Dietrich College Interdisciplinary Minors

Dietrich College interdepartmental minors are programs whose content and components span two or more academic departments to form coherent patterns of study.

A number of interdepartmental minors are offered by Dietrich College and are, in general, available to all Carnegie Mellon undergraduate students. As well, there are numerous other minors offered by other colleges in the university that are generally available to Dietrich College students. The full list of minors available to Carnegie Mellon students is located in the catalog index under “Minors.”

Completion of the requirements for any of these minors is noted on the final transcript.

To declare a Dietrich College interdepartmental minor, students should contact the college’s Academic Advisory Center (AAC) and the faculty advisor for that minor.

To discuss the possibility of declaring a non-Dietrich College minor, contact the advisor listed for the minor in question.

In general, unless noted, no course taken to fulfill requirements for these interdepartmental minors may apply toward any other program’s requirements.

The Minor in African and African American Studies

Professor Edda L. Fields-Black, Faculty Advisor
fieldsblack@andrew.cmu.edu, Baker Hall 231B, 412-268-8012

Dr. Andrew Ramey, Senior Academic Advisor, History
aramey@andrew.cmu.edu, Baker Hall 240, 412-268-7906

Mission

The African and African American Studies minor introduces students to several large regions of the world: sub-Saharan Africa, the Americas, and the Caribbean. Broad geographic coverage and a comparative framework encourage students to make connections between Africa and the African Diaspora, as well as among different Diasporan communities. The minor offers undergraduates the opportunity to undertake an empirical and theoretical examination of the cultural, political, social, and historical experiences of Africans and people of African descent.

This unique transnational minor brings together several departments and colleges within the university and allows students to develop analytical skills particular to the arts, humanities, social sciences, public policy, and management. The African and African American Studies minor allow students a considerable degree of freedom in their choice of electives and independent research projects, including opportunities to study and conduct research in a relevant foreign language.

Courses taken to fulfill requirements in other major or minor programs may only be applied to this minor with permission of the Faculty Advisor.

Requirements

- The minor is composed of 54 units - two core courses and four elective courses.
- The elective courses must include one course that requires a research paper or project.
- Students may take an additional two core courses as electives, but not more than four total courses.
- Students must take courses in at least two of the four regions (African, African American, Latin American, and the Caribbean) between their core and elective courses.

Core Courses 18 units

Choose two from the History and/or English Department courses listed below:

African
79-226 African History: Earliest Times to 1780 9
79-227 Modern Africa: The Slave Trade to the End of Apartheid 9

African American
76-232 Introduction to Black Literature 9
79-241 African American History: Africa to the Civil War 9

Elective Courses 36 units

African
79-225 West African History in Film 9
79-257 Comparative Slavery 9
79-290 The Slave Passage: From West Africa to the Americas 9
79-385 Out of Africa: The Making of the African Diaspora 9
82-303 French & Francophone Cultures 9
82-304 French & Francophone Sociolinguistics 9

African American
57-480 History of Black American Music 6
76-238 What Was the Hiphop Generation? 9
76-333 Race and Controversy in the Arts 9
79-237 Comparative Slavery 9
79-247 African Americans, Imprisonment, and the Carceral State 9
79-252 *Harriet*: Harriet Tubman, Slavery, and the Underground Railroad 6
79-304 African Americans in Pittsburgh 9
79-371 African American Urban History 9

Latin American
79-237 Comparative Slavery 9
79-385 Out of Africa: The Making of the African Diaspora 9
82-303 French & Francophone Cultures 9
82-304 French & Francophone Sociolinguistics 9

Caribbean
79-234 How the West Indies Made the World 9
82-303 Latin America Language and Culture 9
82-451 Studies in Latin American Literature and Culture 9

Notes:

* Denotes courses that require a research paper/project.
** Denotes courses taught in a foreign language

The Minor in Film and Media Studies

Laura E. Donaldson, Academic Advisor
jeffrey.hinkel@andrew.cmu.edu, Faculty Advisor
76-239 Introduction to Film Studies (prerequisite for 76-439) 9

Mission

Film and the electronic media are a crucial part of contemporary culture and society; they constitute an important tool for understanding social arrangements, historical changes, and play an increasingly important role in the development of aesthetic and cultural theory. The Dietrich College minor in Film and Media Studies takes an interdisciplinary approach to the study of film and other electronic media. Courses provide techniques for analyzing and criticizing film and other media, for assessing their value as historical, anthropological and social scientific data, and for understanding the aesthetic and philosophical premises of various media texts.

A maximum of two courses may double count with other programs.

The courses listed below are offered with at least general regularity. Participating departments may subsequently develop and offer other courses that, while not listed here, are deemed appropriate for this minor. A faculty advisor for the minor should be consulted (especially when the schedule of courses to be offered for a given semester becomes available) to identify such additional courses.
Required Intermediate Course  9 units
76-310 Advanced Studies in Film and Media  9

Film and Media Electives  27 units
Complete a minimum of 27 units of course work at the 200-level or above when the primary topic is film and media. Courses may include, but are not limited to, the following:

