BXA Intercollege Degree Programs

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Mission Statement
The BXA Intercollege Degree Programs are designed for students who want to turn talent and passion into viable professions for the future through a challenging academic curriculum. BXA students pursue their goals with the help of multifaceted advising, innovative pedagogical strategies and a focus on the impact arts have on technology and vice versa.

The goal of the Bachelor of Computer Science and Arts (BCSA), the Bachelor of Engineering Studies and Arts (BESA), the Bachelor of Humanities and Arts (BHA), the Bachelor of Science and Arts (BSA) and the additional major in Engineering and Arts (EA), housed under the BXA Intercollege Degree Programs, is to allow a select group of students who demonstrate interest and accomplishment in the fine arts and computer science, engineering, humanities, social sciences or natural sciences to explore beyond the traditional academic major, or integrate more than one field of study across disciplines. These programs foster the creativity of students who explore innovative approaches to the academic environments of two colleges. By merging the components in the arts and computer science, engineering, natural sciences or humanities into an interdisciplinary/multidisciplinary study, a unique, complex product is born. BXA students produce new information, challenging questions and innovative theory.

BXA students are models of independence, motivation and well-rounded scholarship as humanists, scientists and artists at the same time.

In the context of the Carnegie Mellon University environment, the BXA Intercollege Degree Programs hold a special role. BXA provides access to five strong colleges that offer specialized training with expert faculty and researchers. The BXA Programs challenge students to utilize those resources as they explore and develop their own approach to interdisciplinary studies in the fine arts and computer science, engineering, humanities and social sciences, or the natural and mathematical sciences.

BXA students balance courses in their CFA concentration with courses in their academic concentration, as well as BXA-specific courses. These BXA-specific courses give students the opportunity to integrate their areas of concentration by focusing on interdisciplinary approaches and arts-based research techniques. The curricula in the concentration areas provide students with a solid disciplinary foundation upon which they can draw for interdisciplinary projects.

A BXA intercollege degree prepares students for graduate study and careers in an enormous variety of fields, including traditional graduate training in the arts as well as academic areas, positions in arts and education nonprofits such as museums and foundations, and technical positions with media and technology companies.

Program Objectives
The skills developed by BXA students span the creative, the technical, the academic and the practical. The objective of the BXA Intercollege Degree Programs is to prepare graduates for careers in which they will draw on their creative and academic skills to create, educate, communicate and innovate across disciplines.

Students who complete the BXA curriculum will graduate with the following skills:

- Foundational knowledge and technical expertise in the CFA concentration area and the DC/ENG/MCS/SCS concentration area
- Ability to describe the connections between these concentrations and how the student integrates them
- Ability to communicate ideas textually, visually and orally
- Knowledge of how the concentration disciplines intersect with history, society and culture from local and global perspectives
- Ability to use cognitive, behavioral and ethical dimensions within the concentration disciplines to make decisions on individual and social levels
- Experience in engaging in art research to produce new knowledge both within the CFA concentration and the DC/ENG/MCS/SCS concentration
- Experience in designing, researching and completing a large-scale, object-based project that integrates both areas of concentration

Bachelor of Computer Science and Arts Degree Program

The Bachelor of Computer Science and Arts (BCSA) intercollege degree program combines the strengths of the College of Fine Arts (CFA) and the School of Computer Science (SCS). This degree provides an ideal technical, critical and conceptual foundation for students interested in pursuing fields that comprehensively meld technology and the arts, such as game design, computer animation, computer music, recording technologies, interactive stagecraft, robotic art and other emerging media. Students choose their arts concentration from the following schools in CFA: Architecture, Art, Design, Drama or Music. Students choose their computer science concentration established by the School of Computer Science.

The BCSA curriculum has three main components: general education requirements, fine arts concentration requirements and computer science concentration requirements. Each student’s course of study is structured so they can complete this rigorous program in four years.

Students receive extensive advising support. The academic advisors in the BXA Intercollege Degree Programs are the primary advisors and liaisons between CFA and SCS. Each student has two additional academic advisors: an advisor in the admitting school of CFA to guide their focus in the arts and an advisor in SCS to guide their focus in computer science.

BCSA Curriculum

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Total BCSA Degree Requirements: 380

BCSA General Education

(15 courses, 121 units minimum)

- Writing (1 course, 9 units, 76-101 required)
- Mathematics (2 courses, 19 units minimum, 21-122 and either 21-259 or 21-241 required), Probability (1 course, 9 units minimum)
- Science & Engineering (2 courses, 18 units minimum)
- Economic, Political, Social Institutions OR Cognition, Choice & Behavior (1 course, 9 units minimum)
- Two additional courses from Dietrich or CFA (2 courses, 18 units minimum)
- University Requirement (1 course, 3 units, 99-101 required)
- BCSA Required Courses (5 courses, 36 units, 52-190, 52-291, 52-392, 52-401, 52-402)

Writing (1 course, 9 units)

Broadly considered, language is a tool used to communicate, as well as a way to organize non-visual and non-mathematical thinking. This requirement focuses on the social nature of language and the ways in which writing constitutes thinking.

76-101 Interpretation and Argument 9
or 76-102 Advanced First Year Writing: Special Topics
or 76-106 Writing about Literature, Art and Culture
& 76-107 Writing about Data
& 76-108 Writing about Public Problems

All undergraduate students must complete the First-Year Writing requirement—the Department of English does not accept any Advanced Placement exemptions. This requirement can be completed in two different ways. Enroll in one of two full-semester courses 101 or 102 (by invitation only), 9 units, or enroll in two of three half-semester mini courses (back-to-back within a single semester) 106/107/108, 4.5 + 4.5 units. Course options and topics: www.cmu.edu/hss/english/first_year/index.html
Mathematics & Probability (3 courses, 28 units minimum)
Choose two mathematics courses (19 units minimum):
21-122 Integration and Approximation 10
21-259 Calculus in Three Dimensions 9
or 21-241 Matrices and Linear Transformations
Choose one probability course(s) (9 units minimum):
15-259 Probability and Computing 12
21-325 Probability 9
36-218 Probability Theory for Computer Scientists 9
36-225-36-226 Introduction to Probability Theory - Introduction to Statistical Inference 18

Science & Engineering (2 courses, 18 units minimum)
Choose two science courses from differing departments or one science and one engineering course from the following list:
02-223 Personalized Medicine: Understanding Your Own Genome 9
03-121 Modern Biology 9
03-125 Evolution 9
03-132 Basic Science to Modern Medicine 9
03-133 Neurobiology of Disease 9
06-100 Introduction to Chemical Engineering 12
09-105 Introduction to Modern Chemistry I 10
09-217 Organic Chemistry I 9
09-225 Climate Change: Chemistry, Physics and Planetary Science 9
12-100 Exploring CEE: Infrastructure and Environment in a Changing World 12
12-201 Geology 9
18-100 Introduction to Electrical and Computer Engineering 12
24-101 Fundamentals of Mechanical Engineering 12
24-291-24-381 Environmental Systems on a Changing Planet - Environmental Systems on a Changing Planet: Science Engineering Addendum 12
24-358 Culinary Mechanics 9
27-215 Thermodynamics of Materials 12
33-114 Physics of Musical Sound 9
33-120 Science and Science Fiction 9
33-121 Physics I for Science Students 12
42-101 Introduction to Biomedical Engineering 12
85-219 Biological Foundations of Behavior 9

Economic, Political & Social Institutions OR Cognition, Choice & Behavior (1 course from either category, 9 units minimum)

Economic, Political & Social Institutions
This requirement explores the processes by which institutions organize individual preferences and actions into collective outcomes.
19-101 Introduction to Engineering and Public Policy 12
36-303 Sampling, Survey and Society * 9
66-221 Topics of Law: Introduction to Intellectual Property Law 9
70-332 Business, Society and Ethics 9
70-364 Business Law 9
73-102 Principles of Microeconomics 9
73-103 Principles of Macroeconomics * 9
79-101 Making History: How to Think About the Past (and Present) 9
79-189 History of Democracy: Thinking Beyond the Self 9
79-244 Women in American History 9
79-299 Introduction to the History of Science 9
79-300 History of American Public Policy 9
79-310 U. S. Business History: 1870 to the Present 9
79-320 Women, Politics, and Protest 9
79-321 Documenting Human Rights 9
79-331 Body Politics: Women and Health in America 9
79-383 The History of Capitalism 9
80-135 Introduction to Political Philosophy 9
80-136 Social Structure, Public Policy & Ethics 9
80-244 Environmental Ethics 9
80-245 Medical Ethics 9
80-324 Philosophy of Economics 9
80-335 Social and Political Philosophy 9
84-104 Decision Processes in American Political Institutions 9
84-110 Foundations of Political Economy 9
84-275 Comparative Politics 9
84-310 International Political Economy * 9
84-322 Nonviolent Conflict and Revolution 9
84-324 The Future of Democracy 9
84-326 Theories of International Relations 9
84-352 Representation and Voting Rights 9
84-362 Diplomacy and Statecraft 9
84-365 The Politics of Fake News and Misinformation 9
84-380 US Grand Strategy 9
84-386 The Privatization of Force 9
84-389 Terrorism and Insurgency 9
84-390 Social Media, Technology, and Conflict 9
84-393 Legislative Decision Making: US Congress 9
84-402 Judicial Politics and Behavior 9
84-405 The Future of Warfare 9
88-281 Topics in Law: 1st Amendment 9
88-284 Topics of Law: The Bill of Rights 9

Cognition, Choice, and Behavior
This requirement explores the process of thinking, decision making, and behavior in the context of the individual.
70-311 Organizational Behavior * 9
80-101 Dangerous Ideas in Science and Society 9
80-130 Introduction to Ethics 9
80-150 Nature of Reason 9
80-180 Nature of Language 9
80-221 Philosophy of Social Science 9
80-270 Problems of Mind and Body: Meaning and Doing 9
80-271 Mind and Body: The Objective and the Subjective 9
80-275 Metaphysics 9
80-330 Ethical Theory 9
85-102 Introduction to Psychology 9
85-104 Psychopathology 9
85-211 Cognitive Psychology 9
85-213 Human Information Processing and Artificial Intelligence 9
85-221 Principles of Child Development 9
85-241 Social Psychology 9
85-251 Personality 9
85-370 Perception 9
85-408 Visual Cognition * 9
85-421 Language and Thought * 9
88-120 Reason, Passion and Cognition 9
88-230 Human Intelligence and Human Stupidity 9

* Indicates co-requisites and/or prerequisites required.
Additional Dietrich College Courses (2 courses, 18 units minimum)
Complete two non-technical courses. Consult with your BXA advisor to determine the best courses to fulfill this requirement.

University Requirement (1 course, 3 units)
This is a mini-course, pass/no pass, to be completed in the first semester or online in the summer prior to the first semester.
99-101 Computing @ Carnegie Mellon 3

BXA Required Courses (5 courses, 36 units)
BXA-specific courses give students the opportunity to integrate their areas of concentration by focusing on interdisciplinary approaches and arts-based research techniques.
School of Computer Science Concentration

Computer Science Concentration

(11 courses, 113 units minimum)

Prerequisite

15-112 Fundamentals of Programming and Computer Science 12

Computer Science Core Requirements (5 courses, 56 units)

15-122 Principles of Imperative Computation 10
15-150 Principles of Functional Programming 10
15-210 Parallel and Sequential Data Structures and Algorithms 12
15-213 Introduction to Computer Systems 12
15-251 Great Ideas in Theoretical Computer Science 12

Concepts of Mathematics (1 course, 12 units)

21-127 Concepts of Mathematics (co-requisite for 15-122; prerequisite for 15-150) 12

Note: First-year BCSA students may opt for 15-151 if offered, in place of 21-127.

Applications Courses or CS Electives (5 courses, 45 units minimum)

Choose a minimum of five courses from SCS beyond the core requirements, 200-level or higher, not including 02-201, 02-223, 02-250, 02-261, 15-351, 16-223, 17-206, 17-333, 17-062. Listed below are suggested choices for these electives. Consult with the CS advisor if interested in courses not listed.

05-391 Designing Human Centered Software 12
05-418 Design Educational Games 12
10-335 Art and Machine Learning 12
11-291 Applied Computational Intelligence Lab 9
11-344 Machine Learning in Practice 12
11-411 Natural Language Processing 12
15-281 Artificial Intelligence: Representation and Problem Solving 12
15-322 Introduction to Computer Music 9
15-323 Computer Music Systems and Information Processing 9
15-365 Experimental Animation 12
15-388 Practical Data Science 9
15-415 Database Applications 12
15-451 Algorithm Design and Analysis 12
15-458 Discrete Differential Geometry 12
15-462 Computer Graphics 12
15-463 Computational Photography 12
15-464 Technical Animation 12
15-465 Animation Art and Technology 12
15-466 Computer Game Programming 12
15-494 Cognitive Robotics: The Future of Robot Toys 12
16-264 Humanoids 12
16-362 Mobile Robot Algorithms Laboratory 12
16-374 IDEAtE: Art of Robotic Special Effects 12
16-384 Robot Kinematics and Dynamics 12
16-385 Computer Vision 12
16-423 Designing Computer Vision Apps 12
16-455 IDEAtE: Human-Machine Virtuosity 12
16-465 Game Engine Programming 10
16-467 Human Robot Interaction 12
17-214 Principles of Software Construction: Objects, Design, and Concurrency 12
17-313 Foundations of Software Engineering 12
17-356 Software Engineering for Startups 12
17-437 Web Application Development 12

COLLEGE OF FINE ARTS CONCENTRATION

(number of courses vary, 108-114 units minimum)

BCSA students choose one of the following concentrations:

• Architecture (108 units)
• Art (114 units)
• Design (108 units)
• Drama (108 units)
• Music (108 units)

Architecture Concentration

(108 units minimum)

Architecture Required Courses (7 courses, 52 units minimum)

48-100 Architecture Design Studio: POIESIS STUDIO 1 - Fall, Freshman or Sophomore year 10-15
48-095 Spatial Concepts for Non-Architecture Majors 48-095
62-122 Digital Media I - Fall, Freshman year 6
62-125 Drawing I - Fall, Freshman year 6
62-123 Digital Media II - Spring, Freshman year 6
62-126 Drawing II - Spring, Freshman year 6
48-240 History of World Architecture, I - Spring, Freshman year 9
48-241 Modern Architecture - Fall, Sophomore year 9

Architecture Electives (56 units minimum)

A minimum of 56 additional Architecture units must be approved by the Architecture advisor. A list of these selected courses must be filed in the BXA office.

Art Concentration

(114 units minimum)

First-Year Seminar (1 course, 6 units)

60-104 Foundations: Art First-Year Seminar 6

Foundation Studios (3 courses, 30 units)

Complete three courses:

60-110 Foundations: Time-Based Media 10
60-120 Foundations: Digital Media 10
60-131 Foundations: Sculpture 10
60-135 Foundations: Expanded Media Sculpture 10
60-150 Foundations: Drawing 10
60-170 Foundations: Paint/Print 10

Intermediate Studios (3 courses, 30 units)

Complete three courses:

60-2xx Intermediate Studio Elective 10
60-2xx Intermediate Studio Elective 10
60-2xx Intermediate Studio Elective 10

Advanced Studios (3 courses, 30 units)

Students may take courses in any media area (ETB, SIS, CP or DP3). They may take all courses in one media area if a focus is desired. With approval from the Art advisor, BXA students can take an additional intermediate studio in lieu of an advanced studio to increase breadth.

Complete three courses:

60-401/402 Senior Studio 10
60-403 Senior Critique Seminar 10
Advanced Electronic and Time-Based Work (ETB) (course numbers 60-410 through 60-429) 10
Advanced Sculpture, Installation and Site-Work (SIS) (course numbers 60-430 through 60-447) 10
Advanced Contextual Practice (CP) (course numbers 60-448 through 60-449) 10
Advanced Drawing, Painting, Print Media and Photography (DP3) (course numbers 60-450 through 60-498) 10
Design Required Courses (2 courses, 26 units)
54-151-54-152 Stagecraft-Stagecraft (13 units + 13 units)
A minimum of 62 additional Design units must be approved by the Design faculty option coordinator. A list of these selected courses must be filed in the BXA office.

Directing Required Courses (10 courses, 64 units)
54-121-54-122 Directing I: A Director's Mindset - Directing I: A Director's Preparation
54-221-54-222 Directing II: In the Studio - Directing II: In The Room
54-159-54-159 Production Practicum-Production Practicum (two times)
54-517 Director's Colloquium (four times)
A minimum of 24 additional Directing units must be approved by the Directing faculty option coordinator. A list of these selected courses must be filed in the BXA office.

Dramaturgy Required Courses (9 courses, 53 units minimum)
54-109 Dramaturgy 1: Approaches to Text
54-184 Dramaturgy 2: Introduction to Production Dramaturgy
54-121 Directing I: A Director's Mindset
54-159-54-159 Production Practicum-Production Practicum (two times)
54-200-54-200 Dramaturgy Forum-Dramaturgy Forum -Fall (minimum of two; every semester it is offered while enrolled)
54-xxx Dramaturgy 3, 4, 5 or 6 (minimum of two; all four if enrolled as BXA for six semesters or more)
A minimum of 29 additional Dramaturgy units must be approved by the Dramaturgy faculty option coordinator. A list of these selected courses must be filed in the BXA office.

Production Technology and Management Required Courses (2 courses, 26 units)
54-151-54-152 Stagecraft-Stagecraft (13 units + 13 units)
A minimum of 62 additional PTM units must be approved by the PTM faculty option coordinator. A list of these selected courses must be filed in the BXA office.

Music Concentration (108 units minimum)
Options available in the following areas: 1) Audio Recording & Production, 2) Composition, 2) Music Performance (instrumental, organ, piano, voice), 4) Sound Theory & Practice.

Required Course for All Concentration Options (1 course, 9 units)
57-152 Harmony I
or 57-149 Basic Harmony I
Work with Music Advisor to Approve Concentration Option (99 units minimum).

Audio Recording & Production Required Courses (7 courses, 40 units)
57-101 Introduction to Music Technology
or 57-171 Introduction to Music Technology (self-paced)
57-181 Solfege I
or 57-180 Basic Solfege I
or 57-185 Advanced Solfege I
57-173 Survey of Western Music History (co-requisite: 57-188)
57-188 Repertoire and Listening for Musicians
57-337 Sound Recording
57-338 Sound Editing and Mastering
57-438 Multitrack Recording
Choose 59 units from:
57-153 Harmony II
or 57-150 Basic Harmony II
Choose 52 units from:

**Sound Theory & Practice Required Courses (7 courses, 47 units)**
- 57-182 Solfege II
  or 57-186 Advanced Solfege II
- 15-104 Introduction to Computing for Creative Practice
- 15-322 Introduction to Computer Music
- 18-090 Twisted Signals: Multimedia Processing for the Arts
- 33-114 Physics of Musical Sound
- 54-166 Introduction to Sound Design for Theatre
- 54-275 History of Sound Design
- 54-666 Production Audio
- 57-161 Eurhythmics I
- 57-344 Experimental Sound Synthesis
- 57-358 Introduction to Electronic Music (with instructor permission as space allows)
- 57-421 Exploded Ensemble
- 57-427 Advanced Seminar in Film Musicology
- 57-478 Survey of Historical Recording
- 57-622 Independent Study in Sound Recording Production
- 60-131 Foundations: Sculpture
- 60-210 Electronic Media Studio: Introduction to Interactivity

Note: Students completing an IDeATe minor may double-count up to two of the IDeATe minor courses towards the Sound Theory & Practice concentration.

**Composition Required Courses (12 courses, 76 units)**
- 57-161 Eurhythmics I (recommended co-requisite: 57-181)
- 57-181 Solfege I or 57-180 Basic Solfege I or 57-185 Advanced Solfege I
- 57-173 Survey of Western Music History (co-requisite: 57-188)
- 57-188 Repertoire and Listening for Musicians
- 57-49x BXA Studio (4 semesters)
- 57-xxx Major Ensemble (4 semesters)

A minimum of 23 additional Music units must be approved by the Music advisor. A list of these selected courses must be filed in the BXA office.

**Music Performance Required Courses (12 courses, 76 units)**
- 57-161 Eurhythmics I (recommended co-requisite: 57-181)
- 57-181 Solfege I or 57-180 Basic Solfege I or 57-185 Advanced Solfege I
- 57-173 Survey of Western Music History (co-requisite: 57-188)
- 57-188 Repertoire and Listening for Musicians
- 57-49x BXA Studio (4 semesters)
- 57-xxx Major Ensemble (4 semesters)

A minimum of 23 additional Music units must be approved by the Music advisor. A list of these selected courses must be filed in the BXA office.

**Sound Theory & Practice Required Courses (7 courses, 47 units)**
- 57-101 Introduction to Music Technology
  or 57-171 Introduction to Music Technology (self-paced)
- 57-181 Solfege I or 57-180 Basic Solfege I or 57-185 Advanced Solfege I
- 57-173 Survey of Western Music History (co-requisite: 57-188)
- 57-188 Repertoire and Listening for Musicians
- 18-090 Twisted Signals: Multimedia Processing for the Arts
- 57-911 Music Since 1945
- 57-616 Independent Study in Sound Studies

Choose 52 units from:
- 57-153 Harmony II
  or 57-150 Basic Harmony II

57-182 Solfege II
  or 57-186 Advanced Solfege II
- 15-104 Introduction to Computing for Creative Practice
- 15-322 Introduction to Computer Music (prerequisite: 15-112)
- 33-114 Physics of Musical Sound
- 57-337 Sound Recording
- 57-343 Music, Technology, and Culture
- 57-344 Experimental Sound Synthesis
- 57-347 Electronic and Computer Music (prerequisite: 57-101 or 57-171)
- 57-358 Introduction to Electronic Music (with instructor permission as space allows)
- 57-421 Exploded Ensemble
- 57-438 Multitrack Recording
- 57-478 Survey of Historical Recording
- 60-131 Foundations: Sculpture
- 60-210 Electronic Media Studio: Introduction to Interactivity

Note: Students completing an IDeATe minor may double-count up to two of the IDeATe minor courses towards the Sound Theory & Practice concentration.

