and Humanity	9
80-254	Analytic Philosophy	9
80-255	Pragmatism: Making Ideas Work	9
80-270	Problems of Mind and Body: Meaning and Doing	9
80-271	Mind and Body: The Objective and the Subjective	9
80-310	Formal Logic	9
80-311	Undecidability and Incompleteness	9

Human Computer Interaction

05-317	Design of Artificial Intelligence Products	12
05-320	Social Web	12
05-333	Gadgets, Sensors and Activity Recognition in HCI	12
05-823	E-Learning Design Principles and Methods	12
05-433	Programming Usable Interfaces OR Software Structures for Usable Interfaces	6
05-418	Design Educational Games	12
05-413	Human Factors	9
05-410	User-Centered Research and Evaluation	12

Linguistics

80-180	Nature of Language	9
80-280	Linguistic Analysis	9
80-315	Modal Logic	9
76-385	Introduction to Discourse Analysis	9

Machine Learning

10-301	Introduction to Machine Learning (Undergrad)	12
10-335	Art and Machine Learning	12
10-315	Introduction to Machine Learning (SCS Majors)	12
10-405	Machine Learning with Large Datasets (Undergraduate)	12
11-344	Machine Learning in Practice	12
11-411	Natural Language Processing	12

Decision Sciences

88-275	Bubbles: Data Science for Human Minds	9
88-302	Behavioral Decision Making	9
88-355	Social Brains: Neural Bases of Social Perception and Cognition	9
88-380	Dynamic Decisions	9
88-388	Psychological Models of Decision Making	9
88-231	Thinking in Person vs. Thinking Online	9
88-230	Human Intelligence and Human Stupidity	9
88-223	Decision Analysis	12
88-120	Reason, Passion and Cognition	9

Neurosciences

03-133	Neurobiology of Disease	9
03-365	Neural Correlates of Learning and Memory	9
03-366	Neuropharmacology: Drugs, Brain and Behavior	9
86-375	Computational Perception	9
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
03-221	Genomes, Evolution, and Disease: Introduction to Quantitative Genetic Analysis	9
03-360	Genomics and Epigenetics of the Brain	9

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/schools-colleges/dietrichcollegeofhumanitiesandsocialsciences/#hampssgeneraleducationprogram160) and MCS (http://coursecatalog.web.cmu.edu/schools-colleges/melloncollegeofscience/) are found on their respective Catalog pages.

Degree Requirements:

Biological Sciences		Units
03-151	Honors Modern Biology	10
or 03-121	Modern Biology	
03-220	Genetics	9
or 03-221	Genomes, Evolution, and Disease: Introduction to Quantitative Genetic Analysis	
03-231	Honors Biochemistry	9
03-320	Cell Biology	9
03-343	Experimental Techniques in Molecular Biology	12
03-411	Topics in Research	1
03-412	Topics in Research	1
03-xxx	General Biology Elective [1]	9
03-3xx	Advanced Biology Elective [1]	18
Total Biology units		**78**

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

Mathematics, Statistics, Physics and Computer Science		Units
21-120	Differential and Integral Calculus	10
21-124	Calculus II for Biologists and Chemists	10
or 21-122	Integration and Approximation	
36-200	Reasoning with Data	9
36-309	Experimental Design for Behavioral & Social Sciences	9
or 85-309	Statistical Concepts and Methods for Behavioral and Social Science	
33-121	Physics I for Science Students [2]	12
or 33-141	Physics I for Engineering Students	
15-110	Principles of Computing	10-12
or 15-112	Fundamentals of Programming and Computer Science	

99-101	Computing @ Carnegie Mellon	3
Total Science units		**63-65**

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

Chemistry		Units
09-105	Introduction to Modern Chemistry I	10
09-106	Modern Chemistry II	10
09-217	Organic Chemistry I	9
09-218	Organic Chemistry II	9
09-207	Techniques in Quantitative Analysis	9
09-208	Techniques for Organic Synthesis and Analysis	9
Total Chemistry units		**56**