76-238 What Was the Hip-Hop Generation?  9
76-243 Introduction to Television  9
76-259 Film History  9
76-269 Survey of Forms: Screenwriting  9
76-292 Film Production  9
76-295 Russian Cinema: From the Bolshevik Revolution to Putin’s Russia  9
76-312 Crime and Justice in American Film  9
76-313 Creative Visual Storytelling in Film Production  9
76-316 Topics in Literature: Watching HBO’s The Watchmen  9
76-339 Topics in Film and Media  9
76-353 Transnational Feminisms: Fiction and Film  9
76-367 Fact into Film: Translating History into Cinema  9
76-374 Mediated Narrative  9
76-377 Shakespeare on Film  9
76-397 Media in a Digital Age  9
76-438 The Wire: Crime, Realism, and Long-Form TV  9
76-439 Film Seminar: The Rise of the Art Film  9
76-448 Shakespeare on Film  9
76-449 Race and Media  9
76-454 Rise of the Blockbuster  9
76-456 Independent Study in Film & Media Studies  Var.
76-469 Screenwriting Workshop  9
76-476 Screening Mexico: Mexican Cinema, 1898 to Present  6
76-477 Fact into Film: Translating History into Cinema  9
76-480 Crime and Justice in American Film  9
76-489 The Chinese Revolution Through Film (1840-2000)  9
76-499 India Through Film  9
76-348 Juvenile Delinquency & Film: From “Boyz N the Hood” (1991) to “The Wire” (2002-08)  6
76-351 The Cold War in Documents and Film  9
82-215 Arab Culture Through Dialogues, Film, and Literature  9
82-278 Japanese Film and Literature: The Art of Storytelling  9
82-296 World War I - the View from Paris & St. Petersburg  9
82-362 Italian Language and Culture II  9
82-253 Korean Culture Through Film  9
82-428 History of German Film  9
82-456 Topics in Hispanic Studies  9
82-533 Cultural Topics in Chinese Studies  9

* May be taken up to three times and counted for additional credit toward Film and Media Electives if topics differ.

Students should consult with a faculty advisor for the minor regarding courses not listed above.

400-level Film and Media Course  9 units
Complete one 400-level course that concentrates on film/media directly or that uses it as a tool of social or cultural analysis.

76-419 Media in a Digital Age  9
76-438 The Wire: Crime, Realism, and Long-Form TV  9
76-439 Film Seminar: The Rise of the Art Film  9
76-448 Shakespeare on Film  9
76-454 Rise of the Blockbuster  9
76-449 Race and Media  9
76-456 Independent Study in Film & Media Studies  Var.

76-467 Crime Fiction and Film  9
76-469 Screenwriting Workshop  9

The Minor in Gender Studies

Lisa Tetrault, Professor of History and Faculty Advisor
tetrault@andrew.cmu.edu
Location: English Department, Baker Hall 259

Gender studies is an interdisciplinary field that investigates how gender is embedded in social, cultural, and political relationships. It understands gender as a category of power that intersects with other power relations, including race, class, and sexuality.

Courses allow students to develop a deeper understanding of how gender operates, and to transfer the analytical skills they acquire to other courses as well as to their personal and professional lives. The minor combines coursework in some combination of the following fields: English, history, anthropology, psychology, philosophy, economics, and modern languages.

Courses listed are only examples. Course offerings change regularly, so please consult semester offerings and the minor advisor for other courses.

The courses listed below are offered with at least general regularity. Participating departments may develop and offer other courses that, while not listed here, are appropriate for the study of gender. Consult the minor advisor to confirm the relevance of unlisted, gender-focused courses.

Complete 1 of the following required courses.  9 units
76-241 Introduction to Gender Studies  9
79-320 Women, Politics, and Protest  9
79-331 Body Politics: Women and Health in America  9

Complete 5 or more additional courses totaling at least 45 units.  45 units

See examples below, but other courses may fulfill this requirement.*
76-311 Acting Out in the London Theatre  9
76-341 Gender and Sexuality in Performance  9
76-353 Transnational Feminisms: Fiction and Film  9
76-412 Performance and 18th Century Theatrical Culture  9
76-422 Gender and Sexuality Studies  4.5
76-441 Theorizing Sexuality  9
79-244 Women in American History  9
79-320 Women, Politics, and Protest **  9
79-323 Family, Gender, and Sexuality in European History, 500-1800  9
79-324 #MeToo: Naming and Resisting Gender Violence  6
79-325 U.S. Gay and Lesbian History  6
79-327 Modern Girlhood: Historical and Contemporary Perspectives  6
79-331 Body Politics: Women and Health in America **  9
80-224 Race, Gender and Science  9
82-300 Language & Society in the Arab World  9
84-312 Gender and Development in Sub-Saharan Africa  6
85-350 Psychology of Prejudice  9
85-446 Psychology of Gender  9

* Consult with Gender Studies Minor Advisor Professor Lisa Tetrault at tetrault@andrew.cmu.edu.
** If not taken as a requirement.

The Minor in Global Systems and Management

Correy Dandoy, Academic Advisor
Location: HBH 3051

Graduates across all disciplines are increasingly likely to find themselves working as part of a global development team on a wide variety of business, consumer, and intellectual products and services.

The Global Systems and Management minor (GSM) is intended for students wishing to develop skills essential for participating in emerging opportunities in global business systems, systems development, product development and global project management. GSM exposes students to...
contemporary issues and practices facing organizations, managers and individuals working on a global scale across political, cultural and temporal boundaries. GSM presents an opportunity for students to learn about being part of an organization that works globally with its employees, business partners, customers and supply chains.

Students will learn about global project management, outsourcing and cross-cultural communications from theoretical and practical viewpoints. An organized elective structure enables students to tailor the minor to reflect their specific interests.

Curriculum 63

GSM is offered jointly across the departments and programs of the Dietrich College of Humanities and Social Sciences with participation from the Tepper School of Business. The minor is administered by the Dietrich College Information Systems program. The minor requires students to complete 63 units. Note that the courses listed below may be subject to change:

- one Information Systems course: 67-329 Contemporary Themes in Global Systems (offered annually)
- two courses in Communications
- a total of 36 units with at least 9 units in each of the categories of:
  - Humanities, Heritage and Culture
  - International Management

Study Abroad Options

Students are encouraged to complete a semester of study abroad. With prior approval from the GSM Advisor, study abroad courses may be applied to GSM minor requirements except for 67-329 Contemporary Themes in Global Systems. Please consult with the GSM Advisor before embarking on the semester of study abroad.