**Free Electives**
(approximately 4 courses, 32-38 units minimum)
Take any Carnegie Mellon course. A maximum of 9 units of physical education and/or military science may be counted toward this requirement.

**Bachelor of Engineering Studies and Arts Degree Program**
The Bachelor of Engineering Studies and Arts (BESA) intercollege degree program combines the strengths of the College of Fine Arts (CFA) and the College of Engineering (ENG). This degree is tailored for students seeking to apply knowledge from duel fields to advance maker culture in novel and creative ways. Students choose their arts concentration from the following schools in CFA: Architecture, Art, Design, Drama or Music. Students choose their engineering studies concentration established by the College of Engineering. Options within the concentration include: biomedical engineering, chemical engineering, civil & environmental engineering, electrical & computer engineering, materials science & engineering or mechanical engineering.

The BESA curriculum has three main components: general education requirements, fine arts concentration requirements and engineering studies concentration requirements. Each student’s course of study is structured so they can complete this rigorous program in four years.

Students receive extensive advising support. The academic advisors in the BXA Intercollege Degree Programs are the primary advisors and liaisons between CFA and ENG. Each student has two additional academic advisors: an advisor in the admitting school of CFA to guide their focus in the arts and an advisor in ENG to guide their focus in engineering studies.

**BESA Curriculum**

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<td><strong>Total BESA Degree Requirements</strong></td>
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**BESA GENERAL EDUCATION**
(11 courses, 92 units minimum)
- Writing (1 course, 9 units, 76-101 required)
- Mathematics (2 courses, 20 units, 21-120 and 21-122 required)
- Science and Technology (2 courses, 24 units, 15-112 and 33-141 required)
Mathematics & Science Prerequisites

• University Requirement (1 course, 3 units, 99-101 required)
• BXA Required Courses (5 courses, 36 units, 52-190, 52-291, 52-392, 52-401, 52-402)

Writing (1 course, 9 units)
76-101 Interpretation and Argument 9
or 76-102 Advanced First Year Writing: Special Topics 9
or 76-106 Writing about Literature, Art and Culture 9
& 76-107 and Writing about Data 9
& 76-108 and Writing about Public Problems 9

A completed ENG Concentration Declaration form must be approved by consultation with their BXA advisor and the ENG concentration advisors.

BESA students declare one of the following concentrations, through College of Engineering Concentration

1. Biomedical Engineering Concentration

2. Mechanical Engineering Concentration

3. Chemical Engineering Concentration

4. Electrical & Computer Engineering Concentration

5. Civil Engineering Concentration

6. Materials Science and Engineering Concentration

7. Instrumentation and Control Engineering Concentration

Biomedical Engineering Courses (7 courses, 66 units)
42-101 Introduction to Biomedical Engineering - Freshman year 12
xx-xxx 2nd Introduction to Engineering course, student’s choice 12
42-202 Physiology -Sophomore year; prereq: 03-121/03-151 9
42-203 Biomedical Engineering Laboratory -Sophomore year; prereq: 42-101, 03-121/03-151 9
42-302 Biomedical Engineering Systems Modeling and Analysis -Junior year; prereq: 06-262/18-202/21-260 9
42-401 Foundation of BME Design -Fall, Senior year; prereq: 42-101 6
42-402 BME Design Project -Spring, Senior year 9

Electives (3 courses, 27 units minimum)
Choose 3 elective courses in BME tracks and/or ENG with prerequisites in consultation with the concentration advisor.

Chemical Engineering
(102 units minimum)

Mathematics & Science Prerequisites

21-120 Differential and Integral Calculus 10
21-122 Integration and Approximation 10

Science and Technology (2 courses, 24 units)
15-112 Fundamentals of Programming and Computer Science 12
33-141 Physics I for Engineering Students 12

BXA Required Courses (5 courses, 36 units)
BXA-specific courses give students the opportunity to integrate their areas of concentration by focusing on interdisciplinary approaches and arts-based research techniques.

52-190 BXA Seminar I: Building the Wunderkammer - Spring, Freshman (mini-4) 4.5
06-291 BXA Seminar II: Transferring Knowledge -Spring, Sophomore (mini-3) 4.5
52-392 BXA Seminar III: Deconstructing Disciplines 9
52-401 BXA Seminar IV: Capstone Project Research 9
52-402 BXA Seminar V: Capstone Project Production 9

College of Engineering Concentration
(number of courses vary, 93-120 units)
BESA students declare one of the following concentrations, through consultation with their BXA advisor and the ENG concentration advisors.

A completed ENG Concentration Declaration form must be approved by the concentration advisor and submitted to the BXA office, by spring mid-semester break of the student’s first year.

• Biomedical Engineering (93 units)
• Chemical Engineering (102 units)
• Civil Engineering (99 units)
• Electrical & Computer Engineering (120 units)
• Environmental Engineering (95 units)
• Materials Science & Engineering (99 units)
• Mechanical Engineering (105 units)

Biomedical Engineering Concentration
(93 units minimum)

Mathematics & Science Prerequisites

21-120 Differential and Integral Calculus -(Gen Ed) 10
21-122 Integration and Approximation -(Gen Ed) 10
21-254 Linear Algebra and Vector Calculus for Engineers 11
21-260 Differential Equations 9
15-110 Principles of Computing 10
33-141 Physics I for Engineering Students -(Gen Ed) 12
33-142 Physics II for Engineering and Physics Students 12
03-121 Modern Biology 9

Biomedical Engineering Courses (7 courses, 66 units)
42-101 Introduction to Biomedical Engineering - Freshman year 12
xx-xxx 2nd Introduction to Engineering course, student’s choice 12
42-202 Physiology -Sophomore year; prereq: 03-121/03-151 9
42-203 Biomedical Engineering Laboratory -Sophomore year; prereq: 42-101, 03-121/03-151 9
42-302 Biomedical Engineering Systems Modeling and Analysis -Junior year; prereq: 06-262/18-202/21-260 9
42-401 Foundation of BME Design -Fall, Senior year; prereq: 42-101 6
42-402 BME Design Project -Spring, Senior year 9

Electives (3 courses, 27 units minimum)
Choose 3 elective courses in the BME tracks and/or ENG with prerequisites in consultation with the concentration advisor.

Chemical Engineering
(102 units minimum)

Mathematics & Science Prerequisites

21-120 Differential and Integral Calculus -(Gen Ed) 10
21-122 Integration and Approximation -(Gen Ed) 10
21-254 Linear Algebra and Vector Calculus for Engineers -Fall, Sophomore year 11
15-110 Principles of Computing 10
33-141 Physics I for Engineering Students -(Gen Ed) 12
33-142 Physics II for Engineering and Physics Students 12
09-105 Introduction to Modern Chemistry I 10
09-106 Modern Chemistry II 10

Chemical Engineering Courses (7 courses, 75 units)
06-100 Introduction to Chemical Engineering -Freshman year; co-req: 09-105, 21-120 12
06-223 Chemical Engineering Thermodynamics -Fall, Sophomore year; prereq: 06-100, 33-121/33-141/33-151 12
06-261 Fluid Mechanics -Spring, Sophomore year; prereq: 06-223, 21-254 9
06-262 Mathematical Methods of Chemical Engineering -Spring, Sophomore year; prereq: 06-223, 21-254 12
06-323 Heat and Mass Transfer -Fall, Junior year; prereq: 06-261, 06-262/21-260, 33-122/33-142/33-152 9
06-363 Transport Process Laboratory -Spring, Junior year; prereq: 06-261, 06-323 9

Electives (3 courses, 27 units minimum)
Choose 27 units from the following ChemE and/or ENG courses with prerequisites in consultation with the concentration advisor:

06-310 Molecular Foundations of Chemical Engineering - Fall, Junior year; prereq: 06-223, 09-106 9
06-325 Numerical Methods and Machine Learning for Chemical Engineering -Fall, Junior year; prereq: 06-262, 15-110/15-112 6
06-326 Optimization Modeling and Algorithms -Fall, Junior year; prereq: 06-262 6
06-364 Chemical Reaction Engineering -Spring, Junior year; prereq: 06-310, 06-323 9
06-607 Physical Chemistry of Colloids and Surfaces - Senior year 9
06-609 Physical Chemistry of Macromolecules -Fall, Senior year 9

27-xxx Materials Science course 9

Note: With advisor approval, electives can instead be other ChemE/ENG courses as long as they are taken in proper order to follow the required prerequisites, not allowing 06-421.
Civil Engineering
(99 units minimum)

Mathematics & Science Prerequisites
21-120 Differential and Integral Calculus -(Gen Ed) 10
21-122 Integration and Approximation -(Gen Ed) 10
21-254 Linear Algebra and Vector Calculus for Engineers 11
21-260 Differential Equations 9
15-110 Principles of Computing 10
33-141 Physics I for Engineering Students -(Gen Ed) 12
33-142 Physics II for Engineering and Physics Students 12
09-105 Introduction to Modern Chemistry I 10
or 09-111 Nanolegs: Chemical Building Blocks

Civil Engineering Courses (9 courses, 72 units)
12-100 Exploring CEE: Infrastructure and Environment in a Changing World - Freshman year; co-req: 21-120, 33-141 12
xx-xxx 2nd Introduction to Engineering course, student’s choice 12
12-200 CEE Challenges: Design in a Changing World - Fall, Sophomore year; prereq: 12-100 9
12-212 Statics - Fall, Sophomore year; co-req: 12-100, 21-122, 33-141 9
12-233 CEE Infrastructure Systems in Action - Fall, Sophomore year; prereq: 12-100 2
12-231 Solid Mechanics - Spring, Sophomore year; prereq: 12-212 9
12-234 Sensing and Data Acquisition for Engineering Systems - Spring, Sophomore year 4
12-271 Computation and Data Science for Civil & Environmental Engineering - Spring, Sophomore year; prereq: 15-110/115-112, 21-120, 21-122, 33-141 9
27-357 Introduction to Materials Selection - Spring, Junior year 6

Electives (3 courses, 27 units minimum)
Choose 3 elective courses 18-3xx and above. At least 2 courses should be Area Courses from 1 of the 5 Areas within ECE and 1 course may be an additional Area Course from a second Area, a Coverage Course or ENG with prerequisites in consultation with the concentration advisor.

Environmental Engineering
(95 units minimum)

Mathematics & Science Prerequisites
21-120 Differential and Integral Calculus -(Gen Ed) 10
21-122 Integration and Approximation -(Gen Ed) 10
21-254 Linear Algebra and Vector Calculus for Engineers 11
21-260 Differential Equations 9
15-110 Principles of Computing 10
33-141 Physics I for Engineering Students -(Gen Ed) 12
33-142 Physics II for Engineering and Physics Students 12
09-105 Introduction to Modern Chemistry I 10
or 09-111 Nanolegs: Chemical Building Blocks

Environmental Engineering Courses (10 courses, 77 units)
12-100 Exploring CEE: Infrastructure and Environment in a Changing World - Freshman year; co-req: 21-120, 33-141 12
xx-xxx 2nd Introduction to Engineering course, student’s choice 12
12-200 CEE Challenges: Design in a Changing World - Fall, Sophomore year; prereq: 12-100 9
12-221 Environmental Chemistry and Thermodynamics - Fall, Sophomore year; prereq: 09-105/09-111 9
12-222 Environmental Chemistry Laboratory - Fall, Sophomore year; co-req: 09-101, 12-221 3
12-271 Computation and Data Science for Civil & Environmental Engineering - Spring, Sophomore year; prereq: 15-110/115-112, 21-120, 21-122, 33-141 9
12-351 Environmental Engineering - Spring, Junior year; prereq: 09-105/09-111; co-req: 21-260 9
12-352 Environmental Engineering Lab - Spring, Junior year; co-req: 12-351 3
12-355 Fluid Mechanics - Fall, Junior year; prereq: 21-260 9
12-356 Fluid Mechanics Lab - Fall, Junior year; co-req: 12-355 2

Electives (2 courses, 18 units minimum)
Choose 18 units from the following EE courses with prerequisites in consultation with the concentration advisor:

Materials Science & Engineering
(99 units minimum)
Mathematics & Science Prerequisites

21-120 Differential and Integral Calculus -(Gen Ed) 10
21-122 Integration and Approximation -(Gen Ed) 10
21-254 Linear Algebra and Vector Calculus for Engineers 11
21-260 Differential Equations 9
15-110 Principles of Computing 10
33-141 Physics I for Engineering Students -(Gen Ed) 12
33-142 Physics II for Engineering and Physics Students 12
09-105 Introduction to Modern Chemistry I 10

Materials Science & Engineering Courses (8 courses, 72 units)

27-100 Engineering the Materials of the Future - Freshman year; co-req: 21-120, 33-141 12
xx-xxx 2nd Introduction to Engineering course, student’s choice 12
27-211 Structure of Materials (Minor Option) - Fall, Sophomore year 6
27-212 Defects in Materials (Minor Option) - Spring, Sophomore year* 6
27-215 Thermodynamics of Materials - Fall, Sophomore year; co-req: 27-100, 21-259 12
27-216 Transport in Materials - Spring, Sophomore year; prereq: 27-215 9
27-227 Phase Relations and Diagrams (Minor Option) - Spring, Sophomore year 9
27-357 Introduction to Materials Selection - Spring, Sophomore year 6

* In consultation with the concentrations advisor, students may choose to complete the version of the course with lab component.

Electives (45 units minimum)

Choose 5 elective courses. At least 3 courses should be in MechE and 2 courses may be ENG with prerequisites in consultation with the concentration advisor.

Architecture Concentration (108 units minimum)

Architecture Required Courses (7 courses, 52 units minimum)

48-100 Architecture Design Studio: POESIS STUDIO 1 - Fall, Freshman or Sophomore year or 48-095 Spatial Concepts for Non-Architecture Majors 10-15
62-122 Digital Media I -Fall, Freshman year 6
62-125 Drawing I-Fall, Freshman year 6
62-123 Digital Media II -Spring, Freshman year 6
62-126 Drawing II -Spring, Freshman year 6
48-240 History of World Architecture, I -Spring, Freshman year 9
48-241 Modern Architecture - Fall, Sophomore year 9

Architecture Electives (56 units minimum)

A minimum of 56 additional Architecture units must be approved by the Architecture advisor. A list of these selected courses must be filed in the BXA office.

Art Concentration (114 units minimum)

First-Year Seminar (1 course, 6 units)

60-104 Foundations: Art First-Year Seminar 6

Foundation Studios (3 courses, 30 units)

Complete three courses:

60-110 Foundations: Time-Based Media 10
60-120 Foundations: Digital Media 10
60-131 Foundations: Sculpture 10
60-135 Foundations: Expanded Media Sculpture 10
60-150 Foundations: Drawing 10
60-170 Foundations: Paint/Print 10

Intermediate Studios (3 courses, 30 units)

Complete three courses:

60-2xx Intermediate Studio Elective 10
60-2xx Intermediate Studio Elective 10
60-2xx Intermediate Studio Elective 10

Advanced Studios (3 courses, 30 units)

Students may take courses in any media area (ETB, SIS, CP or DP3). They may take all courses in one media area if a focus is desired. With approval from the Art advisor, BXA students can take an additional intermediate studio in lieu of an advanced studio to increase breadth.

Complete three courses:

60-401/402 Senior Studio 10
60-403 Senior Critique Seminar 10
Advanced Electronic and Time-Based Work (ETB) (course numbers 60-410 through 60-429) 10
Advanced Sculpture, Installation and Site-Work (SIS) (course numbers 60-430 through 60-447) 10
Advanced Contextual Practice (CP) (course numbers 60-448 through 60-449) 10
Advanced Drawing, Painting, Print Media and Photography (DP3) (course numbers 60-450 through 60-498) 10
60-499 Studio Independent Study (one only) 10
* Courses offered intermittently; speak with a BXA advisor to determine course availability.

Critical Studies (2 courses, 18 units)
60-105 Cultural History of the Visual Arts -Spring 9
60-3xx Critical Studies Elective 9

Review Requirement (2 required reviews, 0 units)
A review is required at the end of the sophomore and senior years. Pass/no pass only.
60-200 Sophomore Review -Spring 0
60-400 Senior Review -Spring 0

Design Concentration
(108 units minimum)

Design Required Courses (16 courses, 98 units)
51-101 Studio: Survey of Design -Fall, First-year 10
51-121 Visualizing -Fall, First-year 10
51-175 Design Studies: Place -Fall, First-year (mini-1) 5
51-177 Design Studies: Histories -Fall, First-year (mini-2) 5
51-102 Design Lab -Spring, First-year 10
51-122 Collaborative Visualizing -Spring, First-year 10
51-176 Design Studies: Futures -Spring, First-year (mini-3) 5
51-178 Design Studies: Experience -Spring, First-year (mini-4) 5
51-277 Design Studies: Systems -Fall, Sophomore year (mini-1) 5
51-279 Design Studies: Cultures -Fall, Sophomore year (mini-2) 5
51-282 Design Studies: Persuasion -Spring, Sophomore year (mini-3) 5
51-284 Design Studies: Power -Spring, Sophomore year (mini-4) 5

Choose Two Studios -Fall, Sophomore year: 4.5+4.5
51-225 Communications Studio I: Understanding Form & Context
or 51-245 Products Studio I: Understanding Form & Context
or 51-265 Environments Studio I: Understanding Form & Context

Choose Two Corresponding Labs -Fall, Sophomore year: 4.5+4.5
51-227 Prototyping Lab I: Communications
or 51-247 Prototyping Lab I: Products
or 51-267 Prototyping Lab I: Environments

Design Electives (10 units)
A minimum of 10 additional Design units must be approved by the Design advisor. A list of these selected courses must be filed in the BXA office.

Drama Concentration
(108 units minimum)
Options available in the following areas: 1) Design, 2) Directing, 3) Dramaturgy, 4) Production Technology and Management

Required Courses for All Concentration Options (5 courses, 20 units)
54-175-54-176 Conservatory Hour-Conservatory Hour (1 unit each) 2
54-177 Foundations of Drama I 6
54-281 Foundations of Drama II (prerequisite: 54-177) 6
54-381 Special Topics in Drama: History, Literature and Criticism 6
54-362 Anti-Racist & Equitable Practices in Theater (optional) 6

A review is required at the end of the sophomore and senior years. Pass/no pass only.
60-200 Sophomore Review -Spring 0
60-400 Senior Review -Spring 0

Design Required Courses (2 courses, 26 units)
54-151-54-152 Stagecraft-Stagecraft (13 units + 13 units)

A minimum of 62 additional Design units must be approved by the Design faculty option coordinator. A list of these selected courses must be filed in the BXA office.

Directing Required Courses (10 courses, 64 units)
54-121-54-122 Directing I: A Director's Mindset - Directing I: A Director's Preparation 18
54-221-54-222 Directing II: In the Studio - Directing II: In The Room 18
54-159-54-159 Production Practicum-Production Practicum (two times) 12
54-517 Director's Colloquium (four times) 16

A minimum of 24 additional Directing units must be approved by the Directing faculty option coordinator. A list of these selected courses must be filed in the BXA office.

Dramaturgy Required Courses (9 courses, 53 units minimum)
54-109 Dramaturgy I: Approaches to Text 9
54-184 Dramaturgy 2: Introduction to Production 9
54-121 Directing I: A Director's Mindset 9
54-159-54-159 Production Practicum-Production Practicum (two times) 12
54-200-54-200 Dramaturgy Forum-Dramaturgy Forum -Fall (minimum of two; every semester it is offered while enrolled) 2
54-xxx Dramaturgy 3, 4, 5 or 6 (minimum of two; all four if enrolled as BXA for six semesters or more) 18

A minimum of 29 additional Dramaturgy units must be approved by the Dramaturgy faculty option coordinator. A list of these selected courses must be filed in the BXA office.

Production Technology and Management Required Courses (2 courses, 26 units)
54-151-54-152 Stagecraft-Stagecraft (13 units + 13 units)

A minimum of 62 additional PTM units must be approved by the PTM faculty option coordinator. A list of these selected courses must be filed in the BXA office.

Music Concentration
(108 units minimum)
Options available in the following areas: 1) Audio Recording & Production, 2) Composition, 3) Music Performance (instrumental, organ, piano, voice), 4) Sound Theory & Practice

Required Course for All Concentration Options (1 course, 9 units)
57-152 Harmony I 9
or 57-149 Basic Harmony I

A minimum of 59 units from:
57-153 Harmony II 9
or 57-150 Basic Harmony II

Work with Music Advisor to Approve Concentration Option (99 units minimum).

Audio Recording & Production Required Courses (7 courses, 40 units)
57-101 Introduction to Music Technology 6
57-171 Introduction to Music Technology (self-paced) 3
57-181 Solfege I 3
or 57-180 Basic Solfege I
or 57-185 Advanced Solfege I
57-173 Survey of Western Music History (co-requisite: 57-188) 9
57-188 Repertoire and Listening for Musicians 1
57-337 Sound Recording 6
57-338 Sound Editing and Mastering 6
57-438 Multitrack Recording 9

Choose 59 units from:
57-153 Harmony II 9
or 57-150 Basic Harmony II

Work with Drama Faculty Option Coordinator to Approve Concentration Option (88 units minimum).

Work with Design Faculty Option Coordinator to Approve Concentration Option (49 units minimum).
Choose 52 units from:

- 57-182 Solfege II
- 57-186 Advanced Solfege II
- 15-104 Introduction to Computing for Creative Practice
- 15-322 Introduction to Computer Music
- 18-090 Twisted Signals: Multimedia Processing for the Arts
- 33-114 Physics of Musical Sound
- 54-166 Introduction to Sound Design for Theatre
- 54-275 History of Sound Design
- 54-666 Production Audio
- 57-161 Eurhythmics I
- 57-344 Experimental Sound Synthesis
- 57-358 Introduction to Electronic Music
- 57-421 Exploded Ensemble
- 57-427 Advanced Seminar in Film Musicology
- 57-478 Survey of Historical Recording
- 57-622 Independent Study in Sound Recording Production
- 60-131 Foundations: Sculpture
- 60-210 Electronic Media Studio: Introduction to Interactivity

Note: Students completing an IDeATe minor may double-count up to two of the IDeATe minor courses towards the Sound Theory & Practice concentration.