Psychology Courses		Units
85-102	Introduction to Psychology	9
85-219	Foundations of Brain and Behavior	9
85-2xx	Survey Psychology Courses [*]	18
85-310	Research Methods in Cognitive Psychology	9
or 85-314	Cognitive Neuroscience Research Methods	
or 85-320	Research Methods in Developmental Psychology	
or 85-330	Analytic Research Methods	
or 85-340	Research Methods in Social Psychology	
85-3xx	Advanced Psychology Electives	18
Total Psychology units		**63**

[*] Excluding 85-261 Psychopathology

Additional Advanced Elective		9 units
(Choose one of the following courses)		
85-3xx	Advanced Psychology Elective	9
or		
03-3xx	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
85-330	Analytic Research Methods	9
85-340	Research Methods in Social Psychology	9

Elective Units	Units
Free Electives	33-36
MCS Nontechnical Breadth or DC General Education requirements	36-48
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

85-102	Introduction to Psychology [*]	9

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

II. Area Survey courses
Complete one course

85-104	Psychopathology	9
85-211	Cognitive Psychology	9
or 85-213	Human Information Processing and Artificial Intelligence	
85-219	Foundations of Brain and Behavior	9

85-221	Principles of Child Development	9
85-241	Social Psychology	9
85-251	Personality	9

III. Statistics

36-200	Reasoning with Data	9
36-309	Experimental Design for Behavioral & Social Sciences	9
or 85-309	Statistical Concepts and Methods for Behavioral and Social Science	

27 unitsUpper 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	9
85-314	Cognitive Neuroscience Research Methods	9
85-320	Research Methods in Developmental Psychology	9
85-330	Analytic Research Methods	9
85-340	Research Methods in Social Psychology	9

* Prerequisites for all Research Methods courses: 36-309/85-309 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, 66-50

Psychology Elective - Anything with 85-XXX number can be used
9 units

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

03-121	Modern Biology	9
03-363	Systems Neuroscience	9
85-219	Foundations of Brain and Behavior	9
or 03-161	Molecules to Mind	
85-211	Cognitive Psychology	9

Distribution Requirements

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

Approaches to Cognitive Neuroscience

85-213	Human Information Processing and Artificial Intelligence	9
85-314	Cognitive Neuroscience Research Methods	9
85-382	The Psychology and Neuroscience of Consciousness	9
85-407	How the Brain Makes Meaning	9
85-408	Visual Cognition	9
85-412	Cognitive Modeling	9
85-414	Cognitive Neuropsychology	9
85-419	Introduction to Parallel Distributed Processing	9
85-435	Biologically Intelligent Exploration	9
15-386	Neural Computation	9
86-375	Computational Perception	9
85-432	Data Science for Psychology and Neuroscience	9

Cognitive Neuroscience Electives

03-133	Neurobiology of Disease	9
03-362	Cellular Neuroscience	9
03-365	Neural Correlates of Learning and Memory	9
85-211	Cognitive Psychology	9
85-359	Introduction to Music Cognition Research	9
85-360	Origins of Intelligence	9
85-370	Perception	9
85-385	Auditory Perception: Sense of Sound	9
85-351	What is Attention?	9
85-106	Animal Minds	9
85-104	Psychopathology	9

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 Honor 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–

JESSICA CANTLON, Ronald J. and Mary Ann Zdrojkowski 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–

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

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

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

BROOKE C. FEENEY, Professor – 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 – Ph.D., University of Denver; Carnegie Mellon, 1990–

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

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

KENNETH R. KOEDINGER, Hillman Professor & METALS Program Director – Ph.D., Carnegie Mellon University; Carnegie Mellon, 2001–

PHOEBE LAM, Assistant Professor – PhD, Northwestern University; Carnegie Mellon, 2023–

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

BRIAN MACWHINNEY, 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–

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–

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–

MICHAEL TRUJILLO, Assistant Professor – PhD, Virginia Commonwealth University; Carnegie Mellon, 2018–

TIMOTHY VERSTYNEN, Associate Professor and Co Director of the CMU-Pitt BRIDGE Center – Ph.D., University of California, Berkeley ; Carnegie Mellon, 2006–