Double Counting of Courses

At least four of the courses counting toward the GSM minor must be unique to the minor.

Core Course

This course introduces the effective fundamentals of global project management and the mechanics of sourcing arrangements including offshore outsourcing.

Required course:
67-329 Contemporary Themes in Global Systems (offered annually) 9

Communications 18 units

Courses from this category focus on expanding students' communication skills, particularly those necessary to be successful in a professional environment. These skills may include written, oral, and interpersonal communication, as well as presentation, teamwork, and public speaking skills.

Complete two courses:
05-341 Organizational Communication 9
70-321 Negotiation and Conflict Resolution 9
70-340 Business Communications 9
70/85/88-341 Team Dynamics and Leadership 9
70-342 Managing Across Cultures 9
70-350 Acting for Business 9
70-483 Advertising and Marketing Communications 9
73-341 Managing through Incentives 9
76-270 Writing for the Professions 9
76-318 Communicating in the Global Marketplace 9
76-386/786 Language & Culture 9
76-428 Visual Verbal Communication 9
85-375 Crosscultural Psychology 9
88-418 Negotiation: Strategies and Behavioral Insights 9
88-419 International Negotiation 9

Humanities, Heritage and Culture (HHC) & International Management (IM) 36 units

(Complete at least 9 units of HHC or IM)

Humanities, Heritage and Culture

Courses from this category focus on expanding students' knowledge and understanding of societies and cultures outside of the United States.

Students are expected to gain a broader cultural understanding of individuals with whom they will interact in global business systems.

- At least 9 units in total

History course 79-200 level or above covering international/regional studies that are outside of U.S. history
82-215 Arab Culture Through Dialogues, Film, and Literature Var. 9
82-238 Topics in Chinese Culture 9
82-253 Korean Culture Through Film 9
82-254 World of Korea, Then and Now 9
82-273 Introduction to Japanese Language and Culture 9
82-278 Japanese Film and Literature: The Art of Storytelling 9
82-293 Russian Cinema: From the Bolshevik Revolution to Putin's Russia 9
82-303 French & Francophone Cultures 9
82-304 French & Francophone Sociolinguistics 9
82-305 French in its Social Contexts 9
82-311 Advanced Arabic I 9
82-312 Advanced Arabic II 9
82-320 Contemporary Society in Germany, Austria and Switzerland 9
82-323 Germany, Austria and Switzerland in the 20th Century 9
82-333 Introduction to Chinese Language and Culture Var. 9
82-342 Spain: Language and Culture 9
82-343 Latin America Language and Culture 9
82-345 Introduction to Hispanic Literary & Cultural Studies 9
82-361 Italian Language and Culture I 9
82-362 Italian Language and Culture II 9
82-399 Special Topics: Russian in Context Var. 9
82-400 Russian Studies Topics 6
82-415 Topics in French and Francophone Studies 9
or 82-416 Topics in French and Francophone Studies 9
82-425 Topics in German Literature and Culture 9
82-433 Topics in Contemporary Culture of China 9
82-441 Studies in Peninsular Literature and Culture 9
82-450 Advanced Research in Hispanic Language & Culture 9
82-456 Topics in Hispanic Studies 9
82-473 Topics in Japanese Studies 9
or 82-474 Topics in Japanese Studies 9
82-474 Topics in Japanese Studies 9
84-275 Comparative Politics 9
84-312 Gender and Development in Sub-Saharan Africa 6
84-309 Terrorism and Insurgency 9

International Management

Courses from this category focus on expanding students' ability to effectively manage and make decisions that are important in operating and navigating a global businesses. Students are expected to gain an understanding of how to be an effective part of an organization that works globally with its employees, business partners, customers and supply chains.

- At least 9 units in total

19-411 Science and Innovation Leadership for the 21st Century: Firms, Nations, and Tech 9
67-319-67-331 Global Technology Consulting Groundwork - Technology Consulting in the Global Community (these two courses are taken sequentially) 6
67-331 Technology Consulting in the Global Community 3
70-342 Managing Across Cultures 9
70-364 Business Law 9
70-365 International Trade and International Law 9
70-430 International Management 9
70-480 International Marketing 9
73-341 Managing through Incentives 9
84-310 International Political Economy 9
84-311 International Development: Theory and Praxis 9
Minor in Health Care Policy and Management

Sponsored by: Heinz College of Information Systems and Public Policy
Dietrich College of Humanities and Social Sciences
Mellon College of Science

Faculty Advisors:
Jason D’Antonio, Mellon College of Science
James F. Jordan, H. John Heinz III College

The face of health care is changing. The practice of medicine is being fundamentally altered by the forces of change in public policy, health care organizations and in the industry as a whole. The role of individual professionals in this industry is changing as rapidly as the industry itself. Traditional career paths have disappeared overnight to be replaced by new opportunities that require new skills. New organizations are placing new demands on their professional and medical staffs. The criteria of efficiency and financial stability are entering the domains of diagnosis and treatment.

This minor is designed to provide students considering a career in the health professions with an understanding of how these changes are likely to affect their careers. Students will become familiar with the critical policy and management issues and will begin to learn to operate effectively in the emerging health care environment. The curriculum combines economic, professional, and financial stability are entering the domains of diagnosis and treatment. 