**FREE ELECTIVES**

(approximately 6-10 courses, 54-87 units minimum)

Take any Carnegie Mellon course. A maximum of 9 units of physical education and/or military science may be counted toward this requirement.

### Bachelor of Humanities and Arts Degree Program

The Bachelor of Humanities and Arts (BHA) intercollege degree program combines the strengths of the College of Fine Arts (CFA) and the Dietrich College of Humanities and Social Sciences (DC). This degree is designed for academically and artistically talented students who want to develop their interest in the fine arts, while also pursuing studies in the humanities and social/behavioral sciences. Students choose their fine arts concentration from the following schools in CFA: Architecture, Art, Design, Drama or Music. Students choose their humanities and social sciences concentration from the subject areas offered by DC. The most important aspect of the BHA program is for students to blend their interests and to explore the connections between their chosen disciplines. The program also provides enough flexibility for students to broaden or deepen their concentrations and to explore other areas in which they may be interested.

The BHA curriculum has three main components: general education requirements, fine arts concentration requirements and humanities/social sciences concentration requirements. Students must complete an array of courses defined by their chosen concentrations. Each student’s course of study is unique, based on their background and interests, and course availability in the respective colleges.

Students receive extensive advising support. The academic advisors in the BXA Intercollege Degree Programs are the primary advisors and liaisons between CFA and DC. Each student has two additional academic advisors: an advisor in the admitting school of CFA to guide their focus in the arts and an advisor in DC to guide their focus in the humanities or social/behavioral sciences.

### BHA Curriculum

**Units**

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**Total BHA Degree Requirements**

378

### BHA General Education

(14 courses, 111 units minimum)

- 57-182 Solfege II
- 57-150 Basic Harmony II
- 57-153 Harmony II
- 57-180 Music Since 1945
- 57-160 Independent Study in Sound Studies
- 57-478 Survey of Historical Recording
- 57-622 Independent Study in Sound Recording Production
- 60-131 Foundations: Sculpture
- 60-210 Electronic Media Studio: Introduction to Interactivity
- 57-182 Solfege II
- 57-186 Advanced Solfege II
- 15-104 Introduction to Computing for Creative Practice
- 15-322 Introduction to Computer Music
- 18-090 Twisted Signals: Multimedia Processing for the Arts
- 33-114 Physics of Musical Sound
- 57-344 Experimental Sound Synthesis
- 57-358 Introduction to Electronic Music
- 57-421 Exploded Ensemble
- 57-427 Advanced Seminar in Film Musicology
- 57-478 Survey of Historical Recording
- 57-622 Independent Study in Sound Recording Production
- 60-131 Foundations: Sculpture
- 60-210 Electronic Media Studio: Introduction to Interactivity

Note: Students completing an IDeATe minor may double-count up to two of the IDeATe minor courses towards the Sound Theory & Practice concentration.
• Communicating: Language and Interpretations (3 courses, 27 units minimum, 76-101 required, two approved modern language courses required)
• Reflecting: Societies and Cultures (1 course, 9 units, 79-145 or 79-189 required)
• Modeling: Mathematics and Experiments (1 course, 9 units minimum)
• Deciding: Social Sciences and Values (3 courses, 27 units minimum, 36-200 required)
• University Requirement (1 course, 3 units, 99-101 required)
• BXA Required Courses (5 courses, 36 units, 52-190, 52-291, 52-392, 52-401, 52-402)

Communicating: Language and Interpretations (3 courses, 27 units minimum)

Courses in this category give special attention to the study of language as interpretation, expression and argument within and across multiple discourses. Students examine language for its internal logics and structures.

76-101 Interpretation and Argument 9
or 76-102 Advanced First Year Writing: Special Topics 9
& 76-107 Writing about Literature, Art and Culture 9
& 76-108 Writing about Public Problems 9

All undergraduate students must complete the First-Year Writing requirement—the Department of English does not accept any Advanced Placement exemptions. This requirement can be completed in two different ways. Enroll in one of two full-semester courses 101 or 102 (by invitation only), 9 units, or enroll in two of three half-semester mini courses (back-to-back within a single semester) 106/107/108, 4.5 + 4.5 units. Course options and topics: www.cm.edu/hss/english/first_year/index.html

82-xxx Modern Languages 18

Complete two courses taught in a language offered by the Department of Modern Languages. A wide selection of courses are offered in Arabic Studies, Chinese Studies, French and Francophone Studies, German Studies, Hispanic Studies, Japanese Studies and Russian Studies. Students must complete two courses in the same language. Languages taught at other institutions are also acceptable (with advisor approval).

Reflecting: Societies and Cultures (1 course, 9 units)

This category emphasizes the study of history, society and culture from local and global perspectives.

79-145 Genocide and Weapons of Mass Destruction 9
or 79-189 History of Democracy: Thinking Beyond the Self 9

Modeling: Mathematics and Experiments (1 course, 9 units minimum)

Courses in this category stress the interplay of mathematical (formal) theories and experimental work. Some courses investigate the internal structure of theories, whereas others use them as models for producing real-world knowledge. Such models may be drawn from a variety of disciplines including the natural sciences, but also, for example, psychology and computer science. The interactions between theorizing and experimenting (observing) can be understood within an intellectual framework that invites comparative assessment. Select one course from the following course options:

Mathematics

21-111 Calculus I 10
21-120 Differential and Integral Calculus 10
21-127 Concepts of Mathematics 12
80-210 Logic and Proofs 9
80-211 Logic and Mathematical Inquiry 9

Natural Science

03-121 Modern Biology 9
03-125 Evolution 9
03-132 Basic Science to Modern Medicine 9
03-133 Neurobiology of Disease 9
03-161 Molecules to Mind 9
09-103 Atoms, Molecules and Chemical Change 9
09-105 Introduction to Modern Chemistry I 10
12-201 Geology 9

33-104 Experimental Physics 9
33-114 Physics of Musical Sound 9
33-115 Physics for Future Presidents 9
33-124 Introduction to Astronomy 9

Other Courses

05-413 Human Factors 9
15-104 Introduction to Computing for Creative Practice 10
15-110 Principles of Computing 10
15-112 Fundamentals of Programming and Computer Science 12
33-120 Science and Science Fiction 9
80-220 Philosophy of Science 9
80-226 Revolutions in Science 9
80-312 Mathematical Revolutions 9
84-265 Political Science Research Methods 9
85-370 Perception 9
88-275 Bubbles: Data Science for Human Minds 9

Deciding: Social Sciences and Values (3 courses, 27 units minimum)

The theme of this category is the exploration of cognitive, behavioral and ethical dimensions of decision-making on both the individual and social level. Making decisions requires a broad understanding of human rationality and social interaction. Some courses examine the critical collection and analysis of data for achieving such an understanding, whereas others emphasize the historical development of policies and values, which form the matrix for decision-making.

36-200 Reasoning with Data -REQUIRED 9
05-292 IDeATe: Learning in Museums 9
73-102 Principles of Microeconomics 9
80-130 Introduction to Ethics 9
80-136 Social Structure, Public Policy & Ethics 9
80-208 Critical Thinking 9
80-221 Philosophy of Social Science 9
80-244 Environmental Ethics 9
80-245 Medical Ethics 9
80-270 Problems of Mind and Body: Meaning and Doing 9
80-271 Mind and Body: The Objective and the Subjective 9
80-305 Decision Theory 9
80-330 Ethical Theory 9
80-348 Health, Human Rights, and International Development 9
80-405 Game Theory 9
80-447 Global Justice 9
84-104 Decision Processes in American Political Institutions 9
84-369 Decision Science for International Relations 9
85-102 Introduction to Psychology 9
85-211 Cognitive Psychology 9
85-219 Biological Foundations of Behavior 9
85-221 Principles of Child Development 9
85-241 Social Psychology 9
85-251 Personality 9
85-261 Psychopathology 9
88-120 Reason, Passion and Cognition 9

University Requirement (1 course, 3 units)

This is a mini-course, pass/no pass, to be completed in the first semester or online prior to the first semester.

99-101 Computing @ Carnegie Mellon 3

BXA Required Courses (5 courses, 36 units)

BXA-specific courses give students the opportunity to integrate their areas of concentration by focusing on interdisciplinary approaches and arts-based research techniques.

52-190 BXA Seminar I: Building the Wunderkammer -Spring, Freshman (mini-4) 4.5
52-291 BXA Seminar II: Transferring Knowledge -Spring, Sophomore (mini-3) 4.5
Dietrich College of Humanities and Social Sciences Concentrations
(9 courses, 81 units minimum)

BHA students declare an 81-unit DC concentration based on existing DC programs, through consultation with their BXA advisor and the DC concentration advisors. A completed DC Concentration Declaration form must be approved by the concentration advisor and submitted to the BHA office, by spring mid-semester break of the student’s sophomore year. Note: The BHA Environmental & Sustainability Studies concentration requires additional coursework beyond 81 units.

Curriculum for many BHA DC concentration options are outlined below, though this list is not exhaustive of all concentrations possible in DC.

BHA students who are admitted as freshmen are undeclared until they have met with a concentration advisor and have submitted their signed Declaration form. BHA students who are admitted through transfer must have chosen a DC concentration at the time of their application (which serves as declaration). All BHA students wishing to change their DC concentration at any time following the initial declaration must meet with the advisor of their intended concentration area to complete a new Declaration form, which will be reviewed during the internal transfer application period.

Anthropology Concentration
(81 units minimum)
The BHA concentration in Anthropology offers students training in ethnographic methods and in theoretical understandings of culture. Students examine the evolution, depth, and complexities of ethnography, and explore notions of “culture” in diverse settings, over time and across space. In today’s world, students are increasingly aware of the importance of developing a sophisticated approach to culture and its articulation with changes in the domains of the arts, technology, economics, and politics. The BHA concentration in Anthropology provides students with the tools to link artistic practices to various aspects of globalization. It is highly recommended that Anthropology students study abroad in some capacity.

There are three required courses for the concentration: Introduction to Anthropology (79-201) and Global Studies Research Seminar (79-400), and one Methods course which may be satisfied by rotating options each semester. Students also choose 6 regional/topical courses (51 units).

Demonstrating intermediate to advanced level proficiency in a language other than English is a crucial component of the concentration in Anthropology; all students are required to take at least two upper level (intermediate or above) language courses to satisfy this language prerequisite requirement (which is in addition to required concentration courses).

Language Proficiency Requirement

Demonstrating intermediate to advanced level proficiency in a language other than English is a crucial component of the concentration in Anthropology. Normally this requirement can be satisfied by successfully completing a course conducted in the second language at the 300-level or above for French, German, Italian, or Spanish, or the fourth semester (Intermediate II) level or above for Arabic, Chinese, Japanese, or Russian. Comparable proficiency for other languages can be considered. Additional advanced cultural, historical, and literary study in the second language is strongly recommended. If needed these courses may be counted toward the BHA General Education Communicating: Language and Interpretations category.

Anthropology Required Introductory and Capstone Courses (2 courses, 21 units)

Students must earn a final grade of “C” or better for these courses to count toward the concentration.

79-201 Introduction to Anthropology 9
79-400 Global Studies Research Seminar 12

Required Anthropological Methods Course (1 course, 9 units)

Students must take one course in ethnographic, archaeological, or other anthropological methods selected from the list below. Other courses may fulfill these requirements, with permission of the concentration advisor.

79-275 Introduction to Global Studies 9
79-379 Extreme Ethnography 9

79-380 Hostile Environments: The Politics of Pollution in Global Perspective 9

Anthropological Perspectives (6 courses, 51 units minimum)

Students gain knowledge of specialized theoretical and regional topics by choosing 51 units (typically six courses) selecting from the list below.

57-306 World Music 9
79-203 The Other Europe: The Habsburgs, Communism, & Central/Eastern Europe, 1740-1990 9
79-211 Modern Southeast Asia: Colonialism, Capitalism, and Cultural Exchange 9
79-219 Hong Kong, Taiwan and the Idea of “China” 6
79-223 Mexico: From the Aztec Empire to the Drug War 9
79-224 Mayan America 9
79-261 The Last Emperors: Chinese History and Society, 1600-1900 9
79-262 Modern China: From the Birth of Mao ... to Now 9
79-264 Tibet and China: History and Propaganda 6
79-275 Introduction to Global Studies 9
79-276 Beyond the Border 6
79-278 How (Not) to Change the World 9
79-280 Coffee and Capitalism 9
79-313 “Unwanted”: Refugees, Asylum Seekers, and Patterns of Global Migration 6
79-314 The Politics and Culture of Memory 9
79-315 Thirsty Planet: The Politics of Water in Global Perspective 9
79-317 Art, Anthropology, and Empire 9
79-334 Climate Change and Climate Justice: Global Perspectives 6
79-342 Introduction to Science and Technology Studies 9
79-368 Un-natural Disasters: Societies and Environmental Hazards in Global Perspective 6
79-377 Food, Culture, and Power: A History of Eating 9
79-379 Extreme Ethnography 9
79-380 Hostile Environments: The Politics of Pollution in Global Perspective 9

Note: Courses that count toward this category may be taken at another university, and the units transferred to the BHA concentration under the guidance of the concentration advisor.

Behavioral Economics, Policy & Organizations Concentration
(81 units minimum)

Students in BEPO—the first and only major of its kind—will be uniquely trained in the integration of Economics and Psychology and will have a solid grounding in quantitative methods. The core includes courses in economics, psychology, behavioral economics, and quantitative methods. SDS offers the largest selection of behavioral economics courses anywhere in the world. Applied projects in courses will teach students how to collect original data, design field and laboratory experiments, analyze data, and develop interventions to improve economic outcomes and decisions. Students will be well equipped to enter a wide range of professions and graduate degree programs.

Quantitative Methods (3 courses, 27 units)

36-202 Methods for Statistics & Data Science 9
88-251 Empirical Research Methods 9
88-252 Causal Inference in the Field 9

Economics Courses (2 courses, 18 units)

73-102 Principles of Microeconomics 9
73-158 Markets, Models, and Math 9
or 73-230 Intermediate Microeconomics 9
or 73-328 Health Economics 9
or 73-347 Game Theory Applications for Economics and Business 9
or 73-348 Behavioral Economics 9
or 73-359 Benefit-Cost Analysis 9
or 73-408 Law and Economics 9
or 73-421 Emerging Markets 9
or 73-427 Sustainability, Energy, and Environmental Economics 9
or 88-221 Analytical Foundations of Public Policy 9
Core Courses in Chinese Studies Concentration (81 units minimum)

A BHA concentration in Chinese Studies promotes not just language proficiency but also an understanding of Chinese culture. Students who arrive at Carnegie Mellon with previous language study and/or who have high Advanced Placement, an International Baccalaureate, a Cambridge GCE Advanced level or internal placement test scores will be able to begin taking courses in the concentration earlier in their undergraduate program. In all cases, progress in the concentration will be accelerated by study abroad, which is recommended for all students.

Prerequisites

Intermediate level proficiency in Chinese. This is equivalent to the completion of three courses (two at the 100-level and one at the 200-level) or exemption based on Advanced Placement, International Baccalaureate, Cambridge GCE Advanced level or Carnegie Mellon internal placement test scores.

Core Courses in Chinese Studies (4 courses, 36 units minimum)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>82-232</td>
<td>Intermediate Chinese II*</td>
<td>12</td>
</tr>
<tr>
<td>82-233</td>
<td>Reading Into a New China I: Population, Youth, Marriage, &amp; Housing</td>
<td>9</td>
</tr>
<tr>
<td>82-232</td>
<td>Reading Into a New China II: Transportation, Education, Pop Culture, &amp; Health</td>
<td>9</td>
</tr>
<tr>
<td>82-333</td>
<td>Chinese Language and Culture</td>
<td>9</td>
</tr>
</tbody>
</table>

*Students who place out of 82-232/82-235 must take a minimum of 9 additional units chosen from Chinese Studies Electives at the 400-level.

Core Courses in Modern Languages (1 course, 9 units)

Complete one course.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>82-280</td>
<td>Bilingual &amp; Bicultural Experiences in the US</td>
<td>9</td>
</tr>
<tr>
<td>82-282</td>
<td>Interpreting Global Texts &amp; Cultures</td>
<td>9</td>
</tr>
<tr>
<td>82-283</td>
<td>Language Diversity &amp; Cultural Identity</td>
<td>9</td>
</tr>
<tr>
<td>82-284</td>
<td>Multicultural Pittsburgh: VR Storytelling</td>
<td>9</td>
</tr>
<tr>
<td>82-285</td>
<td>Podcasting: Language and Culture Through Storytelling</td>
<td>9</td>
</tr>
<tr>
<td>82-286</td>
<td>Cultural Complexities</td>
<td>9</td>
</tr>
<tr>
<td>82-383</td>
<td>Second Language Acquisition: Theories and Research</td>
<td>9</td>
</tr>
<tr>
<td>82-388</td>
<td>Topics in Second Language Acquisition</td>
<td>9</td>
</tr>
<tr>
<td>82-480</td>
<td>Translation Technologies</td>
<td>9</td>
</tr>
</tbody>
</table>

Note: In consultation with the concentration advisor, students may substitute a Modern Languages course elective with one related to language analysis, language learning, or acquisition of language and culture from the listings in Chinese Studies or from another department. Examples: 80-180 Nature of Language, 85-421 Language and Thought. In addition, students may choose to take 82-580 Senior Seminar in Modern Languages (3 units). The selected course may not double count in the Electives category.

Core Courses in Chinese History & Society (1 course, 9 units)

Complete one course in consultation with the concentration advisor.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>79-261</td>
<td>The Last Emperors: Chinese History and Society, 1600-1900</td>
<td>9</td>
</tr>
<tr>
<td>79-262</td>
<td>Modern China: From the Birth of Mao ... to Now</td>
<td>9</td>
</tr>
<tr>
<td>79-309</td>
<td>The Chinese Revolution Through Film (1949-2000)</td>
<td>9</td>
</tr>
<tr>
<td>82-138</td>
<td>Comparative China: Perceptions Through Youtube &amp; TikTok</td>
<td>9</td>
</tr>
<tr>
<td>82-230</td>
<td>Cultural Topics in Chinese Studies</td>
<td>6</td>
</tr>
<tr>
<td>82-234</td>
<td>Topics in Chinese History</td>
<td>9</td>
</tr>
<tr>
<td>82-238</td>
<td>Topics in Chinese Culture</td>
<td>9</td>
</tr>
<tr>
<td>82-280</td>
<td>Bilingual &amp; Bicultural Experiences in the US</td>
<td>9</td>
</tr>
<tr>
<td>82-282</td>
<td>Interpreting Global Texts &amp; Cultures</td>
<td>9</td>
</tr>
<tr>
<td>82-283</td>
<td>Language Diversity &amp; Cultural Identity</td>
<td>9</td>
</tr>
</tbody>
</table>

82-333 Chinese Language and Culture (must be a different section than the one used for the core requirements) 9

Chinese Studies and Interdisciplinary Electives (3 courses, 27 units minimum)

Complete two courses from Chinese Studies Electives and one course from Interdisciplinary Electives in consultation with the concentration advisor.

Chinese Studies Electives:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>82-334</td>
<td>Structure of Chinese</td>
<td>9</td>
</tr>
<tr>
<td>82-335</td>
<td>Chinese Culture Through Legends and Folktales</td>
<td>9</td>
</tr>
<tr>
<td>82-337</td>
<td>Mandarin Chinese for Oral Communication I</td>
<td>9</td>
</tr>
<tr>
<td>82-338</td>
<td>Mandarin Chinese for Oral Communication II</td>
<td>9</td>
</tr>
<tr>
<td>82-339</td>
<td>Business Language &amp; Culture in China I</td>
<td>9</td>
</tr>
<tr>
<td>82-340</td>
<td>Business Language &amp; Culture in China II</td>
<td>9</td>
</tr>
<tr>
<td>82-341</td>
<td>China and the West</td>
<td>9</td>
</tr>
<tr>
<td>82-432</td>
<td>Chinese Popular Culture: A Game of Learning *</td>
<td>9</td>
</tr>
<tr>
<td>82-433</td>
<td>Topics in Contemporary Culture of China *</td>
<td>9</td>
</tr>
<tr>
<td>82-434</td>
<td>Studies in Chinese Traditions *</td>
<td>9</td>
</tr>
<tr>
<td>82-436</td>
<td>Introduction to Classical Chinese</td>
<td>9</td>
</tr>
<tr>
<td>82-439</td>
<td>Modern China Through Literature</td>
<td>Var.</td>
</tr>
<tr>
<td>82-440</td>
<td>Studies in Chinese Literature &amp; Culture</td>
<td>9</td>
</tr>
<tr>
<td>82-505</td>
<td>Undergraduate Internship</td>
<td>Var.</td>
</tr>
<tr>
<td>82-531/532</td>
<td>Special Topics in Chinese Studies (Independent studies)</td>
<td>Var.</td>
</tr>
<tr>
<td>82-533</td>
<td>Cultural Topics in Chinese Studies *</td>
<td>6</td>
</tr>
</tbody>
</table>

* Students may repeat these courses with new topics.

Interdisciplinary Electives:

This list is compiled from possibilities such as but not limited to the following. Students should consult SfO and the concentration advisor for the most up to date interdisciplinary electives appropriate for the Chinese Studies curriculum. Courses may be suggested to the concentration advisor for approval as a substitute. Note that not all courses are offered each semester.

Business

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>70-342</td>
<td>Managing Across Cultures</td>
<td>9</td>
</tr>
<tr>
<td>70-365</td>
<td>International Trade and International Law</td>
<td>9</td>
</tr>
<tr>
<td>70-430</td>
<td>International Management</td>
<td>9</td>
</tr>
<tr>
<td>76-318</td>
<td>Communicating in the Global Marketplace</td>
<td>9</td>
</tr>
<tr>
<td>76-339</td>
<td>Topics in Film and Media</td>
<td>9</td>
</tr>
</tbody>
</table>
| History

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>79-261</td>
<td>The Last Emperors: Chinese History and Society, 1600-1900</td>
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<tr>
<td>79-309</td>
<td>The Chinese Revolution Through Film (1949-2000)</td>
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</tbody>
</table>

Institute for Politics and Strategy (Choose in consultation with the concentration advisor.)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>84-310</td>
<td>International Political Economy</td>
<td>9</td>
</tr>
<tr>
<td>84-326</td>
<td>Theories of International Relations</td>
<td>9</td>
</tr>
<tr>
<td>84-362</td>
<td>Diplomacy and Statecraft</td>
<td>9</td>
</tr>
<tr>
<td>84-369</td>
<td>Decision Science for International Relations</td>
<td>9</td>
</tr>
<tr>
<td>84-370</td>
<td>Nuclear Security &amp; Arms Control</td>
<td>9</td>
</tr>
<tr>
<td>84-380</td>
<td>US Grand Strategy</td>
<td>9</td>
</tr>
<tr>
<td>84-388</td>
<td>Concepts of War and Cyber War</td>
<td>6</td>
</tr>
<tr>
<td>84-405</td>
<td>The Future of Warfare</td>
<td>9</td>
</tr>
</tbody>
</table>

Modern Languages

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>82-137</td>
<td>Chinese Calligraphy: Culture and Skills</td>
<td>9</td>
</tr>
<tr>
<td>82-138</td>
<td>Comparative Chinese: Perceptions Through Youtube &amp; TikTok</td>
<td>9</td>
</tr>
<tr>
<td>82-139</td>
<td>Topics in Chinese Language, Culture and Society</td>
<td>6</td>
</tr>
<tr>
<td>82-230</td>
<td>Cultural Topics in Chinese Studies</td>
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<td>82-283</td>
<td>Language Diversity &amp; Cultural Identity</td>
<td>9</td>
</tr>
</tbody>
</table>
Cognitive Neuroscience Electives:

82-284 Multicultural Pittsburgh: VR Storytelling 9
82-285 Podcasting: Language and Culture Through Storytelling 9
82-286 Cultural Complexities 9
82-383 Second Language Acquisition: Theories and Research 9
82-388 Topics in Second Language Acquisition 9
82-480 Translation Technologies 9

*(Students may repeat these courses with new topics.)*

Cognitive Neuroscience Concentration

(81 units minimum)

Cognitive neuroscience is a science concerned with discovering biological bases of psychological functions. It addresses questions of how behavior is produced by neural circuits of the brain and also how those neural circuits are in turn influenced by behavioral experiences. Students with a concentration in Cognitive Neuroscience are expected to learn about existing findings within the field and also to become proficient in how to conduct and analyze scientific investigations directed toward understanding the biological basis of behavior. This includes observing behavior, formulating hypotheses, designing experiments to test these hypotheses, running experiments, performing statistical analyses and writing reports.

Introductory and Survey Coursework (4 courses, 36 units)

03-121 Modern Biology 9
03-363 Systems Neuroscience 9
85-219 Biological Foundations of Behavior 9
85-211 Cognitive Psychology 9
or 85-213 Human Information Processing and Artificial Intelligence

Research Methods Training (2 course, 18 units)

36-309 Experimental Design for Behavioral & Social Sciences 9
or 85-309 Statistical Concepts and Methods for Behavioral and Social Science
85-314 Cognitive Neuroscience Research Methods * 9

* 85-310 Research Methods in Cognitive Psychology may be substituted if necessary.

Distribution Requirements (3 courses, 27 units)

Complete three courses with at least one from each category below.

Approaches to Cognitive Neuroscience:

15-386 Neurocomputation 9
15-883 Computational Models of Neural Systems 12
36-746 Statistical Methods for Neuroscience and Psychology 12
85-345 Meaning in Mind and Brain 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
85-429 Cognitive Brain Imaging 9

Cognitive Neuroscience Electives:

03-133 Neurobiology of Disease 9
03-362 Cellular Neuroscience 9
03-364 Developmental Neuroscience 9
85-356 Expertise: The cognitive (neuro)science of mastering almost any skill 9
85-370 Perception 9
85-385 Auditory Perception: Sense of Sound 9
85-406 Autism: Psychological and Neuroscience Perspectives 9

85-408 Visual Cognition 9
85-435 Biologically Intelligent Exploration 9
85-442 Health Psychology 9
85-443 Social Factors and Well-Being 9
85-501 Stress, Coping and Well-Being 9

Cognitive Science Concentration

(81 units minimum)

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 concentration 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.

Prerequisite Courses

15-120 Fundamentals of Programming and Computer Science 12
21-120 or 21-111 Differential and Integral Calculus 10-20
and Calculus I
21-112 and Calculus II 12
21-127 Concepts of Mathematics 12

Statistics Course (1 course, 9 units)

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 (3 courses, 29 units minimum)

Complete two of the following courses:

15-122 Principles of Imperative Computation 10
15-150 Principles of Functional Programming 10
15-251 Great Ideas in Theoretical Computer Science 12

Plus one of the following courses:

85-412 Cognitive Modeling 9
85-419 Introduction to Parallel Distributed Processing 9
85-426 Learning in Humans and Machines 9
85-435 Biologically Intelligent Exploration 9

Cognitive Psychology Core (4 courses, 36 units)

85-211 Cognitive Psychology 9
or 85-213 Human Information Processing and Artificial Intelligence
85-310 Research Methods in Cognitive Psychology 9
or 85-311 Modern Research Methods: Cumulative Science, Big Data, and Meta-Analysis
or 85-314 Cognitive Neuroscience Research Methods

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

85-219 Biological Foundations of Behavior 9
or 85-106 Animal Minds
85-359 Introduction to Music Cognition Research 9
85-360 Origins of Intelligence 9
85-370 Perception 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
80-310 Formal Logic 9
80-314 Causal Discovery, Statistics, and Machine Learning 9
80-315 Modal Logic 9
80-381 Meaning in Language 9
80-383 Language in Use 9
05-413 Human Factors 9
11-344 Machine Learning in Practice 12
Cognitive Science Elective (1 course, 9 units)
Choose one elective in consultation with your concentration advisor.

Creative Writing Concentration (81 units minimum)
In the Creative Writing concentration, BHA students develop their talents in writing fiction, poetry and other imaginative forms. While studying with faculty members who are practicing poets and prose writers, students read widely in literature, explore the resources of their imaginations, sharpen their critical and verbal skills and develop a professional attitude toward their writing. The Creative Writing program is based on a conservatory model, made up of faculty and students who have an intense commitment to their work.

Students in the Creative Writing concentration are required to take two of the introductory Survey of Forms courses, ideally in their sophomore year. Choices include Poetry (76-265), Fiction (76-260), Screenwriting (76-269) and Nonfiction (76-261). In order to proceed into the upper level courses in the concentration (and in each of the genres), students must do well in these introductory courses (receive a grade of A or B). After completing the Survey of Forms courses, students take four workshops in fiction, poetry, screenwriting or nonfiction. At least two of the workshops must be taken in a single genre. In the writing workshops, students develop their critical and verbal abilities through close writing and analysis of poems, stories and other literary forms. Their work is critiqued and evaluated by peers and the faculty.

Survey of Forms Courses (2 courses, 18 units)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>76-260</td>
<td>Introduction to Writing Fiction</td>
<td>9</td>
</tr>
<tr>
<td>76-261</td>
<td>Introduction to Writing Creative Nonfiction</td>
<td>9</td>
</tr>
<tr>
<td>76-265</td>
<td>Introduction to Writing Poetry</td>
<td>9</td>
</tr>
<tr>
<td>76-269</td>
<td>Introduction to Screenwriting</td>
<td>9</td>
</tr>
</tbody>
</table>

Note: A student must receive a grade of A or B in the Survey of Forms class in a specific genre in order to be eligible to enroll in a workshop of that genre. A student who receives a grade of C in a Survey of Forms course may enroll in a related workshop only with the permission of the workshop professor. A student who receives a D or F in Survey of Forms may not take a workshop in that genre.

Creative Writing Workshops (4 courses, 36 units)
Complete four Creative Writing workshops, at least two in a single genre. Workshops in all genres may be taken more than once for credit.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>76-365</td>
<td>Beginning Poetry Workshop</td>
<td>9</td>
</tr>
<tr>
<td>76-366</td>
<td>Essay Writing Workshop</td>
<td>9</td>
</tr>
<tr>
<td>76-460</td>
<td>Beginning Fiction Workshop</td>
<td>9</td>
</tr>
<tr>
<td>76-462</td>
<td>Advanced Fiction Workshop</td>
<td>9</td>
</tr>
<tr>
<td>76-464</td>
<td>Creative Nonfiction Workshop</td>
<td>9</td>
</tr>
<tr>
<td>76-465</td>
<td>Advanced Poetry Workshop</td>
<td>9</td>
</tr>
<tr>
<td>76-469</td>
<td>Screenwriting Workshop</td>
<td>9</td>
</tr>
</tbody>
</table>

English Electives (3 courses, 27 units)
Complete three courses (27 units minimum) from the English Department's offerings. Reading in Forms classes are recommended, as is 76-306 Editing and Publishing (note: this course is invitation only). Please consult the list of courses published each semester by the Department for current offerings. Students should discuss curriculum choices with the concentration advisor to determine the best electives for their focus in Creative Writing.

Cybersecurity & International Conflict (81 units minimum)
The BHA concentration in cybersecurity and international conflict analyzes the role of cyber warfare and cybersecurity in international politics—past, present, and future. Cyber attacks by nation-states and their proxies have the potential to reshape how wars are fought in the twenty-first century. As such, the complexity and policy challenge of cyber-engagements is immense and altogether without precedent. The concentration addresses the role of deterrence, dissuasion, and attribution in cyber conflict, while also studying the nuances of key components of modern warfare—from the security dilemma to escalation management.

Courses in this concentration focus on the existing gaps in our understanding of cybersecurity and international conflict, such as whether or not cyberspace is offense or defense dominant and which factors are most important in determining the answer to this, and other relevant questions, including how nation-states, their primary adversaries, and a bevy of nonstate actors engage online and in the virtual and information environments. Accordingly, the concentration exposes students to basic technology concepts, methods of attack and defense, potential strategy and goals for cyber-engagement, and response and forensics for cyber-engagements.

Alongside conventional methods of warfare, cybersecurity has rapidly developed into a centerpiece of state’s ability to project power and impose its will in order to achieve its national priorities and strategic objectives. As the United States and other emerging cyber powers craft and implement doctrine in this nascent domain, there is likely to be a rapid increase in activity, from efforts to disrupt the online activities of global terrorist networks like the Islamic State to near daily raids on foreign networks designed to cripple states’ cyberweapons before they can be deployed. In the shifting landscape of cyber capabilities, how will laws, authorities, and policies keep pace? What are the implications and consequences of actions that may be considered “short of war” by some countries but “above the threshold” of conflict by others? Will a more aggressive defensive posture with respect to cybersecurity inadvertently increase the risk of conflict with states that sponsor malicious hacking groups? What is the proper balance between offense and defense in cybersecurity and how are cyber operations best integrated into a country’s overall military strategy?

Unlike other kinds of conflicts, the attribution of attacks presents significant challenges. Indeed, in many cases, it can be difficult to determine whether the attacker is a nation-state, a nonstate actor, a criminal gang, or a lone hacktivist. Investigators must combine technical and traditional methods to identify potentially responsible parties and to understand their intent. If the aggressor’s identity cannot be confirmed, how can a counterattack be launched? Some attackers may seek to mount “false flag” attacks and deception, for example, that misdirect defenders to counter-attack in the wrong direction. Additionally, what are appropriately responses to attacks made on civil infrastructure and private business operations, such as in the areas of financial services, transportation, energy, entertainment, and health care? In other words, what are the appropriate rules of engagement for national systems, infrastructural systems, businesses, and individuals? When, for example, is a counterattack or a “kinetic” response permissible? These questions have major implications for the study of war and peace. More than at any time in the past, those who seek to start war may be harder to find and their motives more difficult to discern. The cybersecurity and international conflict concentration outlined herein tackles the social-scientific dimensions of cybersecurity with a focus on the implications of the cyber age for modern statecraft, warfare, elections (local, state, and national), and politics, more generally.

Foundational Courses (2 courses, 18 units)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>84-275</td>
<td>Comparative Politics</td>
<td>9</td>
</tr>
<tr>
<td>84-326</td>
<td>Theories of International Relations</td>
<td>9</td>
</tr>
</tbody>
</table>

Core Courses (3 courses, 24 units)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>84-387</td>
<td>Technology and Policy of Cyber War</td>
<td>9</td>
</tr>
<tr>
<td>84-388</td>
<td>Concepts of War and Cyber War</td>
<td>6</td>
</tr>
<tr>
<td>84-405</td>
<td>The Future of Warfare</td>
<td>9</td>
</tr>
</tbody>
</table>

Electives (4-5 courses, 39 units minimum)
At least two courses (18 units) must be taken from the Institute for Politics and Strategy and have an 84-number.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>16-735</td>
<td>Ethics and Robotics</td>
<td>12</td>
</tr>
<tr>
<td>17-200</td>
<td>Ethics and Policy Issues in Computing</td>
<td>9</td>
</tr>
<tr>
<td>17-303</td>
<td>Cryptocurrencies, Blockchain Systems and Applications</td>
<td>9</td>
</tr>
<tr>
<td>17-331</td>
<td>Information Security, Privacy, and Policy</td>
<td>12</td>
</tr>
<tr>
<td>17-333</td>
<td>Privacy Policy, Law, and Technology</td>
<td>9</td>
</tr>
<tr>
<td>17-334</td>
<td>Usable Privacy and Security</td>
<td>9</td>
</tr>
<tr>
<td>79-301</td>
<td>History of Surveillance: From the Plantation to Data Capitalism</td>
<td>6</td>
</tr>
<tr>
<td>79-302</td>
<td>Killer Robots:The Ethics, Law, and Politics of Lethal Autonomous Weapons Systems</td>
<td>6</td>
</tr>
<tr>
<td>80-249</td>
<td>AI, Society, and Humanity</td>
<td>9</td>
</tr>
<tr>
<td>84-200</td>
<td>Security Game Simulation</td>
<td>9</td>
</tr>
<tr>
<td>84-312</td>
<td>Terrorism in Sub-Saharan Africa</td>
<td>6</td>
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<tr>
<td>84-319</td>
<td>Civil-Military Relations</td>
<td>9</td>
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<td>84-323</td>
<td>War and Peace in the Contemporary Middle East</td>
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<td>84-325</td>
<td>Contemporary American Foreign Policy</td>
<td>9</td>
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<tr>
<td>84-327</td>
<td>Repression and Control in Dictatorships</td>
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<tr>
<td>84-328</td>
<td>Military Strategy and Doctrine</td>
<td>9</td>
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<tr>
<td>84-370</td>
<td>Nuclear Security &amp; Arms Control</td>
<td>9</td>
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<td>84-372</td>
<td>Space and National Security</td>
<td>9</td>
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<tr>
<td>84-373</td>
<td>Emerging Technologies and the Law</td>
<td>9</td>
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<tr>
<td>84-380</td>
<td>US Grand Strategy</td>
<td>9</td>
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</tbody>
</table>
Decision Science Concentration
(81 units minimum)

Decision Science is grounded in theories and methods drawn from psychology, economics, philosophy, statistics, and management science. Courses in the BHA concentration in Decision Science cover the three aspects of decision science: (a) normative analysis, creating formal models of rational choice; (b) descriptive research, studying how cognitive, emotional, social, and institutional factors affect judgment and choice; and (c) prescriptive interventions, seeking to improve judgment and decision making. In addition to gaining a broad education in the principles of judgment and decision making, students with a concentration in Decision Science gain broadly applicable skills in research design and analysis. They also have the chance to think about and discuss decision making in many different areas.

Disciplinary Perspectives (5 courses, 48 units)

73-102 Principles of Microeconomics 9
85-102 Introduction to Psychology 9
88-120 Reason, Passion and Cognition (freshman or sophomore year) 9
88-223 Decision Analysis 12
88-302 Behavioral Decision Making 9

Research Methods (2 courses, 18 units)

36-202 Methods for Statistics & Data Science 9
or 36-309 Experimental Design for Behavioral & Social Sciences 9
or 85-309 Statistical Concepts and Methods for Behavioral and Social Science 9
88-251 Empirical Research Methods 9

Electives (2 courses, 18 units minimum)

Complete at least 18 units from the following categories of courses. The selected courses may be from one category or from any combination of categories. Note that not all elective courses are offered every year. At least one of these courses (9 units) must be a Department of Social and Decision Sciences course (88-xxx).

Biological and Behavioral Aspects of Decision Making:

85-350 Psychology of Prejudice 9
85-352 Evolutionary Psychology 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
88-230 Human Intelligence and Human Stupidity 9
88-231 Thinking in Person vs. Thinking Online 9
88-312 Decision Models and Games 9
88-342 The Neuroscience of Decision Making 9
88-360 Behavioral Economics 9
88-365 Behavioral Economics and Public Policy 9
88-372 Social and Emotional Brain 9
88-380 Dynamic Decisions 9

Managerial and Organizational Aspects of Decision Making:

70-311 Organizational Behavior 9
70-381 Marketing I 9
70-443 Digital Marketing and Social Media Strategy 9
70-460 Mathematical Models for Consulting 9
88-150 Managing Decisions 9
88-221 Analytical Foundations of Public Policy 9
88-406 Behavioral Economics @ Work 9
88-418 Negotiation: Strategies and Behavioral Insights 9

Decision Science and Public Policy:

84-364 Comparative Presidential Behavior: Leadership, Personality, and Decision Making 9
84-369 Decision Science for International Relations 9
88-221 Analytical Foundations of Public Policy 9
88-344 Systems Analysis: Environmental Policy 9
88-365 Behavioral Economics and Public Policy 9
88-366 Behavioral Economics of Poverty and Development 9
88-405 Risk Perception and Communication 9
88-435 Decision Science and Policy 9
88-444 Public Policy and Regulations 9
88-451/452 Policy Analysis Senior Project 12

Research Methods for Decision Science:

36-303 Sampling, Survey and Society 9
70-460 Mathematical Models for Consulting 9
85-310 Research Methods in Cognitive Psychology 9
85-314 Cognitive Neuroscience Research Methods 9
88-252 Causal Inference in the Field 9
88-388 Psychological Models of Decision Making 9

Economics Concentration
(81 units minimum)

The BHA concentration in Economics provides a solid understanding of economic theory and quantitative economic analysis. The core disciplinary sequences in economic theory and quantitative analysis are combined with calculus and data analysis to provide students with knowledge and skills that allow for creative problem-solving.

Mathematics Prerequisites

These courses are not counted as part of your DC Concentration. It may be used to satisfy general education or free elective requirements.

21-120 Differential and Integral Calculus 10
21-256 Multivariate Analysis 9

Economic Theory Requirements (4 courses, 36 units)

73-102 Principles of Microeconomics 9
73-103 Principles of Macroeconomics 9
73-230 Intermediate Microeconomics 9
73-240 Intermediate Macroeconomics 9

* Students who place out of 73-102 based on the economics placement exam will receive a prereq waiver for 73-102 and are waived from taking 73-102.

**Quantitative Analysis Requirements (2 courses, 18 units)**

These courses require 36-200 Reasoning with Data as a prerequisite; 36-200 fulfills a general education Decision making requirement, as well.

73-265 Economics and Data Science 9
73-274 Econometrics I 9

**Advanced Economics Electives (2 courses, 18 units)**

Students must take two advanced elective courses. Advanced elective courses are those numbered 73-300 through 73-495, as well as courses designated by the program offered by other departments/programs. Additionally, students may work with their economics advisor to structure alternative sets of courses to meet these requirements based on their particular interests, subject to course availability.

**Senior Work (1 course, 9 units)**

73-497 Senior Project 9

**Environmental & Sustainability Studies Concentration (93 units minimum)**

The BHA concentration in Environmental & Sustainability Studies (ESS) focuses on human-environment interactions from a multitude of disciplinary perspectives. The curriculum draws on the expertise of faculty across several Carnegie Mellon colleges in order to provide students with the interdisciplinary background and skills necessary to understand environmental problems and the means to mitigate them. The curriculum is designed to help students apply social and scientific perspectives to environmental problems; to distinguish among scientific methods for evaluating environmental problems; to identify and assess sources of environmental data; and to identify environmental justice issues within the context of proposed policy solutions.

**Core Courses (3 course, 27 units)**

24/09-291 Environmental Systems on a Changing Planet 9
79-336 Introduction to Environmental Ideas 9
66-506 Senior Capstone (Interdisciplinary Research: Capstone in ESS) 9

**Earth and Environmental Science (1 course, 9 units)**

Choose one course from the list below.

03-140 Ecology and Environmental Science 9
33-115 Physics for Future Presidents 9

**Global Course (1 course, 3 units)**

99-xxx Each semester, a new course is offered on Global themes, in partnership with University of Pittsburgh’s Global Studies Center. 3

**Political Economy (1 course, 9 units minimum)**

Choose one course from the list below.

19-101 Introduction to Engineering and Public Policy 12
79-300 History of American Public Policy 9
84-110 Foundations of Political Economy 9
84-313 International Organizations and Law 9
84-325 Contemporary American Foreign Policy 9
88-344 Systems Analysis: Environmental Policy 9

**Electives (5 courses, 45 units minimum)**

Choose three DC Electives and two MCS/ENG Electives in consultation with the concentration advisor.