This minor is designed to provide students considering a career in the health professions with an understanding of how these changes are likely to affect their careers. Students will become familiar with the critical policy and management issues and will begin to learn to operate effectively in the emerging health care environment. The curriculum combines economic, professional, and financial stability are entering the domains of diagnosis and treatment. 

The Minor in Linguistics

Linguistics is the scientific study of human language. The central goal of the Linguistics Program is to provide students with the analytical skills and linguistic concepts needed to understand language scientifically, whether formally, as researchers, or informally, as participants in daily linguistic interactions. The foundation of the Linguistics Minor is a set of rigorous core courses, informed by contemporary approaches to the study of linguistic form and meaning. The Core courses cover the principal domains of linguistic analysis: phonetics and phonology, syntax, and meaning. Students then move on to the Extended Core, which includes more advanced courses as well as courses on a wider range of topics, such as intonation and language variation. All courses counted toward the minor must be taken for a letter grade and passed with a grade of “C” or above.

Core (27 units)

Required
80-180 Nature of Language 9
Select 2 from the following 3 options
80-282 Phonetics and Phonology I 9
80-280 Linguistic Analysis 9
or 80-285 Natural Language Syntax 9
80-381 Meaning in Language 9
or 80-383 Language in Use 9

Other courses as approved

Extended Core: Choose 3 courses (27 units) from the Extended Core and/or additional courses from Core.

Extended Core
80-283 It Matters How You Say It 9
80-284 Invented Languages 9
80-286 Words and Word Formation: Introduction to Morphology 9
80-287 Language Variation and Change 9
80-288 Intonation: Transcription and Analysis 9
80-284 Invented Languages 9
80-382 Phonetics and Phonology II 9
80-384 Linguistics of Turkic Languages 9
80-385 Linguistics of Germanic Languages 9
80-388 Linguistic Typology: Diversity and Universals 9
80-488 Acoustics of Human Speech: Theory, Data, and Analysis 9
The Minor in Logic and Computation

The Minor in Logic and Computation provides students with general course work in logic, the theory of computation, and philosophy. Students must complete six courses, among them the following three core courses. All courses counted towards the minor must be taken for a letter grade and passed with a grade of “C” or above.

Logic and Computation Core Courses 27 units

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>80-150</td>
<td>Nature of Reason</td>
<td>9</td>
</tr>
<tr>
<td>80-211</td>
<td>Logic and Mathematical Inquiry</td>
<td>9</td>
</tr>
<tr>
<td>or 80-210</td>
<td>Logic and Proofs</td>
<td>9</td>
</tr>
<tr>
<td>80-310</td>
<td>Formal Logic</td>
<td>9</td>
</tr>
<tr>
<td>or 80-311</td>
<td>Undecidability and Incompleteness</td>
<td>9</td>
</tr>
</tbody>
</table>

Logic and Computation Electives 27 units

Students must take two courses in the Philosophy Department at the 300-level or higher, in subjects related to logic and computation. And an additional course at the 300-level or higher in an area that uses logical and computational tools, such as philosophy, computer science, linguistics, mathematics, psychology, or statistics. The choice of electives must be approved by the Academic Program Manager.

Neural Computation Minor

Dr. Tai Sing Lee, Director
Melissa Stupka, Administrative Coordinator

Neural computation is a scientific enterprise to understand the neural basis of intelligent behaviors from a computational perspective. Study of neural computation includes, among others, decoding neural activities using statistical and machine learning techniques, and developing computational theories and neural models of perception, cognition, motor control, decision-making and learning. The neural computation minor allows students to learn about the brain from multiple perspectives, and to acquire the necessary background for graduate study in neural computation. Students enrolled in the minor will be exposed to, and hopefully participate in, the research effort in neural computation and computational neuroscience at Carnegie Mellon University.

The minor in Neural Computation is an intercollege minor jointly sponsored by the School of Computer Science, the Mellon College of Science, and the Dietrich College of Humanities and Social Sciences, and is coordinated by the Neuroscience Institute (https://www.cmu.edu/ni/) and the Center for the Neural Basis of Cognition (CNBC) (http://www.cnbc.cmu.edu/).

The Neural computation minor is open to students in any major of any college at Carnegie Mellon. It seeks to attract undergraduate students from computer science, psychology, engineering, biology, statistics, physics, and mathematics from SCS, CIT, Dietrich College and MCS. The primary objective of the minor is to encourage students in biology and psychology to learn about neuroscience, and to bring students from different disciplines together to form a community. The curriculum and course requirements are designed to maximize the participation of students from diverse academic disciplines. The program seeks to produce students with both basic computational skills and knowledge in cognitive science and neuroscience that are central to computational neuroscience.

APPLYING

Students must apply for admission no later than November 30 of their senior years; an admission decision will usually be made within one month. Students are encouraged to apply as early as possible in their undergraduate careers so that the director of the Neural Computation minor can provide advice on their curriculum, but should contact the program director any time even after the deadline.