**DC Electives:**

76-241 Introduction to Gender Studies 9
76-291 Getting Heard/Making a Difference 9
76-354 Watchdog Journalism 9
76-395 Science Writing 9
76-450 Law, Culture, and the Humanities 9
79-201 Introduction to Anthropology 9
79-275 Introduction to Global Studies 9

**MCS/ENG Electives:**

79-278 How (Not) to Change the World 9
79-268 Bananas, Baseball, and Borders: Latin America and the United States 9
79-297 Technology and Work 9
79-331 Body Politics: Women and Health in America 9
79-372 The Rise and Fall of Pittsburgh Steel 6
79-377 Food, Culture, and Power: A History of Eating 9
79-379 Extreme Ethnography 9
79-383 The History of Capitalism 9
79-386 A Tale of Two Epidemics: Influenza 1918 and Covid 19 9
80-135 Introduction to Political Philosophy 9
80-244 Environmental Ethics 9
84-110 Foundations of Political Economy 9
84-275 Comparative Politics 9
84-325 Contemporary American Foreign Policy 9
85-241 Social Psychology 9

**Foundations of Public Policy Requirement (1 course, 9 units)**

Choose one 9-unit course from the list below.

73-102 Principles of Microeconomics 12
79-300 History of American Public Policy 9
84-104 Decision Processes in American Political Institutions 9
84-110 Foundations of Political Economy 9

**History Core (3 courses, 27 units)**

Choose one 9-unit course from each category below. (Students must earn a final grade of “C” or better for these courses to count toward the concentration).

**Policy History:**

79-300 History of American Public Policy 9

**U.S. History:**

79-204 American Environmental History 9
79-212 Jim Crow America 9
79-231 American Civil Rights Movement: From Garveyism to Black Power 9
79-240 Development of American Culture 9
79-242 African American History: Reconstruction to the Present 9
79-244 Women in American History 9
79-245 Capitalism and Individualism in American Culture 9
79-248 U.S. Constitution & the Presidency 9
79-249 20th Century U.S. History 9
79-320 Women, Politics, and Protest 9
Non-U.S. History:

79-202 Flesh and Spirit: Early Modern Europe, 1400-1750
79-203 The Other Europe: The Habsburgs, Communism, & Central/Eastern Europe, 1740-1990
79-205 20th Century Europe
79-211 Modern Southeast Asia: Colonialism, Capitalism, and Cultural Exchange
79-223 Mexico: From the Aztec Empire to the Drug War
79-226 African History: Earliest Times to 1780
79-227 Modern Africa: The Slave Trade to the End of Apartheid
79-229 The Origins of the Palestinian-Israeli Conflict, 1880-1948
79-230 Arab-Israeli Conflict Since 1948
79-237 Comparative Slavery
79-260 Nazi Germany
79-261 The Last Emperors: Chinese History and Society, 1600-1900
79-262 Modern China: From the Birth of Mao ... to Now
79-264 Tibet and China: History and Propaganda
79-265 Russian History: Game of Thrones
79-266 Russian History and Revolutionary Socialism
79-268 World War I: The Twentieth Century’s First Catastrophe
79-307 Religion and Politics in the Middle East

Philosophy Core (3 courses, 27 units)

Choose one course from three of the four categories below. No more than 9 units at the 100-level may be counted toward this requirement.

Ethics:

80-130 Introduction to Ethics
80-330 Ethical Theory

Political Philosophy:

80-135 Introduction to Political Philosophy
80-335 Social and Political Philosophy

Foundations of Social Science:

80-221 Philosophy of Social Science
80-324 Philosophy of Economics

Applied Philosophy:

80-136 Social Structure, Public Policy & Ethics
80-244 Environmental Ethics
80-245 Medical Ethics
80-249 AI, Society, and Humanity
80-336 Philosophy of Law
80-348 Health, Human Rights, and International Development
80-447 Global Justice

Elective Courses (2 courses, 18 units)

Choose any two courses from any of the following categories.

Engineering and Public Policy:

19-424 Energy and the Environment

Business:

70-311 Organizational Behavior
70-321 Negotiation and Conflict Resolution
70-332 Business, Society and Ethics
70-364 Business Law
70-365 International Trade and International Law
70-430 International Management

Economics:

73-352 Public Economics
73-359 Benefit-Cost Analysis
73-365 Firms, Market Structures, and Strategy

73-408 Law and Economics
73-476 American Economic History

English:

76-492 Rhetoric of Public Policy

History:

79-145 Genocide and Weapons of Mass Destruction
79-189 History of Democracy: Thinking Beyond the Self
79-206 Crime and Punishment in Early Modern Europe
79-233 The United States and the Middle East since 1945
79-234 Technology and Society
79-242 African American History: Reconstruction to the Present
79-247 African Americans, Imprisonment, and the Carceral State
79-250 Voting Rights: An Unexpected History
79-267 The Soviet Union in World War II: Military, Political, and Social History
79-280 Coffee and Capitalism
79-288 Bananas, Baseball, and Borders: Latin America and the United States
79-291 Innovation and Entertainment: A Business History of American Popular Culture
79-298 Guns in American History: Culture, Violence, and Politics
79-299 Introduction to the History of Science
79-301 History of Surveillance: From the Plantation to Data Capitalism
79-302 Killer Robots: The Ethics, Law, and Politics of Lethal Autonomous Weapons Systems
79-303 Pittsburgh and the Transformation of Modern Urban America
79-305 Moneyball Nation: Data in American Life
79-310 U. S. Business History: 1870 to the Present
79-315 Thirsty Planet: The Politics of Water in Global Perspective
79-320 Women, Politics, and Protest
79-322 Stalin and the Great Terror
79-325 U.S. Gay and Lesbian History
79-330 Medicine and Society: Health, Healers, and Hospitals
79-331 Body Politics: Women and Health in America
79-334 Climate Change and Climate Justice: Global Perspectives
79-336 Introduction to Environmental Ideas
79-338 History of Education in America
79-339 Juvenile Delinquency & Film: From Soul of Youth (1920) to West Side Story (1961)
79-342 Introduction to Science and Technology Studies
79-343 Education, Democracy, and Civil Rights
79-359 Truth, Lies, and Propaganda: A Historical Inquiry
79-370 Technology in the United States
79-371 African American Urban History
79-381 Energy and Empire: How Fossil Fuels Changed the World
79-397 Environmental and Public Health Crises in the City

Philosophy:

80-130 Introduction to Ethics
80-135 Introduction to Political Philosophy
80-136 Social Structure, Public Policy & Ethics
80-221 Philosophy of Social Science
80-244 Environmental Ethics
80-245 Medical Ethics
80-256 Modern Moral Philosophy
80-305 Decision Theory
80-330 Ethical Theory
Courses in Film Production, Screenwriting, Digital Media, Literature & Culture, and/or Film & Visual Media Studies (3 courses, 27 units)
Students may take an additional three Dietrich College courses for a minimum of 27 units of courses offered in the categories listed above. Because there are dozens of options available, including many of the courses listed above, please consult with the Department of concentration advisor for guidance.

**French & Francophone Studies Concentration**
*(81 units minimum)*

A BHA concentration in French & Francophone Studies promotes not just language proficiency but also an understanding of French and francophone cultures. Students who arrive at Carnegie Mellon with previous language study and/or who have high Advanced Placement, an International Baccalaureate, a Cambridge GCE Advanced level or internal placement test scores will be able to begin taking courses in the concentration earlier in their undergraduate program. In all cases, progress in the concentration will be accelerated by study abroad, which is recommended for all students.

**Prerequisites**
Intermediate level proficiency in French. This is equivalent to the completion of four courses (two at the 100-level and two at the 200-level) or exemption based on Advanced Placement, International Baccalaureate, Cambridge GCE Advanced level or Carnegie Mellon internal placement test scores.

**Core Courses in French & Francophone Studies (3 courses, 27 units)**
82-303 French & Francophone Cultures 9
82-304 French & Francophone Sociolinguistics 9
82-3xx or 82-4xx 9

Note: 82-303 or 82-304 can be repeated with a different topic. A 400-level course may be substituted with the concentration advisor’s approval.

**Core Courses in Modern Languages (1 course, 9 units)**

Complete one course.
82-280 Bilingual & Bicultural Experiences in the US 9
82-282 Interpreting Global Texts & Cultures 9
82-283 Language Diversity & Cultural Identity 9
82-284 Multicultural Pittsburgh: VR Storytelling 9
82-285 Podcasting: Language and Culture Through Storytelling 9
82-286 Cultural Complexities 9
82-383 Second Language Acquisition: Theories and Research 9
82-388 Topics in Second Language Acquisition 9
82-480 Translation Technologies 9

Note: In consultation with the concentration advisor, students may substitute a Modern Languages course elective with one related to language analysis, language learning, or acquisition of language and culture from the listings in French & Francophone Studies or from another department. Examples: 80-180 Nature of Language, 85-421 Language and Thought. In addition, students may choose to take 82-580 Senior Seminar in Modern Languages (3 units). The selected course may not double count in the Electives category.

**French & Francophone Studies and Interdisciplinary Electives (5 courses, 45 units minimum)**

Complete four courses from French & Francophone Electives and one course from Interdisciplinary Electives or three courses from French & Francophone Electives and two courses from Interdisciplinary Electives in consultation with the concentration advisor.

**French & Francophone Studies Electives:**
82-415/416 Topics in French and Francophone Studies 9
82-501/502 Special Topics in French & Francophone Studies 9
82-505 Undergraduate Internship 9

*Students may repeat these courses with new topics.*

**Interdisciplinary Electives:**
This list is compiled from possibilities such as but not limited to the following. Students should consult SIO and the concentration advisor for the most up to date interdisciplinary electives appropriate for the French & Francophone Studies curriculum. Courses may be suggested to the concentration advisor for approval as a substitute. Note that not all courses are offered each semester.

### Film & Visual Media Concentration
*(81 units minimum)*

The BHA concentration in Film & Visual Media trains students through a combination of coursework in visual media, film history and analysis, screenwriting, and production of film and other visual media. This concentration offers a comprehensive education in film and visual media, from theoretical framing and historical-cultural contextualization to training skills in both creating and analyzing film, and developing a complex blend of creative, professional and technical competencies. CMU’s Department of English is an ideal home for the Film & Visual Media concentration due to the department’s combination of creative writers, film and media studies scholars, film makers, digital humanities and visual communication researchers.

#### Introductory Courses (2 courses, 18 units)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>76-239</td>
<td>Introduction to Film Studies 9</td>
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<tr>
<td>76-310</td>
<td>Advanced Studies in Film and Media 9</td>
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#### Production Course (1 course, 9 units)

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>76-292</td>
<td>Introduction to Film Production 9</td>
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#### Screenwriting Course (1 course, 9 units)

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>76-269</td>
<td>Introduction to Screenwriting 9</td>
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</tbody>
</table>

#### Topics in Film & Visual Media Studies (2 courses, 18 units)

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>76-278</td>
<td>Japanese Film and Literature: The Art of Storytelling 9</td>
</tr>
<tr>
<td>76-312</td>
<td>Crime and Justice in American Film 9</td>
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<tr>
<td>76-339</td>
<td>Topics in Film and Media 9</td>
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<tr>
<td>76-353</td>
<td>Transnational Feminisms: Fiction and Film 9</td>
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<tr>
<td>76-367</td>
<td>Fact Into Film: Translating History into Cinema 9</td>
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<td>76-377</td>
<td>Shakespeare on Film 9</td>
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<td>76-438</td>
<td>The Wire: Crime, Realism, and Long-Form TV 9</td>
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<td>76-439</td>
<td>Seminar in Film 9</td>
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<td>76-448</td>
<td>Shakespeare on Film 9</td>
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<td>76-449</td>
<td>Race and Media 9</td>
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<td>76-225</td>
<td>West African History in Film 9</td>
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<td>76-306</td>
<td>Fact into Film: Translating History into Cinema 9</td>
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<td>76-308</td>
<td>Crime and Justice in American Film 9</td>
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<td>79-319</td>
<td>India Through Film 6</td>
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<td>79-326</td>
<td>Shall We Dance? Culture, Politics, and Movement in the 20th Century 6</td>
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<td>79-339</td>
<td>Juvenile Delinquency &amp; Film: From Soul of Youth (1920) to West Side Story (1961) 6</td>
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<tr>
<td>82-215</td>
<td>Arab Culture Through Dialogues, Film, and Literature 9</td>
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<td>82-278</td>
<td>Japanese Film and Literature: The Art of Storytelling 9</td>
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<td>82-284</td>
<td>Multicultural Pittsburgh: VR Storytelling 9</td>
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<tr>
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<tr>
<td>80-335</td>
<td>Social and Political Philosophy 9</td>
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<td>80-336</td>
<td>Philosophy of Law 9</td>
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<td>80-405</td>
<td>Game Theory 9</td>
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<td>80-447</td>
<td>Global Justice 9</td>
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</tbody>
</table>
English

76-239 Introduction to Film Studies 9
76-318 Communicating in the Global Marketplace 9
76-385 Introduction to Discourse Analysis 9
76-386 Language & Culture 9

History

79-202 Flesh and Spirit: Early Modern Europe, 1400-1750 9
79-205 20th Century Europe 9
79-227 Modern Africa: The Slave Trade to the End of Apartheid 9
79-275 Introduction to Global Studies 9
79-350 Early Christianity 9
79-385 Out of Africa: The Making of the African Diaspora 9

Institute for Politics and Strategy (Choose in consultation with the concentration advisor.)

84-265 Political Science Research Methods 9
84-275 Comparative Politics 9
84-313 International Organizations and Law 9
84-322 Nonviolent Conflict and Revolution 9
84-324 The Future of Democracy 9
84-326 Theories of International Relations 9
84-362 Diplomacy and Statecraft 9
84-364 Comparative Presidential Behavior: Leadership, Personality, and Decision Making 9

Modern Languages

82-227 Germany & the European Union 9
82-280 Bilingual & Bicultural Experiences in the US 9
82-282 Interpreting Global Texts & Cultures 9
82-284 Multicultural Pittsburgh: VR Storytelling 9
82-285 Podcasting: Language and Culture Through Storytelling 9
82-288 Everyday Learning: Designing Learning Exp in Times of Unrest & Uncertainty 9
82-383 Second Language Acquisition: Theories and Research 9
82-388 Topics in Second Language Acquisition 9
82-480 Translation Technologies 9

Philosophy

80-180 Nature of Language 9
80-280 Linguistic Analysis 9
80-282 Phonetics and Phonology I 9
80-380 Philosophy of Language 9
80-381 Meaning in Language 9

Psychology

85-241 Social Psychology 9
85-375 Crosscultural Psychology 9
85-421 Language and Thought 9

German Studies Concentration

(81 units minimum)

A BHA concentration in German Studies promotes not just language proficiency but also an understanding of German culture. Students who arrive at Carnegie Mellon with previous language study and/or who have high Advanced Placement, an International Baccalaureate, a Cambridge GCE Advanced level or internal placement exam scores will be able to begin taking courses in the concentration earlier in their undergraduate program. In all cases, progress in the concentration will be accelerated by study abroad, which is recommended for all students.

Prerequisites

Intermediate level proficiency in German. This is equivalent to the completion of four courses (two at the 100-level and two at the 200-level) or exemption based on Advanced Placement, International Baccalaureate, Cambridge GCE Advanced level or Carnegie Mellon internal placement test scores.

Core Courses in German Studies (5 courses, 45 units)

82-221 Intermediate German I 9
82-222 Intermediate German II 9
82-320 Contemporary Society in Germany, Austria and Switzerland 9
82-323 Germany, Austria and Switzerland in the 20th Century 9
82-327 The Emergence of the German Speaking World 9

Note: If students have already completed the equivalent of the 200-level courses prior to arriving at Carnegie Mellon, they may take 400-level courses with approval from the concentration advisor. 400-level courses may also be substituted for the 300-level courses with the approval of the concentration advisor.

Core Courses in Modern Languages (1 course, 9 units)

Complete one course.

82-280 Bilingual & Bicultural Experiences in the US 9
82-282 Interpreting Global Texts & Cultures 9
82-283 Language Diversity & Cultural Identity 9
82-284 Multicultural Pittsburgh: VR Storytelling 9
82-285 Podcasting: Language and Culture Through Storytelling 9
82-286 Cultural Complexities 9
82-383 Second Language Acquisition: Theories and Research 9
82-388 Topics in Second Language Acquisition 9
82-480 Translation Technologies 9

Note: In consultation with the concentration advisor, students may substitute a Modern Languages course elective with one related to language analysis, language learning, or acquisition of language and culture from the listings in German Studies or from another department. Examples: 80-180 Nature of Language, 85-421 Language and Thought. In addition, students may choose to take 82-580 Senior Seminar in Modern Languages (3 units). The selected course may not double count in the Electives category.

German Studies and Interdisciplinary Electives (3 courses, 27 units minimum)

Complete two courses from German Studies Electives and one course from German Studies Electives and two courses from Interdisciplinary Electives in consultation with the concentration advisor.

German Studies Electives:

82-420 The Crucible of Modernity: Vienna 1900 9
82-425/426 Topics in German Literature and Culture 9
82-427 Nazi and Resistance Culture 9
82-428 History of German Film 9
82-429 German Reading and Translation Workshop: Germany in Today’s World 9
82-505 Undergraduate Internship 9
82-521/522 Special Topics in German Studies 9

* Students may repeat these courses with new topics.

Interdisciplinary Electives:

This list is compiled from possibilities such as but not limited to the following. Students should consult SIO and the concentration advisor for the most up to date interdisciplinary electives appropriate for the German Studies curriculum. Courses may be suggested to the concentration advisor for approval as a substitute. Note that not all courses are offered each semester.

English

76-239 Introduction to Film Studies 9
76-386 Language & Culture 9
76-387 Writing in the Disciplines 6
76-483 Corpus Analysis in Rhetoric 9

History

79-205 20th Century Europe 9
79-257 Germany and the Second World War 9

Institute for Politics and Strategy (Choose in consultation with the concentration advisor.)

84-310 International Political Economy 9
84-326 Theories of International Relations 9
84-362 Diplomacy and Statecraft 9
84-397 Ethical Theory in International Relations 9
84-407 American Foreign Policy 9
Gaining skills in more languages is a crucial component of the major Language Proficiency Requirement toward the concentration. Students must earn a final grade of “C” or better for these courses to count.

Global Studies Introductory and Capstone Courses (2 courses, 21 units)

Students must earn a final grade of “C” or better for these courses to count toward the concentration.

79-275 Introduction to Global Studies 9
79-400 Global Studies Research Seminar 12

Language Proficiency Requirement

Gaining skills in more languages is a crucial component of the major in Global Studies. Students will pursue at least three semesters of language study, no matter the level. That is, students could take three introductory courses in three different languages, or three different level courses in the same language, or two different level courses in Language 1 and a third course in Language 2.

If students already know a language at an advanced level, they will take a test to certify those language skills. If they pass the test, they will need to take at least two semesters of language study, focused on a language different from the one they were tested on.

Please see the Modern Languages section of the schedule of classes (https://enr-apps.as.cmu.edu/open/SOC/SOCServlet).

Theoretical and Topical Core Courses (2 courses, 18 units)

To gain a solid foundation in the theories, methods, and analytical topics underpinning the concentration in Global Studies, students select 18 units (typically two courses) from the core courses listed below. Students must earn a final grade of “C” or better in these courses to fulfill the theoretical and topical core course requirement.

79-201 Introduction to Anthropology 9
79-211 Modern Southeast Asia: Colonialism, Capitalism, and Cultural Exchange 9
79-278 How (Not) to Change the World 9
79-280 Coffee and Capitalism 9
79-289 Animal Planet: An Environmental History of People and Animals 9
79-314 The Politics and Culture of Memory 9
79-315 Thirsty Planet: The Politics of Water in Global Perspective 9
79-317 Art, Anthropology, and Empire 9
79-318 Sustainable Social Change: History and Practice 9
79-377 Food, Culture, and Power: A History of Eating 9
79-379 Extreme Ethnography 9
79-380 Hostile Environments: The Politics of Pollution in Global Perspective 9
79-381 Energy and Empire: How Fossil Fuels Changed the World 9
79-383 The History of Capitalism 9

Transnational, Global, and Regional Courses (3 courses, 27 units)

To gain insight into how complex transnational and global processes shape and are affected by local, national and regional dynamics, students will select 27 units (typically three courses) from any subcategories below.

Transnational and Global Courses:

76-337 Intersectional Feminism 9
76-384 Race, Nation, and the Enemy 9
79-224 Mayan America 9
79-233 The United States and the Middle East since 1945 9
79-237 Comparative Slavery 9
79-270 Anti-Semitism Then and Now: Perspectives from the Middle Ages to the Present 6
79-273 Jews and Muslims in History 9
79-276 Beyond the Border 6
79-280 Coffee and Capitalism 9
79-282 Europe and the World Since 1800 9
79-283 Hungry World: Food and Famine in Global Perspective 9
79-288 Bananas, Baseball, and Borders: Latin America and the United States 9
79-313 “Unwanted”: Refugees, Asylum Seekers, and Patterns of Global Migration 6
79-350 Early Christianity 9
79-368 Un-natural Disasters: Societies and Environmental Hazards in Global Perspective 6
79-385 Out of Africa: The Making of the African Diaspora 9
79-386 A Tale of Two Epidemics: Influenza 1918 and Covid 19 9
79-510 Global Studies Guided Reading 3
80-348 Health, Human Rights, and International Development 9
80-447 Global Justice 9
82-283 Language Diversity & Cultural Identity 9
82-304 French & Francophone Sociolinguistics 9
82-345 Introduction to Hispanic Literary and Cultural Studies 9
Regional Courses:

Africa
79-225 West African History in Film 9
79-226 African History: Earliest Times to 1780 9
79-227 Modern Africa: The Slave Trade to the End of Apartheid 9
79-290 The Slave Passage: From West Africa to the Americas 6

Eastern and Southern Asia and the Pacific
79-211 Modern Southeast Asia: Colonialism, Capitalism, and Cultural Exchange 9
79-264 Tibet and China: History and Propaganda 6
88-411 Rise of the Asian Economies 9

Europe
79-202 Flesh and Spirit: Early Modern Europe, 1400-1750 9
79-203 The Other Europe: The Habsburgs, Communism, & Central/Eastern Europe, 1740-1990 9
79-205 20th Century Europe 9
79-208 Witchcraft and Witch-Hunting 9
79-268 World War I: The Twentieth Century’s First Catastrophe 9
79-270 Anti-Semitism Then and Now: Perspectives from the Middle Ages to the Present 6
82-320 Contemporary Society in Germany, Austria and Switzerland 9
82-415 Topics in French and Francophone Studies 9
82-441 Studies in Peninsular Literature and Culture 9

The Middle East
79-229 The Origins of the Palestinian-Israeli Conflict, 1880-1948 9
79-230 Arab-Israeli Conflict Since 1948 9
79-307 Religion and Politics in the Middle East 9
79-398 Documenting the 1967 Arab-Israeli War 9
82-215 Arab Culture Through Dialogues, Film, and Literature 9
84-323 War and Peace in the Contemporary Middle East 9

The Americas
79-223 Mexico: From the Aztec Empire to the Drug War 9
82-245 New Directions in Hispanic Studies 9
82-343 Latin America: Language and Culture 9
82-451 Studies in Latin American Literature and Culture 9
82-455 Topics in Hispanic Studies 9
82-456 Topics in Hispanic Studies 9
84-308 Political Economy of Latin America 9

Electives (2 courses, 15 units minimum)

Students are required to take an additional 15 units (typically two courses) of electives, selected from one or both of the subcategories below. "Theoretical and Topical Core Courses" and "Transnational, Global, and Regional Courses" listed above that are not used to fulfill those requirements may be counted as electives in addition to the courses listed below.

Global Studies offers students the opportunity to gain credit for a 9 unit elective while gaining first-hand experience interning with Pittsburgh-based organizations that work across borders. 79-506 Global Studies Internship is offered every semester and students should register for the course after consulting with the concentration advisor. The concentration advisor will assist students with matching their interests to local organizations and identifying an on-site supervisor available to collaborate in the ongoing and final evaluation of the student’s work.

Thematic Courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>57-306</td>
<td>World Music</td>
<td>9</td>
</tr>
<tr>
<td>70-365</td>
<td>International Trade and International Law</td>
<td>9</td>
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<tr>
<td>76-241</td>
<td>Introduction to Gender Studies</td>
<td>9</td>
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<tr>
<td>76-449</td>
<td>Race and Media</td>
<td>9</td>
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<tr>
<td>76-450</td>
<td>Law, Culture, and the Humanities</td>
<td>9</td>
</tr>
<tr>
<td>76-468</td>
<td>Space and Mobilities</td>
<td>9</td>
</tr>
<tr>
<td>79-101</td>
<td>Making History: How to Think About the Past (and Present)</td>
<td>9</td>
</tr>
<tr>
<td>79-204</td>
<td>American Environmental History</td>
<td>9</td>
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<tr>
<td>79-240</td>
<td>Introduction to Religion</td>
<td>9</td>
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<tr>
<td>79-316</td>
<td>Photography, the First 100 Years, 1839-1939</td>
<td>9</td>
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<tr>
<td>79-324</td>
<td>#MeToo: Naming and Resisting Gender Violence</td>
<td>6</td>
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<tr>
<td>79-330</td>
<td>Medicine and Society: Health, Healers, and Hospitals</td>
<td>9</td>
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<tr>
<td>79-343</td>
<td>Education, Democracy, and Civil Rights</td>
<td>9</td>
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<tr>
<td>79-397</td>
<td>Environmental and Public Health Crises in the City</td>
<td>6</td>
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<tr>
<td>80-244</td>
<td>Environmental Ethics</td>
<td>9</td>
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<tr>
<td>80-335</td>
<td>Social and Political Philosophy</td>
<td>9</td>
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<tr>
<td>82-215</td>
<td>Arab Culture Through Dialogues, Film, and Literature</td>
<td>9</td>
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<tr>
<td>82-541</td>
<td>Special Topics in Hispanic Studies</td>
<td>Var.</td>
</tr>
<tr>
<td>84-275</td>
<td>Comparative Politics</td>
<td>9</td>
</tr>
<tr>
<td>84-310</td>
<td>International Political Economy</td>
<td>9</td>
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<tr>
<td>84-318</td>
<td>Politics of Developing Nations</td>
<td>9</td>
</tr>
<tr>
<td>84-362</td>
<td>Diplomacy and Statecraft</td>
<td>9</td>
</tr>
</tbody>
</table>

Nation-based Courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>79-216</td>
<td>Genghis Khan and the Mongol Empire</td>
<td>3</td>
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<tr>
<td>79-257</td>
<td>Germany and the Second World War</td>
<td>9</td>
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<tr>
<td>79-261</td>
<td>The Last Emperors: Chinese History and Society, 1600-1900</td>
<td>9</td>
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<tr>
<td>79-262</td>
<td>Modern China: From the Birth of Mao ... to Now</td>
<td>9</td>
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<tr>
<td>79-263</td>
<td>Mao and the Chinese Cultural Revolution</td>
<td>9</td>
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<tr>
<td>79-265</td>
<td>Russian History: Game of Thrones</td>
<td>9</td>
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<td>79-266</td>
<td>Russian History and Revolutionary Socialism</td>
<td>9</td>
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<tr>
<td>79-267</td>
<td>The Soviet Union in World War II: Military, Political, and Social History</td>
<td>9</td>
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<tr>
<td>79-269</td>
<td>Russian History: From Socialism to Capitalism</td>
<td>9</td>
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<tr>
<td>79-309</td>
<td>The Chinese Revolution Through Film</td>
<td>9</td>
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<tr>
<td>79-319</td>
<td>India Through Film</td>
<td>6</td>
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<tr>
<td>79-320</td>
<td>Women, Politics, and Protest</td>
<td>9</td>
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<td>79-322</td>
<td>Stalin and the Great Terror</td>
<td>9</td>
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<td>79-331</td>
<td>Body Politics: Women and Health in America</td>
<td>9</td>
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<td>82-253</td>
<td>Korean Culture Through Film</td>
<td>9</td>
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<tr>
<td>82-254</td>
<td>World of Korea, Then and Now</td>
<td>9</td>
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<tr>
<td>82-273</td>
<td>Introduction to Japanese Language and Culture</td>
<td>9</td>
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<td>82-278</td>
<td>Japanese Film and Literature: The Art of Storytelling</td>
<td>9</td>
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<tr>
<td>82-293</td>
<td>Russian Cinema: From the Bolshevik Revolution to Putin’s Russia</td>
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<tr>
<td>82-294</td>
<td>19th Century Russian Masterpieces</td>
<td>9</td>
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<tr>
<td>82-303</td>
<td>French &amp; Francophone Cultures</td>
<td>9</td>
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<tr>
<td>82-305</td>
<td>French in its Social Contexts</td>
<td>9</td>
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<tr>
<td>82-333</td>
<td>Chinese Language and Culture</td>
<td>Var.</td>
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<tr>
<td>82-342</td>
<td>Spain: Language and Culture</td>
<td>9</td>
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<tr>
<td>82-344</td>
<td>U.S. Latinos: Language and Culture</td>
<td>9</td>
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<tr>
<td>82-361</td>
<td>Italian Language and Culture I</td>
<td>9</td>
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<tr>
<td>82-420</td>
<td>The Crucible of Modernity:Vienna 1900</td>
<td>9</td>
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<tr>
<td>82-425</td>
<td>Topics in German Literature and Culture</td>
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<tr>
<td>82-427</td>
<td>Nazi and Resistance Culture</td>
<td>9</td>
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<tr>
<td>82-428</td>
<td>History of German Film</td>
<td>9</td>
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<tr>
<td>82-433</td>
<td>Topics in Contemporary Culture of China</td>
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<td>82-434</td>
<td>Studies in Chinese Traditions</td>
<td>9</td>
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<tr>
<td>82-440</td>
<td>Studies in Chinese Literature &amp; Culture</td>
<td>9</td>
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<tr>
<td>82-473</td>
<td>Topics in Japanese Studies</td>
<td>9</td>
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</tbody>
</table>

Hispanic Studies Concentration

(81 units minimum)

<table>
<thead>
<tr>
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<td>Special Topics in Hispanic Studies</td>
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<td>Diplomacy and Statecraft</td>
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</table>
A BHA concentration in Hispanic Studies promotes not just language proficiency but also an understanding of its varied cultures. Students who arrive at Carnegie Mellon with previous language study and/or who have high Advanced Placement, an International Baccalaureate, the Cambridge GCE Advanced level or internal placement exam scores will be able to begin taking courses in the concentration earlier in their undergraduate program. In all cases, progress in the concentration will be accelerated by study abroad, which is recommended for all students.

**Prerequisites**

Intermediate level proficiency in Spanish. This is equivalent to the completion of four courses (two at the 100-level and two at the 200-level) or exemption based on Advanced Placement, International Baccalaureate, Cambridge GCE Advanced level or Carnegie Mellon internal placement test scores.

**Core Courses in Hispanic Studies (3 courses, 27 units)**

Complete two courses.

- 82-342 Spain: Language and Culture 9
- 82-343 Latin America: Language and Culture 9
- 82-344 U.S. Latinos: Language and Culture 9

**Complete required course.**

82-345 Introduction to Hispanic Literary and Cultural Studies 9

**Core Courses in Modern Languages (1 course, 9 units)**

Complete one course.

- 82-280 Bilingual & Bicultural Experiences in the US 9
- 82-282 Interpreting Global Texts & Cultures 9
- 82-283 Language Diversity & Cultural Identity 9
- 82-284 Multicultural Pittsburgh: VR Storytelling 9
- 82-285 Podcasting: Language and Culture Through Storytelling 9
- 82-286 Cultural Complexities 9
- 82-388 Second Language Acquisition: Theories and Research 9
- 82-480 Translation Technologies 9

**Note:** In consultation with the concentration advisor, students may substitute a Modern Languages course elective with one related to language analysis, language learning, or acquisition of language and culture from the listings in Hispanic Studies or from another department. Examples: 80-180 Nature of Language, 85-421 Language and Thought. In addition, students may choose to take 82-580 Senior Seminar in Modern Languages (3 units). The selected course may not double count in the Electives category.

**Hispanic Studies and Interdisciplinary Electives (5 courses, 45 units)**

Complete five courses from Hispanic Studies Electives or four courses from Hispanic Studies Electives and one course from Interdisciplinary Electives in consultation with the concentration advisor.

**Hispanic Studies Electives:**

- 82-441 Studies in Peninsular Literature and Culture * 9
- 82-443 Spanish Reading and Translation Workshop 9
- 82-444 The Structure of Spanish 9
- 82-451 Studies in Latin American Literature and Culture 9
- 82-455/456 Topics in Hispanic Studies * 9
- 82-506 Hispanic Studies Internship Var.
- 82-541/542 Special Topics in Hispanic Studies * Var.

* Students may repeat these courses with new topics.

**Interdisciplinary Electives:**

This list is compiled from possibilities such as but not limited to the following. Students should consult SIO and the concentration advisor for the most up to date interdisciplinary electives appropriate for the Hispanic Studies curriculum. Courses may be suggested to the concentration advisor for approval as a substitute. Note that not all courses are offered each semester.

- History
  - 79-223 Mexico: From the Aztec Empire to the Drug War 9
  - 79-224 Mayan America 9
  - 79-237 Comparative Slavery 9

- 79-276 Beyond the Border 6
- 79-288 Bananas, Baseball, and Borders: Latin America and the United States Institute for Policy and Strategy (Choose in consultation with the concentration advisor.)
- 84-308 Political Economy of Latin America 9

**Modern Languages**

- 82-245 New Directions in Hispanic Studies 9
- 82-247 The Hispanic World: History, Culture and Globalization 9
- 82-249 Hispanic Language & Cultures for the Professions 9
- 82-280 Bilingual & Bicultural Experiences in the US 9
- 82-281 Contextual Thinking 9
- 82-282 Interpreting Global Texts & Cultures 9
- 82-283 Language Diversity & Cultural Identity 9
- 82-284 Multicultural Pittsburgh: VR Storytelling 9
- 82-285 Podcasting: Language and Culture Through Storytelling 9
- 82-286 Cultural Complexities 9
- 82-299 Equity & Justice 9
- 82-388 Topics in Second Language Acquisition 9
- 82-480 Translation Technologies 9

**Philosophy**

- 80-180 Nature of Language 9
- 80-280 Linguistic Analysis 9
- 80-285 Natural Language Syntax 9
- 80-286 Words and Word Formation: Introduction to Morphology 9
- 80-380 Philosophy of Language 9
- 80-381 Meaning in Language 9

**Psychology**

- 85-375 Crosscultural Psychology 9
- 85-421 Language and Thought 9

**Humanities Analytics Concentration**

(81 units minimum)

The human experience that is traditionally at the core of a humanities education is being dramatically transformed by the emergence of big data, digital platforms, computational thinking, and digital connectivity. Spurred by such developments, the concentration in Humanities Analytics (HumAn), offered by the Department of English, trains students in the processes involved in analyzing, digitizing, quantifying and visualizing different types of humanities and cultural phenomena, including printed books, manuscripts, historical records, art, music and film. The HumAn concentration trains students to work with cultural objects (like texts, films, historical records, etc.) but also to turn words and images into data; to move from one cultural object (like a Victorian novel, for instance) to a corpus consisting of tens of thousands of other novels published in the same period, and to combine close reading with distant reading (aggregating and analyzing massive amounts of data) for maximum insight and accuracy.

Students will develop a broad technical understanding of state-of-the-art computer-assisted methods for humanistic study, such as: social network analysis, text analysis and data mining, topic modeling, classification techniques and visualization. Students will also investigate the histories and historical contexts of such methods, learning to consider their applicability in specific domains. Finally, students will learn to turn a critical eye on the corpora and infrastructures that increasingly underpin humanistic research.

**Required Courses (5 courses, 45 units)**

- 76-275 Introduction to Critical Writing 9
- 76-380 Methods in Humanities Analytics 9

Three core courses from the following list:

- 76-314 Data Stories 9
- 76-388 Coding for Humanists 9
- 76-425 Rhetoric, Science, and the Public Sphere 9
- 76-429 Introduction to Digital Humanities 9
- 88-275 Bubbles: Data Science for Human Minds 9
- 88-300 Programming and Data Analysis for Social Scientists 9
Electives (4 courses, 36 units minimum)
Choose four courses from the following categories. One course must come from List A, two from List B, and the fourth in consultation with your Humanities Analytics advisor.

List A: One elective course relevant to digital and analytics methods (at least 9 units):
- 05-391 Designing Human Centered Software 12
- 05-434/11-344 Machine Learning in Practice 12
- 11-411 Natural Language Processing 12
- 11-441/741 Machine Learning for Text and Graph-based Mining (Course is very mathematical, and is therefore appropriate only to students with such a preparation.) 9
- 15-104 Introduction to Computing for Creative Practice 10
- 15-110 Principles of Computing 10
- 15-112 Fundamentals of Programming and Computer Science 12
- 16-223 IDeATe Portal: Creative Kinetic Systems 10
- 16-385 Computer Vision 12
- 17-340 Green Computing 9
- 17-450 Crafting Software 12
- 17-562 Law of Computer Technology 9
- 18-090 Twisted Signals: Multimedia Processing for the Arts 10
- 36-201 Statistical Reasoning and Practice 9
- 36-202 Methods for Statistics & Data Science 9
- 36-204 Discovering the Data Universe 3
- 36-226 Introduction to Statistical Inference 9
- 36-311 Statistical Analysis of Networks 9
- 36-315 Statistical Graphics and Visualization 9
- 36-350 Statistical Computing 9
- 36-462 Special Topics: Methods of Statistical Learning 9
- 48-095 Spatial Concepts for Non-Architecture Majors 10
- 48-120 Digital Media I 6
- 51-229 Digital Photographic Imaging 9
- 53-451 Research Issues in Game Development: Designing for XR 12
- 60/62-142 Digital Photography I 10
- 62-150 IDeATe Portal: Introduction to Media Synthesis and Analysis 10

List B: Two elective courses relevant to broad humanities expertise (at least 18 units):
- 76-210 Banned Books 9
- 76-245 Shakespeare’s Dark Plays 9
- 76-247 Shakespeare: Comedies and Romances 9
- 76-325 Intertextuality 9
- 76-339 Topics in Film and Media 9
- 76-373 Argument 9
- 76-476 Rhetoric of Science 9
- 79-200 Introduction to Historical Research & Writing 9
- 79-234 Technology and Society 9
- 79-305 Moneyball Nation: Data in American Life 9
- 80-180 Nature of Language 9
- 80-280 Linguistic Analysis 9
- 80-381 Meaning in Language 9
- 80-383 Language in Use 9
- 82-282 Interpreting Global Texts & Cultures 9
- 82-283 Language Diversity & Cultural Identity 9
- 82-383 Second Language Acquisition: Theories and Research 9
- 82-480 Translation Technologies 9

Note: Additional courses not on List A or List B may also be approved as electives; new courses are added every semester so please speak with Humanities Analytics advisor.

Information Systems Concentration (81 units minimum)

Did you enjoy computer science or more technical courses in high school, but are mostly interested in the practical and social applications of technology? Do you have a passion for business and want to use advanced technology to change how companies work? Do you want to learn how data and technology can be harnessed for social good?

The BHA concentration in Information Systems combines aspects of computer science, information technology, and business management to provide you with an uncommonly well-rounded portfolio. You will be uniquely positioned for an impactful career in an increasingly digitized and connected world and able to adapt to rapid evolution across industries.

In addition to building a solid foundation in computing, communications, and software development, you will also study social sciences and organizational theory to develop “big picture” critical thinking and understand the human impacts of technological change. This blend prepares you to take a leading role in our digital future.

Students must earn a final grade of “C” or better for these courses to count toward the concentration.

Mathematics and Computer Science Prerequisite Courses
- 15-112 Fundamentals of Programming and Computer Science 12
- 15-121 Introduction to Data Structures or 15-122 Principles of Imperative Computation 10

Choose one:
- 21-112 Calculus II 10
- 21-120 Differential and Integral Calculus 10
- 21-127 Concepts of Mathematics 12
- 21-240 Matrix Algebra with Applications 10

Information Systems Professional Core (8 courses, 76 units)
- 67-200 Information Systems Research Colloquium -Fall 1
- 67-250 The Information Systems Milieux -Spring 9
- 67-262 Database Design and Development -Fall 9
- 67-272 Application Design and Development -Spring 12
- 67-373 Information Systems Consulting Project -Spring 12
- 05-391 Designing Human Centered Software 12
- 05-410 User-Centered Research and Evaluation or 05-452 Service Design 9
- 17-313 Foundations of Software Engineering 12
- 95-422 Managing Digital Transformation 9

IS Breadth Category (1-2 courses, 6 units minimum)
Choose one-two courses from any of the three IS Breadth categories (Professional Communication, Quantitative Analysis and Innovation & Entrepreneurship).

Professional Communications:
Information systems professionals communicate with a wide range of people in most organizations and often facilitate communications between diverse groups of stakeholders. Consequently, the most successful professionals typically are those with strong communication skills. These courses help students see that the structure and presentation of information affects how well and (how easily) it can be understood and used.
- 05-317 Design of Artificial Intelligence Products 12
- 36-315 Statistical Graphics and Visualization 9
- 51-261 Design Center: Communication Design Fundamentals: xD for Communications or 51-262 Design Center: CD Fundamentals: Design for Interactions for Communications 9
- 67-202 The Softer Side of Software 6
- 67-265 Design Fundamentals: Shaping Interactions and Experiences 9
- 67-338 Information & Grid Design 9
- 70-321 Negotiation and Conflict Resolution 9
- 70-340 Business Communications 9
- 76-327 Equity & Communication 9
- 84-250 Writing for Political Science and Policy 9
- 88-418 Negotiation: Strategies and Behavioral Insights 9
- 88-419 International Negotiation 9
- 88/70-341 Team Dynamics and Leadership 9
Quantitative Analysis and Research Methods:

This area focuses on decision making and data analysis—essential to development of useful information systems. This area exposes students to analytic methods in the social sciences and quantitative methods for approaching complex methods.

- 36-202 Methods for Statistics & Data Science 9
- 36-225 Introduction to Probability Theory 9
- 36-303 Sampling, Survey and Society 9
- 36-309 Experimental Design for Behavioral & Social Sciences 9
- 36-315 Statistical Graphics and Visualization 9
- 36-401 Modern Regression 9
- 36-402 Advanced Methods for Data Analysis 9
- 36/70-208 Regression Analysis 9
- 67-285 Across the Universe from Intelligent Agents to Users 9
- 67-364 Practical Data Science 9
- 80-305 Decision Theory 9
- 88-223 Decision Analysis 12
- 88-251 Empirical Research Methods 9
- 88-252 Causal Inference in the Field 9

Innovation and Entrepreneurship:
The focus of this area is to apply disciplined techniques to generate ideas that have value in a market, and bring them through design, feasibility testing, and frequent revision, towards a potential launch.

- 05-470 Digital Service Innovation 12
- 17-356 Software Engineering for Startups 12
- 67-443 Mobile Application Design and Development 12
- 94-491 Hacking for Defense/ Homeland Security 12

International Relations & Politics Concentration

(81 units minimum)

Offered through the Institute for Politics and Strategy (IPS), the International Relations and Politics (IRP) BHA concentration analyzes the role of politics at the national, represal, international, and transnational levels; examines political and institutional arrangements within and among these levels; and investigates current issues relevant to the field of international relations.

The IRP concentration studies the ways in which leaders construct foreign and national security policy; the impact of domestic and international forces on states’ security and economic policies; and the significance of alliances, coalitions, and international institutions for world politics. The concentration emphasizes the importance of political institutions (domestic and comparative), decision making by leaders in shaping policy, and contemporary challenges to the international system.

Thinking systematically about international and domestic politics is the core objective of the IRP concentration. To this end, the concentration has required courses in statistics that help to sharpen students’ ability to undertake scientific analysis in the required substantive and historical courses. The concentration is rooted in the discipline of political science but also utilizes the interdisciplinary strengths of decision science, economics, and political history. Thus, students pursuing this major will use the analytic tools of game theory, economic and statistical analysis, qualitative analysis, rational choice theory, and theories of behavioral decision making as they study alliances, coalitions, institutions, and political strategy.