To apply, send email to the director of the Neural Computation minor Dr. Tai Sing Lee (tai@cnbc.cmu.edu) and copy Melissa Stupka (mstupka@andrew.cmu.edu). Include in your email:

- Full name
- Andrew ID
- Preferred email address (if different)
- Your class and College/School at Carnegie Mellon
- Semester you intend to graduate
- All (currently) declared majors and minors
- Statement of purpose (maximum 1 page) - Describes why you want to take this minor and how it fits into your career goals
- Proposed schedule of required courses for the Minor (this is your plan, NOT a commitment)
- Research projects you might be interested in

Curriculum

The Minor in Neural Computation will require a total of five courses: four courses drawn from the four core areas (A: neural computation, B: neuroscience, C: cognitive psychology, D: intelligent system analysis), one from each area, and one additional depth elective chosen from one of the core areas that is outside the student’s major. The depth elective can be replaced by a one-year research project in computational neuroscience. No more than two courses can be double counted toward the student’s major or other minors. However, courses taken for general education requirements of the student’s degree are not considered to be double counted. A course taken to satisfy one core area cannot be used to satisfy the course requirement for another core area. The following listing presents a set of current possible courses in each area. Other computational neuroscience courses are being developed at Carnegie Mellon and University of Pittsburgh that will also satisfy core area A requirement and the requirements will be updated as they come on-line. Substitution is possible but requires approval.

A. Neural Computation

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>15-386</td>
<td>Neural Computation</td>
<td>9</td>
</tr>
<tr>
<td>15-387</td>
<td>Computational Perception</td>
<td>9</td>
</tr>
<tr>
<td>15-883</td>
<td>Computational Models of Neural Systems</td>
<td>12</td>
</tr>
<tr>
<td>85-419</td>
<td>Introduction to Parallel Distributed Processing</td>
<td>9</td>
</tr>
<tr>
<td>86-375</td>
<td>Computational Perception</td>
<td>9</td>
</tr>
<tr>
<td>85-765</td>
<td>Cognitive Neuroscience</td>
<td>Var.</td>
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</tbody>
</table>

B. Neuroscience

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<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>03-362</td>
<td>Cellular Neuroscience</td>
<td>9</td>
</tr>
<tr>
<td>03-363</td>
<td>Systems 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>42-630</td>
<td>Introduction to Neural Engineering</td>
<td>12</td>
</tr>
<tr>
<td>85-765</td>
<td>Cognitive Neuroscience</td>
<td>Var.</td>
</tr>
</tbody>
</table>

C. Cognitive Psychology

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>85-211</td>
<td>Cognitive Psychology</td>
<td>9</td>
</tr>
<tr>
<td>85-213</td>
<td>Human Information Processing and Artificial Intelligence</td>
<td>9</td>
</tr>
<tr>
<td>85-412</td>
<td>Cognitive Modeling</td>
<td>9</td>
</tr>
<tr>
<td>85-419</td>
<td>Introduction to Parallel Distributed Processing</td>
<td>9</td>
</tr>
<tr>
<td>85-426</td>
<td>Learning in Humans and Machines</td>
<td>9</td>
</tr>
<tr>
<td>85-765</td>
<td>Cognitive Neuroscience</td>
<td>Var.</td>
</tr>
</tbody>
</table>

D. Intelligent System Analysis

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<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>10-301</td>
<td>Introduction to Machine Learning</td>
<td>12</td>
</tr>
<tr>
<td>or 10-315</td>
<td>Introduction to Machine Learning (SCS Majors)</td>
<td>12</td>
</tr>
<tr>
<td>15-281</td>
<td>Artificial Intelligence: Representation and Problem Solving</td>
<td>12</td>
</tr>
<tr>
<td>15-386</td>
<td>Neural Computation</td>
<td>9</td>
</tr>
<tr>
<td>15-387</td>
<td>Computational Perception</td>
<td>9</td>
</tr>
<tr>
<td>15-494</td>
<td>Cognitive Robotics: The Future of Robot Toys</td>
<td>12</td>
</tr>
<tr>
<td>16-299</td>
<td>Introduction to Feedback Control Systems</td>
<td>12</td>
</tr>
<tr>
<td>16-311</td>
<td>Introduction to Robotics</td>
<td>12</td>
</tr>
<tr>
<td>16-385</td>
<td>Computer Vision</td>
<td>12</td>
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<tr>
<td>18-290</td>
<td>Signals and Systems</td>
<td>12</td>
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<tr>
<td>24-352</td>
<td>Dynamic Systems and Controls</td>
<td>12</td>
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<tr>
<td>36-225</td>
<td>Introduction to Probability Theory</td>
<td>9</td>
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<tr>
<td>36-247</td>
<td>Statistics for Lab Sciences</td>
<td>9</td>
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<tr>
<td>36-401</td>
<td>Modern Regression</td>
<td>9</td>
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<tr>
<td>36-410</td>
<td>Introduction to Probability Modeling</td>
<td>9</td>
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<tr>
<td>36-746</td>
<td>Statistical Methods for Neuroscience and Psychology</td>
<td>12</td>
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</tbody>
</table>
42-631 Neural Data Analysis 9
42-632 Neural Signal Processing 12
86-375 Computational Perception 9
86-631 Neural Data Analysis 9

Prerequisites
The required courses in the above four core areas require a number of basic prerequisites: basic programming skills at the level of 15-110 Principles of Computing and basic mathematical skills at the level of 21-122 Integration and Approximation or their equivalents. Some courses in Area D require additional prerequisites. Area B Biology courses require, at minimum, 03-121 Modern Biology. Students might skip the prerequisites if they have the permission of the instructor to take the required courses. Prerequisite courses are typically taken to satisfy the students’ major or other requirements. In the event that the student is not part of the prerequisite or required courses of a student’s major, one of them can potentially count toward the five required courses (e.g., the depth elective), conditional on approval by the director of the minor program.

Research Requirements (Optional)
The minor itself does not require a research project. The student however may replace the depth elective with a year-long research project. In special circumstances, a research project can also be used to replace one of the five courses, as long as (1) the project is not required by the student’s major or other minor, (2) the student has taken a course in each of the four core areas (not necessarily for the purpose of satisfying this minor’s requirements), and (3) has taken at least three courses in this curriculum not counted toward the student’s major or other minors. Students interested in participating in the research project should contact any faculty engaged in computational neuroscience or neural computation research at Carnegie Mellon or in the University of Pittsburgh. A useful webpage that provides listing of faculty in neural computation is https://www.cmub.edu/ni/academics/pnc/pnc-training-faculty.html. The director of the minor program will be happy to discuss with students about their research interest and direct them to the appropriate faculty.

Fellowship Opportunities
The Program in Neural Computation (PNC) administered by the Center for the Neural Basis of Cognition currently provides 3-4 competitive full-year fellowships ($11,000) to Carnegie Mellon undergraduate students to carry out mentored research in neural computation. The fellowship has course requirements similar to the requirements of the minor. Students do not apply to the fellowship program directly. They have to be nominated by the faculty members who are willing to mentor them. Therefore, students interested in the full-year fellowship program should contact and discuss research opportunities with any CNBC faculty at Carnegie Mellon or University of Pittsburgh working in the area of neural computation or computational neuroscience and ask for their nomination by sending email to Dr. Tai Sing Lee, who also administers the undergraduate fellowship program at Carnegie Mellon. See www.cnbc.cmu.edu/training/undergraduate/undergraduate-research-fellowships-in-computational-neuroscience/ for details.

The Program in Neural Computation also offers a summer training program for undergraduate students from any U.S. undergraduate college. The students will engage in a 10-week intense mentored research and attend a series of lectures in neural computation. See www.cnbc.cmu.edu/training/undergraduate/summer-undergraduate-research-program-in-computational-neuroscience/ for application information.

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## The Minor in Religious Studies

Professor Allyson Creasman, Faculty Advisor
acreasman@cmu.edu (aeowen@cmu.edu), Baker Hall 242D, 412-268-9832

Dr. Andrew Ramey, Senior Academic Advisor, History
aramey@andrew.cmu.edu, Baker Hall 240, 412-268-7906

The Religious Studies minor offers students a range of intellectual tools for thinking about religious ideas, behaviors and institutions. It also enables students to build a base of knowledge that extends beyond any one particular religious tradition.

### Curriculum

The minor consists of six courses, totaling at least 54 units. Courses taken to fulfill requirements in other major or minor programs may only be applied to this minor with permission of the Faculty Advisor.

### Required Core Course

9 units

All Religious Studies minors are required to take 79-281, Introduction to Religion. This required course introduces several modes of inquiry into religion, such as the philosophy of religion, sociological and behavioral approaches to religion, historical analysis of religious subject, literary and critical analysis of religious texts, theological modes of thought, and anthropological treatments of religion. This course is offered regularly, usually in the Spring semester.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>79-281</td>
<td>Introduction to Religion</td>
</tr>
</tbody>
</table>

### Distribution Requirements

18 units

In addition to the required Core Course, students must complete Distribution Courses totaling 18 units (usually two 9-unit courses). A Distribution Course is one that applies a particular discipline to more than one religion. Some examples of qualifying Distribution Courses that have been offered include:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>79-208</td>
<td>Witchcraft and Witch-Hunting</td>
</tr>
<tr>
<td>79-307</td>
<td>Religion and Politics in the Middle East</td>
</tr>
<tr>
<td>79-352</td>
<td>Christianity Divided: The Protestant and Catholic Reformations, 1450-1650</td>
</tr>
<tr>
<td>80-276</td>
<td>Philosophy of Religion</td>
</tr>
<tr>
<td>76-331</td>
<td>Dissenters and Believers: Romantics, Revolution, and Religions</td>
</tr>
</tbody>
</table>

In addition to the courses listed above, participating departments often offer other courses that may qualify as Distribution Courses for the minor. The Faculty Advisor should be consulted to identify qualifying courses (especially after the Schedule of Courses for a given semester becomes available).

### Elective Courses

27 units

In addition to the required Core Course and the Distribution Courses, students must complete Elective Courses totaling at least 27 units (usually three 9-unit courses). Unlike Distribution Courses, an Elective Course may focus on the study of only one religion (although courses examining more than one religious tradition may be accepted as Elective Courses if not otherwise used to fulfill the Distribution Requirement).

Some examples of qualifying Elective Courses that have been offered include:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>79-202</td>
<td>Flesh and Spirit: Early Modern Europe, 1400-1750</td>
</tr>
<tr>
<td>79-296</td>
<td>Religion in American Politics</td>
</tr>
<tr>
<td>79-349</td>
<td>United States and the Holocaust</td>
</tr>
<tr>
<td>79-350</td>
<td>Early Christianity</td>
</tr>
<tr>
<td>79-375</td>
<td>Science &amp; Religion</td>
</tr>
</tbody>
</table>

In addition to the courses listed above, participating departments often offer other courses that may qualify as Elective Courses for the minor. The Faculty Advisor should be consulted to identify qualifying courses (especially after the Schedule of Courses for a given semester becomes available).

In addition to courses offered at CMU, relevant courses taken at the University of Pittsburgh, Duquesne University, or other Pittsburgh...
The Minor in Science, Technology and Society

Professor Christopher J. Phillips, Faculty Advisor
cjp1@cmu.edu, Baker Hall 231C, 412-268-1753
Dr. Andrew Ramey, Senior Academic Advisor, History
aramey@andrew.cmu.edu, Baker Hall 240, 412-268-7906

This minor provides interdisciplinary perspectives on the development and meaning of science and technology in modern society. The core courses enable you to develop a historical and philosophical understanding of the interplay among science, technology, and society. Elective courses enable you to pursue in greater depth and variety subjects and approaches that build on both the core courses and your primary major.