A rich set of electives allows students to investigate issues of national security strategy, cybersecurity and international conflict, military strategy, economic policy, representation and voting rights, climate change, political psychology, grand strategy, and the effects of culture and society on the international and domestic systems.

Recognizing the influence of language and culture on politics, students are required to complete the intermediate (200) level, or its equivalent, in a modern language other than English. Advanced-level study is strongly encouraged.

Prerequisite

- 84-110 Foundations of Political Economy 9
  or 73-102 Principles of Microeconomics 9
  or 73-103 Principles of Macroeconomics 9

Core Courses (7 courses, 60 units)

- 84-104 Decision Processes in American Political Institutions 9

Electives (3 courses, 21 units minimum)

International Relations and Politics BHA students must take 21 units (three courses) from the elective lists below. At least two courses must be from the Institute for Politics and Strategy (84-xxx).

Grand Strategy and Political Institutions

- 79-301 History of Surveillance: From the Plantation to Data Capitalism 6
- 80-135 Introduction to Political Philosophy 9
- 80-321 Causation, Law, and Social Policy 9
- 80-335 Social and Political Philosophy 9
- 84-200 Security War Game Simulation 6
- 84-304 In the News: Analysis of Current Events 6
- 84-312 Terrorism in Sub-Saharan Africa 6
- 84-319 Civil-Military Relations 9
- 84-322 Nonviolent Conflict and Revolution 9
- 84-323 War and Peace in the Contemporary Middle East 9
- 84-324 The Future of Democracy 9
- 84-325 Contemporary American Foreign Policy 9
- 84-327 Repression and Control in Dictatorships 9
- 84-328 Military Strategy and Doctrine 9
- 84-329 Military Strategic Theory 6
- 84-352 Representation and Voting Rights 9
- 84-362 Diplomacy and Statecraft 9
- 84-363 Comparative Legal Systems 9
- 84-364 Comparative Presidential Behavior: Leadership, Personality, and Decision Making 9
- 84-365 The Politics of Fake News and Misinformation 9
- 84-366 The American Presidency 9
- 84-369 Decision Science for International Relations 9
- 84-370 Nuclear Security & Arms Control 9
- 84-372 Space and National Security 9
- 84-373 Emerging Technologies and the Law 9
- 84-380 US Grand Strategy 9
- 84-383 Cyber Policy as National Policy 6
- 84-386 The Privatization of Force 9
- 84-387 Technology and Policy of Cyber War 9
- 84-388 Concepts of War and Cyber War 9
- 84-389 Terrorism and Insurgency 9
- 84-390 Social Media, Technology, and Conflict 9
- 84-393 Legislative Decision Making; US Congress 9
- 84-402 Judicial Politics and Behavior 9
- 84-405 The Future of Warfare 9
- 84-421 Advanced Topics in American Politics 9
- 88-281 Topics in Law: 1st Amendment 9
- 88-284 Topics of Law: The Bill of Rights 9

Economics and Society

- 19-452 EPP Projects II 12
- 70-342 Managing Across Cultures 9
- 70-365 International Trade and International Law 9
- 70-430 International Management 9
- 73-238 Health Economics 12
- 73-332 Political Economy 9
or exemption based on Advanced Placement, International Baccalaureate, Low-intermediate level proficiency in Japanese. This is equivalent to the Prerequisites abroad, which is recommended for all students.

A BHA concentration in Japanese Studies promotes not just language proficiency but also an understanding of Japanese culture. Students who arrive at Carnegie Mellon with previous language study and/or who have taken a Cambridge GCE Advanced level or Carnegie Mellon internal placement test scores.

**Core Courses in Japanese Studies (4 courses, 39 units)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>82-272</td>
<td>Intermediate Japanese II</td>
<td>12</td>
</tr>
<tr>
<td>82-273</td>
<td>Introduction to Japanese Language and Culture</td>
<td>9</td>
</tr>
<tr>
<td>82-371</td>
<td>Advanced Japanese I</td>
<td>9</td>
</tr>
<tr>
<td>82-372</td>
<td>Advanced Japanese II</td>
<td>9</td>
</tr>
</tbody>
</table>

* Students who place out of 82-272 Intermediate Japanese II must take 12 units chosen from the Japanese Studies and Interdisciplinary Electives category below.

**Core Courses in Modern Languages (1 course, 9 units)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>82-280</td>
<td>Bilingual &amp; Bicultural Experiences in the US</td>
<td>9</td>
</tr>
<tr>
<td>82-282</td>
<td>Interpreting Global Texts &amp; Cultures</td>
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</tr>
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<td>82-480</td>
<td>Translation Technologies</td>
<td>9</td>
</tr>
</tbody>
</table>

Note: In consultation with the concentration advisor, students may substitute a Modern Languages course elective with one related to language analysis, language learning or acquisition of language and culture from the listing in Japanese Studies or from another department. Examples: 80-180 Nature of Language, 85-421 Language and Thought. In addition, students may choose to take 82-580 Senior Seminar in Modern Languages (3 units). The selected course may not double count in the Electives category.

**Japanese Studies and Interdisciplinary Electives (4 courses, 33 units minimum)**

Complete three courses from Japanese Studies Electives and one course from Interdisciplinary Electives or two courses from Japanese Studies Electives and two courses from Interdisciplinary Electives in consultation with the concentration advisor. With permission of the concentration advisor, students are encouraged to complete at least one Japanese history course that qualifies for Japanese Studies and Interdisciplinary Electives at the University of Pittsburgh, one in Japan when they study abroad or in a summer program at any other university.

**Japanese Studies Electives**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</tr>
</thead>
<tbody>
<tr>
<td>82-373</td>
<td>Structure of the Japanese Language</td>
<td>9</td>
</tr>
<tr>
<td>82-374</td>
<td>Issues in Japanese Technology &amp; Society</td>
<td>9</td>
</tr>
<tr>
<td>82-473/474</td>
<td>Topics in Japanese Studies</td>
<td>9</td>
</tr>
<tr>
<td>82-505</td>
<td>Undergraduate Internship</td>
<td>Var.</td>
</tr>
<tr>
<td>82-571/572</td>
<td>Special Topics in Japanese Studies</td>
<td>Var.</td>
</tr>
</tbody>
</table>

* Students may repeat these courses with new topics.

**Interdisciplinary Electives**

This list is compiled from possibilities such as but not limited to the following. Students should consult SIO and concentration advisor for the most up to date interdisciplinary electives appropriate for the Japanese Studies curriculum. Courses may be suggested to the concentration advisor for approval as a substitute. Note that not all courses are offered each semester.

English

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>76-239</td>
<td>Introduction to Film Studies</td>
<td>9</td>
</tr>
</tbody>
</table>

History

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>79-261</td>
<td>The Last Emperors: Chinese History and Society, 1600-1900</td>
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<td>Modern China: From the Birth of Mao ... to Now</td>
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<td>Introduction to Global Studies</td>
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Institute for Politics and Strategy (Choose in consultation with the concentration advisor.)

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>84-310</td>
<td>International Political Economy</td>
<td>9</td>
</tr>
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**Japanese Studies Concentration (31 units minimum)**

A BHA concentration in Japanese Studies promotes not just language proficiency but also an understanding of Japanese culture. Students who arrive at Carnegie Mellon with previous language study and/or who have high Advanced Placement, an International Baccalaureate, a Cambridge GCE Advanced level or internal placement exam scores will be able to begin taking courses in the concentration earlier in their undergraduate program. In all cases, progress in the concentration will be accelerated by study abroad, which is recommended for all students.

**Prerequisites**

Low-intermediate level proficiency in Japanese. This is equivalent to the completion of three courses (two at the 100-level and one at the 200-level) or exemption based on Advanced Placement, International Baccalaureate, or exemption based on Advanced Placement, International Baccalaureate, Low-intermediate level proficiency in Japanese. This is equivalent to the Prerequisites abroad, which is recommended for all students.

**Japanese Studies Concentration (31 units minimum)**

A BHA concentration in Japanese Studies promotes not just language proficiency but also an understanding of Japanese culture. Students who arrive at Carnegie Mellon with previous language study and/or who have high Advanced Placement, an International Baccalaureate, a Cambridge GCE Advanced level or internal placement exam scores will be able to begin taking courses in the concentration earlier in their undergraduate program. In all cases, progress in the concentration will be accelerated by study abroad, which is recommended for all students.

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**Japanese Studies and Interdisciplinary Electives (4 courses, 33 units minimum)**

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Choose three courses from Extended Core or additional courses from the Extended Core (3 courses, 27 units)

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<tbody>
<tr>
<td>80-380</td>
<td>US Grand Strategy</td>
<td>9</td>
</tr>
<tr>
<td>80-388</td>
<td>Concepts of War and Cyber War</td>
<td>6</td>
</tr>
<tr>
<td>80-405</td>
<td>The Future of Warfare</td>
<td>9</td>
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Modern Languages

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<tr>
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<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>82-234</td>
<td>Topics in Chinese History</td>
<td>9</td>
</tr>
<tr>
<td>82-278</td>
<td>Japanese Film and Literature: The Art of Storytelling</td>
<td>9</td>
</tr>
<tr>
<td>82-279</td>
<td>Anime - Visual Interplay between Japan and the World</td>
<td>9</td>
</tr>
<tr>
<td>82-280</td>
<td>Bilingual &amp; Bicultural Experiences in the US</td>
<td>9</td>
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<tr>
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 Philosophy

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<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>80-180</td>
<td>Nature of Language</td>
<td>9</td>
</tr>
<tr>
<td>80-280</td>
<td>Linguistic Analysis</td>
<td>9</td>
</tr>
<tr>
<td>80-380</td>
<td>Philosophy of Language</td>
<td>9</td>
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</tbody>
</table>

Psychology

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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<tbody>
<tr>
<td>85-375</td>
<td>Crosscultural Psychology</td>
<td>9</td>
</tr>
<tr>
<td>85-421</td>
<td>Language and Thought</td>
<td>9</td>
</tr>
</tbody>
</table>

Linguistics Concentration

(81 units minimum)

The BHA concentration in Linguistics combines courses from the departments of English, Modern Languages, Philosophy and Psychology and the Language Technologies Institute. Linguistics is the study of human language, and it encompasses a broad spectrum of research questions, approaches and methodologies. Some linguists are concerned with the cognitive aspects of language learning, production and comprehension; some are concerned with language as a social and cultural phenomenon; others engage in the analysis of linguistic form and meaning, some from a functional and others from a formal perspective. There are also computational approaches to linguistics with both applied and theoretical goals.

Introductory Course (1 course, 9 units)

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<tr>
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</thead>
<tbody>
<tr>
<td>80-180</td>
<td>Nature of Language</td>
<td>9</td>
</tr>
</tbody>
</table>

Linguistics Core (2 courses, 18 units)

Take one course each in two of the following three areas.

Sounds:

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>80-282</td>
<td>Phonetics and Phonology I</td>
<td>9</td>
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</tbody>
</table>

Structure:

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<tr>
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</thead>
<tbody>
<tr>
<td>80-280</td>
<td>Linguistic Analysis</td>
<td>9</td>
</tr>
<tr>
<td>80-285</td>
<td>Natural Language Syntax</td>
<td>9</td>
</tr>
</tbody>
</table>

Meaning:

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<tr>
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</thead>
<tbody>
<tr>
<td>80-381</td>
<td>Meaning in Language</td>
<td>9</td>
</tr>
<tr>
<td>80-383</td>
<td>Language in Use</td>
<td>9</td>
</tr>
</tbody>
</table>

Extended Core (3 courses, 27 units)

Choose three courses from Extended Core or additional courses from the Linguistics Core above.

<table>
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<tr>
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<tbody>
<tr>
<td>80-283</td>
<td>It Matters How You Say It</td>
<td>9</td>
</tr>
<tr>
<td>80-284</td>
<td>Invented Languages</td>
<td>9</td>
</tr>
<tr>
<td>80-286</td>
<td>Words and Word Formation: Introduction to Morphology</td>
<td>9</td>
</tr>
<tr>
<td>80-287</td>
<td>Language Variation and Change</td>
<td>9</td>
</tr>
<tr>
<td>80-288</td>
<td>Intonation: Transcription and Analysis</td>
<td>9</td>
</tr>
<tr>
<td>80-382</td>
<td>Phonetics and Phonology II</td>
<td>9</td>
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<tr>
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<tbody>
<tr>
<td>80-384</td>
<td>Linguistics of Turkic Languages</td>
<td>9</td>
</tr>
<tr>
<td>80-385</td>
<td>Linguistics of Germanic Languages</td>
<td>9</td>
</tr>
<tr>
<td>80-388</td>
<td>Linguistic Typology: Diversity and Universals</td>
<td>9</td>
</tr>
<tr>
<td>80-488</td>
<td>Acoustics of Human Speech: Theory, Data, and Analysis</td>
<td>9</td>
</tr>
</tbody>
</table>

Elective Courses (3 courses, 27 units)

Take three additional electives. These can be additional courses from the Core or Extended Core courses listed above, the electives list below, or any other course which must be approved by the concentration advisor as a linguistics elective. Listed below are the additional electives taught on a regular basis. Additional appropriate courses are offered irregularly or on a one-off basis. The concentration advisor will provide students with a list of possible electives each semester, and will assist students in selecting electives that are consistent with their goals and interests. A list of these courses must be filed in the BXA office.

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<td>Philosophy of Language</td>
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<td>76-318</td>
<td>Communicating in the Global Marketplace</td>
<td>9</td>
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<tr>
<td>76-325</td>
<td>Intertextuality</td>
<td>9</td>
</tr>
<tr>
<td>76-389</td>
<td>Rhetorical Grammar</td>
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<tr>
<td>82-305</td>
<td>French in its Social Contexts</td>
<td>9</td>
</tr>
<tr>
<td>82-373</td>
<td>Structure of the Japanese Language</td>
<td>9</td>
</tr>
<tr>
<td>82-383</td>
<td>Second Language Acquisition: Theories and Research</td>
<td>9</td>
</tr>
<tr>
<td>82-585</td>
<td>Topics in Second Language Acquisition</td>
<td>9</td>
</tr>
<tr>
<td>82-304</td>
<td>French &amp; Francophone Sociolinguistics</td>
<td>9</td>
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Psychology:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>85-354</td>
<td>Infant Language Development</td>
<td>9</td>
</tr>
<tr>
<td>85-421</td>
<td>Language and Thought</td>
<td>9</td>
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Language Technologies Institute:

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>11-411</td>
<td>Natural Language Processing</td>
<td>12</td>
</tr>
<tr>
<td>11-492</td>
<td>Speech Processing</td>
<td>12</td>
</tr>
<tr>
<td>11-422</td>
<td>Grammar Formalisms</td>
<td>9</td>
</tr>
</tbody>
</table>

Literature & Culture Concentration

(81 units minimum)

The BHA concentration in Literature & Culture teaches students how to read, interpret and write persuasively about novels, poems, plays and other imaginative works across a variety of genres and media forms. Along with teaching students the analytical skills and methodological tools to interpret these works, this major teaches the importance of understanding imaginative works within their cultural and historical contexts. In addition, the concentration is designed to train students in strong professional and academic skills like critical thinking, inductive reasoning and persuasive argumentation that are applicable to other fields of study and a variety of career paths.

Prerequisite Course

Choose one course:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>76-260</td>
<td>Introduction to Writing Fiction</td>
<td>9</td>
</tr>
<tr>
<td>76-261</td>
<td>Introduction to Writing Creative Nonfiction</td>
<td>9</td>
</tr>
<tr>
<td>76-265</td>
<td>Introduction to Writing Poetry</td>
<td>9</td>
</tr>
<tr>
<td>76-269</td>
<td>Introduction to Screenwriting</td>
<td>9</td>
</tr>
</tbody>
</table>

Required Introductory Courses (2 courses, 18 units)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>76-245</td>
<td>Shakespeare's Dark Plays</td>
<td>9</td>
</tr>
<tr>
<td>or 76-247</td>
<td>Shakespeare: Comedies and Romances</td>
<td>9</td>
</tr>
<tr>
<td>76-275</td>
<td>Introduction to Critical Writing</td>
<td>9</td>
</tr>
</tbody>
</table>

200-Level Literature & Culture Course (1 course, 9 units)

Course options include but are not limited to the following:
Course options include but are not limited to the following:

**Theory Course (1 course, 9 units)**
- 76-207 Special Topics in Literature & Culture 9
- 76-210 Banned Books 9
- 76-217 Literature & Culture of the 20th and 21st Century 9
- 76-221 Books You Should Have Read By Now 9
- 76-223 Contemporary Black Literature 9
- 76-230 Literature & Culture in the 19th Century 9
- 76-232 Introduction to Black Literature 9
- 76-233 Literature and Culture in the Renaissance 9
- 76-238 What Was the Hip-Hop Generation? 9
- 76-245 Shakespeare’s Dark Plays 9
  (if not taken as Required Introductory Course)
- 76-247 Shakespeare: Comedies and Romances 9
  (if not taken as Required Introductory Course)
- 76-290 Literature & Culture in the 20th Century 9

**300-Level Course (1 course, 9 units)**
Course options include but are not limited to the following:
- 76-310 Advanced Studies in Film and Media 9
- 76-314 Data Stories 9
- 76-316 Topics in Literature: Watching HBO’s The Watchmen 9
- 76-317 Contemporary American Fiction 9
- 76-337 Intersectional Feminism 9
  (if not taken for the Theory Course requirement)
- 76-339 Topics in Film and Media 9
- 76-343 Rise of the American Novel 9
- 76-350 Critical Theories about Literature 9
  (if not taken for the Theory Course requirement)
- 76-352 Music, Technology, and Culture 9
- 76-353 Transnational Feminisms: Fiction and Film 9
- 76-367 Fact Into Film: Translating History into Cinema 9
- 76-376 History of Critical Ideas (if not taken for the Theory Course requirement) 9
- 76-388 Coding for Humanists 9

**400-Level Course (1 course, 9 units)**
Course options include but are not limited to the following:
- 76-407 Topics in Literary & Cultural Studies 9
- 76-408 Culture and Globalization 9
- 76-429 Introduction to Digital Humanities 9
- 76-439 Seminar in Film 9
- 76-440 Postcolonial Theory: Diaspora and Transnationalism 9
- 76-446 Revenge Tragedy 9
- 76-448 Shakespeare on Film 9
- 76-449 Race and Media 9
- 76-452 Generations and Culture 9
- 76-467 Crime Fiction and Film 9

**Theory Course (1 course, 9 units)**
Course options include but are not limited to the following:
- 76-337 Intersectional Feminism 9
  (if not taken as a 300-Level Course)
- 76-350 Critical Theories about Literature 9
  (if not taken as a 300-Level Course)
- 76-376 History of Critical Ideas (if not taken for the Theory Course requirement) 9

**Rhetoric Course (1 course, 9 units)**
Course options include but are not limited to the following:
- 76-318 Communicating in the Global Marketplace 9
- 76-319 Environmental Rhetoric 9
- 76-351 Rhetorical Invention 9
- 76-355 Leadership, Dialogue, and Change 9
- 76-359 User Experience Methods for Documents 9
- 76-373 Argument 9
- 76-378 Literacy: Educational Theory and Community Practice 9
- 76-384 Race, Nation, and the Enemy 9
- 76-388 Coding for Humanists 9
- 76-389 Rhetorical Grammar 9
- 76-396 Non-Profit Message Creation 9
- 76-415 Mediated Power and Propaganda 9
- 76-418 Rhetoric and the Body 9
- 76-457 Rhetorical Invention 9
- 76-475 Law, Performance, and Identity 9
- 76-476 Rhetoric of Science 9
- 76-484 Discourse Analysis 9
- 76-485 The New Public Sphere 9
- 76-486 Argument Theory 9
- 76-491 Rhetorical Analysis 9
- 76-492 Rhetoric of Public Policy 9
- 76-496 Research Methods in Rhetoric & Writing Studies 9
  (permission required from instructor)

**English Elective Courses (2 courses, 18 units)**
Complete two additional courses from the English Department’s offerings.
One course must be at the 300-level, and one must be at the 400-level.
Electives may include any courses offered by the English Department from any specialization area, with the exception of creative writing workshops.

**Logic & Computation Concentration**

*(81 units minimum)*

Students in the program take a common core of courses in logic, methodology, and computer science, together with an associated seminar in their senior year. The individual focus is achieved by selecting a sequence of four advanced and closely related courses. It is in this area of focus (or specialization) that students write their senior thesis under the supervision of a faculty member.

The resulting education in logic, analytic philosophy, mathematics, statistics and computer science enables students to pursue professional careers or graduate study. The analytic and communication skills developed in the major support a wide range of career choices, including those among the fields of technology, business and law. Fields of graduate study for which students are well prepared include, for example, computer science, cognitive science, philosophy, logic and linguistics.

**Prerequisites**
- 15-112 Fundamentals of Programming and Computer Science 12
- 21-127 Concepts of Mathematics 12

**Logic & Computation Core (6 courses, 56 units)**
- 15-122 Principles of Imperative Computation 10
- 15-150 Principles of Functional Programming 10
- 80-150 Nature of Reason 9
- 80-211 Logic and Mathematical Inquiry 9
- 80-310 Formal Logic 9
- 80-311 Undecidability and Incompleteness 9

**Logic & Computation Electives (3 courses, 25 units minimum)**

Bearing in mind prerequisites, Logic & Computation students must complete three advanced courses in areas that use logical and computational tools, such as philosophy, computer science, linguistics, mathematical logic, psychology or statistics. The sequence of courses, mostly at the 300-level, must be selected in consultation with the concentration advisor.

**Philosophy Concentration**

*(81 units minimum)*

The BHA Concentration in Philosophy provides students with a broad humanities education and sharpens their analytical skills. We encourage, but do not require, students to choose a thematic concentration through their electives. Sample curricula emphasizing Pre-Law, Metaphysics and Epistemology, Ethics and Social Philosophy, and Philosophy of Mind are suggested below. However, alternative emphases can be proposed and approved by the concentration advisor.