Courses taken to fulfill requirements in other major or minor programs may only be applied to this minor with permission of the Faculty Advisor.

Curriculum 54 units

Core Courses 27 units

Complete one course from each area. Additional courses from the History of Science Core and the History of Philosophy Core may count as electives for the minor.

Area 1. History of Science Core

Take at least 1 course from the list below.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>79-234</td>
<td>Technology and Society</td>
</tr>
<tr>
<td>79-299</td>
<td>From Newton to the Nuclear Bomb: History of Science, 1750-1950</td>
</tr>
<tr>
<td>79-305</td>
<td>Moneyball Nation: Data in American Life</td>
</tr>
<tr>
<td>79-330</td>
<td>Medicine and Society: Health, Healers, and Hospitals</td>
</tr>
<tr>
<td>79-342</td>
<td>Introduction to Science and Technology Studies</td>
</tr>
<tr>
<td>79-370</td>
<td>Technology in the United States</td>
</tr>
<tr>
<td>79-380</td>
<td>Hostile Environments: The Politics of Pollution in Global Perspective</td>
</tr>
</tbody>
</table>

Area 2. Philosophy of Science Core

Take at least 1 course from the list below.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>80-220</td>
<td>Philosophy of Science</td>
</tr>
<tr>
<td>80-221</td>
<td>Philosophy of Social Science</td>
</tr>
<tr>
<td>80-226</td>
<td>Revolutions in Science</td>
</tr>
<tr>
<td>80-244</td>
<td>Environmental Ethics</td>
</tr>
<tr>
<td>80-245</td>
<td>Medical Ethics</td>
</tr>
<tr>
<td>80-249</td>
<td>AI, Society, and Humanity</td>
</tr>
</tbody>
</table>

Area 3. Science Core

Take at least 1 course (9 units total) from the following departments: 15-xxx Computer Science, 09-xxx Chemistry, 03-xxx Biological Sciences, 35-xxx Physics

Electives 27 units

Complete three courses from the approved list of elective courses. Courses listed in Areas 1 and 2 may also be taken as electives if not already completed for an Area requirement. To petition for a course not listed to be approved as an elective, contact the Faculty Advisor, cjp1@cmu.edu, directly.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-482</td>
<td>Telecommunications Technology and Policy for the Internet Age</td>
</tr>
<tr>
<td>48-448</td>
<td>History of Sustainable Architecture</td>
</tr>
<tr>
<td>73-427</td>
<td>Sustainability, Energy, and Environmental Economics</td>
</tr>
</tbody>
</table>

The Minor in Societal & Human Impacts of Future Technologies (SHIFT)

Students pursuing the SHIFT minor will gain the skills, knowledge, and experience to successfully take on roles in integrated, multidisciplinary analyses of current and near-future computational technologies. The SHIFT minor requires eight total courses, with no limit to double-counting with other majors or minors. All courses counted towards the minor must be taken for a letter grade and passed with a grade of “C” or above.

Core Courses (2 courses, 18 units total)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>80-249</td>
<td>AI, Society, and Humanity</td>
</tr>
<tr>
<td>80-445</td>
<td>Shift Capstone Experience</td>
</tr>
</tbody>
</table>

Area Courses (6 courses, 54 units total)

Note: Five of the six Area Courses must be taken in different departments

Technology area (18 units)
Courses that build basic technological competence, and teach concepts & frameworks that provide high-level understanding of computational technologies, including their possibilities and limits.

**Technology area**

05-317 Design of Artificial Intelligence Products 12  
05-318 Human AI Interaction 12  
05-320 Social Web 12  
05-452 Service Design 12  
15-110 Principles of Computing 10  
15-112 Fundamentals of Programming and Computer Science 12  
16-467 Human Robot Interaction 12  
17-303 Cryptocurrencies, Blockchains and Applications Var.  
17-313 Foundations of Software Engineering 12  
17-331 Information Security, Privacy, and Policy 12  
17-333 Privacy Policy, Law, and Technology 9  
17-355 Program Analysis 12  
36-201 Statistical Reasoning and Practice 9  
36-202 Methods for Statistics & Data Science 9  
67-250 The Information Systems Milieux 9  
88-300 Programming and Data Analysis for Social Scientists 9

### Social & Behavioral Sciences area (18 units)

Courses that teach the concepts and frameworks of social & behavioral sciences (e.g., economics, psychology, sociology), including methods and analyses such as experimental design and qualitative & quantitative data analysis.

**Social & Behavioral Science area**

05-413 Human Factors 9  
17-224 Influence, Persuasion, and Manipulation Online 9  
36-200 Reasoning with Data 9  
70-311 Organizational Behavior 9  
70-321 Negotiation and Conflict Resolution 9  
70-341 Team Dynamics and Leadership 9  
73-102 Principles of Microeconomics 9  
73-103 Principles of Macroeconomics 9  
84-265 Decision Science for International Relations 9  
84-370 Global Nuclear Politics 9  
84-372 Space and National Security 9  
84-373 Emerging Technologies and the Law 9  
84-380 US Grand Strategy 9  
84-386 The Privatization of Force 9  
84-387 Technology and Policy of Cyber War 9  
84-389 Terrorism and Insurgency 9  
84-390 Social Media, Technology, and Conflict 9  
84-405 The Future of Warfare 9  
84-414 International and Subnational Security 9  
88-221 Analytical Foundations of Public Policy 9  
88-406 Behavioral Economics @ Work 9  
88-418 Negotiation: Strategies and Behavioral Insights 9  
88-419 International Negotiation 9  
88-435 Decision Science and Policy 9

### Ethics, Policy & Design Area (18 units)

Courses that teach core concepts and frameworks to address and analyze ethical, policy, and design challenges relevant to current and near-future computational technologies.

**Ethics, Policy & Design Area**

05-413 Human Factors 9  
08-200 Ethics and Policy Issues in Computing 9  
16-161 ROB Freshman Seminar: Artificial Intelligence and Humanity 9  
17-224 Influence, Persuasion, and Manipulation Online 9  
36-200 Reasoning with Data 9  
51-173 Design Center: Human Experience in Design 9  
51-241 How People Work 9  
51-371 Futures I 4.5  
51-373 Futures II 4.5  
51-382 Design Center: Design for Social Innovation 9  
70-311 Organizational Behavior 9  
70-321 Negotiation and Conflict Resolution 9  
70-332 Business, Society and Ethics 9  
70-341 Team Dynamics and Leadership 9  
70-364 Business Law 9  
73-102 Principles of Microeconomics 9  
73-103 Principles of Macroeconomics 9  
79-234 Technology and Society 9  
79-299 From Newton to the Nuclear Bomb: History of Science, 1750-1950 9

### The Minor in Sociology

**Saurabh Bhargava, Faculty Director**  
Connie Angermeier, Senior Academic Program Manager and Advisor  
Location: Porter Hall 208A  
cia2@andrew.cmu.edu  
Schedule an appointment: [https://go.oncehub.com/ConnieAngermeier](https://go.oncehub.com/ConnieAngermeier)

The Sociology minor introduces the student to central concepts in sociological theory and methods of empirical inquiry needed to broadly understand social behavior, including its structure, history, and dynamics. Students choose among a range of methodological approaches and substantive topic areas including social psychology, work and organizations, social networks, technology and society, medical sociology, and gender and family. Exposure to these topics will help students understand and appreciate the processes by which families, groups, and organizations form and evolve over time; by which individuals affect and are affected by the society in which they live; and by which technology and institutions shape and influence society. This background in empirical tools and social theory will strengthen the student’s ability to pursue graduate studies in sociology, social history, social science, and organizational theory; to begin professional careers involving social analysis, network analysis, data analysis of teams, groups and organizations, social analysis within journalism, political institutions, the government, and online; and to enter the corporate environment with a thorough understanding of organizational activity.

### Curriculum

54 units

In addition to the general education requirements of the student's college and the requirements of the student’s major, Sociology minors must satisfy the following requirements. The Core courses comprise 18 units of the minor. One course is taken from the Organizations cluster, and one course is taken from the Methodology cluster. The Elective courses comprise 36 units of the minor. Sociology minors should consult with the program advisor to plan a course schedule prior to registration.

NOTE: The core courses are offered regularly; the elective courses are offered with at least general regularity. Participating departments may subsequently develop and offer other courses that, while not listed here, are deemed appropriate for this minor. The program advisor should be consulted (especially when the schedule of courses to be offered for a given semester becomes available) to identify such additional courses.

No more than 9 units in the Sociology minor may be counted to fulfill any other major or minor’s requirements.

**Core Courses**

18 units
A. Organizations
Complete one course.
70-311 Organizational Behavior

B. Methodology
Complete one course.
36-202 Methods for Statistics & Data Science
70-208 Regression Analysis
85-310 Research Methods in Cognitive Psychology
85-340 Research Methods in Social Psychology
88-251 Empirical Research Methods
88-252 Causal Inference in the Field

Elective Courses
Complete four courses (a minimum of 36 units) from the following list. Two courses (18 units) must be taken from one category to complete the depth requirement. One course (9 units) must be taken from the other category. The remaining course (9 units) may be taken from either category. Appropriate courses offered by the Department of Sociology at the University of Pittsburgh (available during the academic year through cross-registration) may also be included as part of this option. Contact the Sociology program advisor for more information.

1. Sociology of Gender, Family, and Culture
70-342 Managing Across Cultures
70-385 Consumer Behavior
76-241 Introduction to Gender Studies
79-244 Women in American History
79-261 The Last Emperors: Chinese History and Society, 1600-1900
79-308 Crime and Justice in American Film
79-320 Women, Politics, and Protest
79-323 Family, Gender, and Sexuality in European History, 500-1800
79-331 Body Politics: Women and Health in America
79-343 Education, Democracy, and Civil Rights
79-377 Food, Culture, and Power: A History of Eating
80-224 Race, Gender and Science
80-245 Medical Ethics
80-246 Moral Psychology
80-256 Modern Moral Philosophy
80-305 Decision Theory
80-335 Social and Political Philosophy
80-348 Health, Human Rights, and International Development
84-369 Decision Science for International Relations
85-241 Social Psychology
85-350 Psychology of Prejudice
85-352 Evolutionary Psychology
85-358 Pro-Social Behavior
85-377 Attitudes and Persuasion
85-442 Health Psychology
85-446 Psychology of Gender
88-230 Human Intelligence and Human Stupidity
88-231 Thinking in Person vs. Thinking Online
88-380 Dynamic Decisions
88-388 Psychological Models of Decision Making

2. Sociology of Work, Organizations, and Technology
70-332 Business, Society and Ethics
73-348 Behavioral Economics
79-275 Introduction to Global Studies
79-342 Introduction to Science and Technology Studies
88-275 Bubbles: Data Science for Human Minds
80-341 Computers, Society and Ethics
88-255 Strategic Decision Making
88-341 Team Dynamics and Leadership
88-344 Environmental Policy and Planning
88-365 Behavioral Economics and Public Policy
88-366 Behavioral Economics of Poverty and Development

Note: Some courses have additional prerequisites.