In any of the areas listed, substitutions of courses that cohere with a student’s interest may be allowed with approval from the concentration advisor.

**Introduction to Philosophy (1 course, 9 units)**
- 80-100 Introduction to Philosophy 9
Area 1: Values and Normative Theory (1 course, 9 units)
80-130 Introduction to Ethics 9
80-135 Introduction to Political Philosophy 9
80-136 Social Structure, Public Policy & Ethics 9
80-244 Environmental Ethics 9
80-245 Medical Ethics 9
80-246 Moral Psychology 9
80-249 AI, Society, and Humanity 9
80-330 Ethical Theory 9
80-335 Social and Political Philosophy 9
80-336 Philosophy of Law 9
80-348 Health, Human Rights, and International Development 9
80-447 Global Justice 9

Area 2: Philosophy of Mind/Language/Metaphysics (1 course, 9 units)
80-180 Nature of Language 9
80-270 Problems of Mind and Body: Meaning and Doing 9
80-271 Mind and Body: The Objective and the Subjective 9
80-276 Philosophy of Religion 9
80-280 Linguistic Analysis 9
80-282 Phonetics and Phonology I 9
80-283 It Matters How You Say It 9
80-284 Invented Languages 9
80-285 Natural Language Syntax 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
80-380 Philosophy of Language 9
80-381 Meaning in Language 9
80-382 Phonetics and Phonology II 9
80-383 Language in Use 9
80-384 Linguistics of Turkic Languages 9
80-385 Linguistics of Germanic Languages 9
80-388 Linguistic Typology: Diversity and Universals 9
80-580 Seminar on the Philosophy of Language 9

Area 3: Logic/Philosophy of Mathematics (1 course, 9 units)
80-210 Logic and Proofs 9
80-211 Logic and Mathematical Inquiry 9
80-212 Arguments and Logical Analysis 9
80-310 Formal Logic 9
80-311 Undecidability and Incompleteness 9
80-312 Mathematical Revolutions 9
80-314 Causal Discovery, Statistics, and Machine Learning 9
80-315 Modal Logic 9
80-411 Proof Theory 9
80-413 Category Theory 9
80-419 Interactive Theorem Proving 9
80-514 Categorical Logic 9
80-518 Seminar on Topics in Logic 9

Area 4: Epistemology/Metaphysics (1 course, 9 units)
80-150 Nature of Reason 9
80-201 Knowledge and Justified Belief 9
80-208 Critical Thinking 9
80-220 Philosophy of Science 9
80-221 Philosophy of Social Science 9
80-226 Revolutions in Science 9
80-305 Decision Theory 9
80-324 Philosophy of Economics 9
80-326 Epistemology of Machine Learning 9
80-405 Game Theory 9
80-516 Causality and Machine Learning 9
80-521 Seminar on Formal Epistemology: Belief and Evidence 9

Area 5: History of Philosophy (1 course, 9 units)
80-150 Nature of Reason 9
80-226 Revolutions in Science 9
80-250 Ancient Philosophy 9
80-251 Modern Philosophy 9
80-252 Kant 9
80-253 Continental Philosophy 9
80-254 Analytic Philosophy 9
80-255 Pragmatism 9
80-256 Modern Moral Philosophy 9
80-257 Nietzsche 9
80-261 Experience, Reason, and Truth 9
80-358 Hume 9

Area 6: Electives (3 courses, 27 units)
Three other philosophy courses, or appropriate courses from other departments, with the permission of the concentration advisor.

Policy & Management Concentration
(81 units minimum)
The Policy & Management concentration prepares students for key decision-making and management roles in government, non-profit organizations and business. The concentration emphasizes analytical approaches to decision making, practical management skills and empirical techniques necessary for graduates to excel in the public and private sectors. The multidisciplinary curriculum merges frontier knowledge on the ideals of decision making, policy and data analysis, as well as the realities of individual behavior within various institutional settings that must be confronted if high-quality outcomes are to be attained.

The Policy & Management concentration provides an excellent combination of theoretical and practical skills for students who intend to seek managerial positions. Because of its strong analytic orientation, it is also an excellent concentration for those who intend to go on to professional school programs in law, business or public policy. It is also an appropriate choice for students pursuing graduate degrees in economics, political science or decision science.

Policy Core (2 courses, 18 units)
The Policy Core gives students applied economic training and policy analysis experience. Students will gain an analytical understanding of some of the biggest domestic and global economic policy challenges, and gain an appreciation of the economic analysis of complex decisions, as well as the trade-off between economic and political-based decision making.
73-102 Principles of Microeconomics 9
88-221 Analytical Foundations of Public Policy 9

Management Core (3 courses, 30 units)
The Management Core focuses on real-world applications of decision making. Students will develop an understanding of effective negotiation strategies and tactics, and identify the barriers and the psychological factors that may prevent decision-makers from reaching wise agreements. The courses provide systematic methods for dealing with the complexities that make decisions difficult, ranging from incorporating issues of risk and uncertainty in decision making to dealing with choices that have mutually conflicting objectives. For example, a business or government agency may need to decide on a policy for mitigating the uncertain impacts of air pollution while simultaneously trying to minimize the costs of such a policy on manufacturing. A firm might want to consider the uncertain reductions in security dangers from alternative policies to protect against terrorism.
88-150 Managing Decisions 9
or 88-255 Strategic Decision Making 9
88-223 Decision Analysis 12
88-418 Negotiation: Strategies and Behavioral Insights 9
or 88-419 International Negotiation 9

Empirical Core (3 courses, 27 units)
The Empirical Core focuses on key methods for collecting and analyzing data that are needed to make informed decisions. Students learn to use interviews, surveys, experiments and econometric methods to enhance their ability to test existing, and design new policies. Students will create
statistical models to address questions asked in conceptual, computational and data-driven investigations.

36-202 Methods for Statistics & Data Science 9
88-251 Empirical Research Methods 9
88-252 Causal Inference in the Field 9
or 88-275 Bubbles: Data Science for Human Minds

Senior Project (1 course, 12 units)

The required Senior Project course gives students hands-on experience in a policy-related area. Students work in teams to apply the research and analytical methods learned in their other courses to a real-world problem.

88-451/452 Policy Analysis Senior Project 12

Politics & Public Policy Concentration

(81 units minimum)

Rooted in the discipline of political science, the concentration in Politics and Public Policy investigates US public policy issues and other matters of domestic politics while providing students hands-on and practical learning experiences. Students pursuing the Politics and Public Policy concentration must participate in the Carnegie Mellon University Washington Semester Program (CMU/WSP) (https://www.cmu.edu/ips/washington-dc-semester-program/) for one semester during their undergraduate experience.

The CMU/WSP, sponsored by the university’s Institute for Politics and Strategy (IPS), is a semester-long program in which students live, intern, and take CMU classes in Washington, DC. Undergraduates from any course of study at the university may participate in the program. Students earn 48 units for the Carnegie Mellon University Washington Semester Program, intern about twenty-four hours per week in any sector or field of interest within Washington, DC, while taking classes taught by Carnegie Mellon faculty.

From embassies to nongovernmental organizations, think tanks to advocacy organizations, government agencies to congressional offices, and consulting firms to media outlets, Washington, DC, is the center for many political, international relations, and public policy activities. Students in the program come into direct contact with political, business, and community leaders and learn about the most pressing policy issues of the day.

Through this experiential learning program, CMU/WSP participants develop professional and networking skills, explore how coursework connects to the real world, learn to give and receive constructive feedback in the workplace and classroom, and intentionally reflect on their learning and growth. Every CMU/WSP student is paired with a Washington, DC- based alumni mentor to share career advice and tips about life in DC. IPS also sponsors events and policy-oriented opportunities in Washington for students participating in the program to further enrich their experience and enhance their understanding of how Washington functions as a hub of international and policy decision making.

Foundation Courses (2 courses, 18 units)

Students must complete the following course:

84-104 Decision Processes in American Political Institutions 9

Students must complete one of the following courses:

84-275 Comparative Politics 9
or 84-326 Theories of International Relations 9

Economics Course (1 course, 9 units)

Students must complete one of the following courses:

84-110 Foundations of Political Economy 9
or 73-102 Principles of Microeconomics 9
or 73-103 Principles of Macroeconomics 9

CMU/WSP Core Seminars (3 courses, 24 units)

Students must take the following courses while participating in the CMU/WSP:

84-360 CMU/WSP: Internship Seminar 12
84-450 Policy Seminar 6
84-451 Policy Seminar II 6

CMU/WSP Elective Seminars (3 course, 24 units minimum)

Students must take 24 units from the below list of elective seminars offered in the CMU/WSP. Offerings vary by semester:

84-330 The Shading of Democracy: The Influence of Race on American Politics 6
84-331 Money, Media, and the Power of Data in Decisionmaking 6
84-332 Effects of US Policy on Businesses: Perspectives of Asian Americans 6
84-333 Power and Levers for Change in Washington, DC 12
84-334 The History and Practice of Economic Statecraft 6
84-335 Intelligence and Policy 6
84-336 Implementing Public Policy: From Good Idea To Reality 12
84-337 Biomedical Science Research, Policy, and Governance 6
84-338 Political News Coverage in the Era of Trump, Twitter, and “Fake News” 6
84-339 Seminar in Public Policy Research 12
84-343 Language and Power: How to Understand and Use Political Speech 6
84-346 Legal Issues in Public Administration 6
84-348 Advocacy, Policy and Practice 6

American Politics Elective (1 course, 6 units minimum)

Students must take one course from the below list of electives taught in Pittsburgh.

84-304 In the News: Analysis of Current Events 6
84-325 Contemporary American Foreign Policy 9
84-352 Representation and Voting Rights 9
84-366 The American Presidency 9
84-380 US Grand Strategy 9
84-393 Legislative Decision Making: US Congress 9
84-402 Judicial Politics and Behavior 9
84-421 Advanced Topics in American Politics 9

Professional Writing Concentration

(81 units minimum)

Professional Writing combines liberal and professional education with a strong foundation in rhetorical studies. The concentration in Professional Writing has a strong career orientation and is specifically designed to prepare students for successful careers as writers and communications specialists in a range of fields: publishing, government, journalism, the non-profit sector, education, public and media relations, corporate communications, advocacy writing and the arts. The concentration is designed to develop articulate and reflective communications professionals with both the skills needed to enter and negotiate current work contexts (including writing for the web and other digital media) and the analytic and problem-solving skills needed to understand and keep pace with cultural and technological change.

Prerequisite English Elective

Students with a concentration in Professional Writing must complete one prerequisite course from the English Department’s offerings, which focuses on the relationships between texts and their cultural and historical contexts. The course must be at or above the 200 level. 76-270 Writing for the Professions, and 76-271 Introduction to Professional and Technical Writing may not count as English electives. Appropriate courses are advertised every semester in the English department’s “What Counts for What” publication.

Foundation Courses (5 courses, 39 units)

76-26x Introduction to Writing (Nonfiction, Fiction, Poetry or Screenwriting) 9
76-271 Introduction to Professional and Technical Writing 9
76-300 Professional Seminar 3
76-373 Argument 9
76-390 Style 9
Rhetoric/Language Studies Course (1 course, 9 units)

Students with a concentration in Professional Writing complete one course from designated Rhetoric courses offered and advertised each semester by the English Department. Rhetoric courses focus on understanding the role of language and language practices in both personal and professional contexts. Courses emphasize the relationships between texts and their contexts and pay particular attention to textual features, meaning, processes of reading and writing, and the ways in which language practices vary over time and across situations and cultures. The courses also equip students with explicit techniques for analyzing, understanding and exploring language practices. The Rhetoric/Language Studies courses may also be taken as part of the concentration requirements for three additional, Advanced Writing/Rhetoric courses and include but are not limited to the following list.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>76-319</td>
<td>Environmental Rhetoric</td>
<td>9</td>
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<tr>
<td>76-325</td>
<td>Intertextuality</td>
<td>9</td>
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<tr>
<td>76-351</td>
<td>Rhetorical Invention</td>
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<tr>
<td>76-359</td>
<td>User Experience Methods for Documents</td>
<td>9</td>
</tr>
<tr>
<td>76-360</td>
<td>Literary Journalism Workshop</td>
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<tr>
<td>76-384</td>
<td>Race, Nation, and the Enemy</td>
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</tr>
<tr>
<td>76-388</td>
<td>Coding for Humanists</td>
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<tr>
<td>76-389</td>
<td>Rhetorical Grammar</td>
<td>9</td>
</tr>
<tr>
<td>76-395</td>
<td>Science Writing</td>
<td>9</td>
</tr>
<tr>
<td>76-396</td>
<td>Non-Profit Message Creation</td>
<td>9</td>
</tr>
<tr>
<td>76-415</td>
<td>Mediated Power and Propaganda</td>
<td>9</td>
</tr>
<tr>
<td>76-474</td>
<td>Software Documentation</td>
<td>9</td>
</tr>
<tr>
<td>76-476</td>
<td>Rhetoric of Science</td>
<td>9</td>
</tr>
<tr>
<td>76-494</td>
<td>Healthcare Communications</td>
<td>9</td>
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</tbody>
</table>

Advanced Writing/Rhetoric Courses (3 courses, 27 units minimum)

Students with a concentration in Professional Writing complete three Advanced Writing/Rhetoric courses at the 300- or 400-level at a minimum of 27 units, as some courses are only six units, while others are variable units. Options for these courses include all of the Rhetoric/Language Studies courses listed above plus the writing-focused courses listed below. Additional courses that fulfill these requirements are advertised on a semester-by-semester basis. For help in choosing which of the possible options are most appropriate for various professional goals - journalism, writing for new media, editing and publishing, public relations/corporate communications, or science and technical writing – consult your English Department advisor. All students with a concentration in PW, regardless of their career focus, are encouraged to take 76-391 Document & Information Design and 76-487 Web Design to extend their skills in writing for print to include information design for digital media. Both courses focus on the role of the writer in these specializations and provide lab instruction in the relevant software and related computer skills.

Courses include but are not limited to:

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>76-301</td>
<td>Internship</td>
<td>Var.</td>
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<tr>
<td>76-302</td>
<td>Communication Support Tutoring Practicum</td>
<td>6</td>
</tr>
<tr>
<td>76-314</td>
<td>Data Stories</td>
<td>9</td>
</tr>
<tr>
<td>76-319</td>
<td>Environmental Rhetoric</td>
<td>9</td>
</tr>
<tr>
<td>76-351</td>
<td>Rhetorical Invention</td>
<td>9</td>
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<tr>
<td>76-354</td>
<td>Watchdog Journalism</td>
<td>9</td>
</tr>
<tr>
<td>76-359</td>
<td>User Experience Methods for Documents</td>
<td>9</td>
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<tr>
<td>76-360</td>
<td>Literary Journalism Workshop</td>
<td>9</td>
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<tr>
<td>76-372</td>
<td>News Writing</td>
<td>9</td>
</tr>
<tr>
<td>76-378</td>
<td>Literacy: Educational Theory and Community Practice</td>
<td>9</td>
</tr>
<tr>
<td>76-380</td>
<td>Methods in Humanities Analytics</td>
<td>9</td>
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<tr>
<td>76-418</td>
<td>Rhetoric and the Body</td>
<td>9</td>
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<tr>
<td>76-420</td>
<td>The Cognition of Reading and Writing: Introduction to a Social/Cognitive Process</td>
<td>9</td>
</tr>
<tr>
<td>76-425</td>
<td>Rhetoric, Science, and the Public Sphere</td>
<td>9</td>
</tr>
<tr>
<td>76-457</td>
<td>Rhetorical Invention</td>
<td>9</td>
</tr>
<tr>
<td>76-464</td>
<td>Creative Nonfiction Workshop</td>
<td>9</td>
</tr>
<tr>
<td>76-474</td>
<td>Software Documentation</td>
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<td>76-475</td>
<td>Law, Performance, and Identity</td>
<td>9</td>
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<tr>
<td>76-476</td>
<td>Rhetoric of Science</td>
<td>9</td>
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<tr>
<td>76-481</td>
<td>Introduction to Multimedia Design</td>
<td>12</td>
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<tr>
<td>76-484</td>
<td>Discourse Analysis</td>
<td>9</td>
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<tr>
<td>76-485</td>
<td>The New Public Sphere</td>
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<tr>
<td>76-487</td>
<td>Web Design</td>
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<td>76-494</td>
<td>Healthcare Communications</td>
<td>9</td>
</tr>
<tr>
<td>76-496</td>
<td>Research Methods in Rhetoric &amp; Writing Studies</td>
<td>9</td>
</tr>
</tbody>
</table>

English Elective (1 course, 6 units minimum)

Students with a concentration in Professional Writing complete one additional course from the English Department’s offerings. This course should be one that focuses on the relationships between texts and their cultural and historical contexts. Courses in literature, cultural studies, rhetoric and media studies that meet this requirement are advertised on a semester-by-semester basis. The English Elective may be any course offered by the Department with the exception of 76-270 Writing for the Professions, which is designed for non-majors and overlap with 76-271 Introduction to Professional and Technical Writing.

Psychology Concentration

(B1 units minimum)

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

Breadth Courses (4 courses, 36 units)

To gain familiarity with the breadth of the field of Psychology, students take 85-102 Introduction to Psychology and three survey courses.

Required Intro Course:

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

Survey Courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>85-104</td>
<td>Psychopathology</td>
<td>9</td>
</tr>
<tr>
<td>85-211</td>
<td>Cognitive Psychology</td>
<td>9</td>
</tr>
<tr>
<td>85-219</td>
<td>Biological Foundations of Behavior</td>
<td>9</td>
</tr>
<tr>
<td>85-221</td>
<td>Principles of Child Development</td>
<td>9</td>
</tr>
<tr>
<td>85-241</td>
<td>Social Psychology</td>
<td>9</td>
</tr>
<tr>
<td>85-251</td>
<td>Personality</td>
<td>9</td>
</tr>
</tbody>
</table>

Research Methods and Statistics (2 courses, 18 units)

Students complete one course in Research Methods (9 units). The corresponding survey course is a prerequisite for this course.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>85-310</td>
<td>Research Methods in Cognitive Psychology</td>
<td>9</td>
</tr>
<tr>
<td>85-314</td>
<td>Cognitive Neuroscience Research Methods</td>
<td>9</td>
</tr>
<tr>
<td>85-320</td>
<td>Research Methods in Developmental Psychology</td>
<td>9</td>
</tr>
<tr>
<td>85-330</td>
<td>Analytic Research Methods</td>
<td>9</td>
</tr>
<tr>
<td>85-340</td>
<td>Research Methods in Social Psychology</td>
<td>9</td>
</tr>
</tbody>
</table>

The following Statistics course is a prerequisite for all the Research Methods courses. This Statistics course counts toward the Psychology concentration.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>36-309</td>
<td>Experimental Design for Behavioral &amp; Social Sciences -Fall</td>
<td>9</td>
</tr>
<tr>
<td>or 85-309</td>
<td>Statistical Concepts and Methods for Behavioral and Social Science</td>
<td>9</td>
</tr>
</tbody>
</table>

Advanced Courses (3 courses, 27 units)

Complete any three advanced courses or seminars in Psychology numbered higher than 85-349. (excepting 85-480, 85-482, 85-484, 85-506, 85-507, 85-508).

Russian Studies Concentration

(B1 units minimum)

A BHA concentration in Russian Studies promotes not just language proficiency but also an understanding of Russian culture. Students who arrive at Carnegie Mellon with previous language study and/or who have high Advanced Placement, an International Baccalaureate, a Cambridge
GCE Advanced level or internal placement exam scores will be able to begin taking courses in the concentration earlier in their undergraduate program. In all cases, progress in the concentration will be accelerated by study abroad, which is recommended for all students.

**Prerequisites**

Intermediate level proficiency in Russian. This is equivalent to the completion of three courses (two at the 100-level and one at the 200-level) or exemption based on Advanced Placement, International Baccalaureate, Cambridge GCE Advanced level or Carnegie Mellon internal placement test scores.

**Core Courses in Russian Studies (3 courses, 33 units)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>82-294</td>
<td>19th Century Russian Masterpieces</td>
<td>Var. (12 units)</td>
</tr>
<tr>
<td>82-295</td>
<td>20th Century Russian Masterpieces</td>
<td>Var.</td>
</tr>
<tr>
<td>79-265</td>
<td>Russian History: Game of Thrones</td>
<td>9</td>
</tr>
<tr>
<td>79-266</td>
<td>Russian History and Revolutionary Socialism</td>
<td>9</td>
</tr>
</tbody>
</table>

**Core Courses in Modern Languages (1 course, 9 units)**

Complete one course.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>82-280</td>
<td>Bilingual &amp; Bicultural Experiences in the US</td>
<td>9</td>
</tr>
<tr>
<td>82-282</td>
<td>Interpreting Global Texts &amp; Cultures</td>
<td>9</td>
</tr>
<tr>
<td>82-283</td>
<td>Language Diversity &amp; Cultural Identity</td>
<td>9</td>
</tr>
<tr>
<td>82-284</td>
<td>Multicultural Pittsburgh: VR Storytelling</td>
<td>9</td>
</tr>
<tr>
<td>82-285</td>
<td>Podcasting: Language and Culture Through Storytelling</td>
<td>9</td>
</tr>
<tr>
<td>82-286</td>
<td>Cultural Complexities</td>
<td>9</td>
</tr>
<tr>
<td>82-383</td>
<td>Second Language Acquisition: Theories and Research</td>
<td>9</td>
</tr>
<tr>
<td>82-388</td>
<td>Topics in Second Language Acquisition</td>
<td>9</td>
</tr>
<tr>
<td>82-480</td>
<td>Translation Technologies</td>
<td>9</td>
</tr>
</tbody>
</table>

**Note:** In consultation with the concentration advisor, students may substitute a Modern Languages course elective with one related to language analysis, language learning, or acquisition of language and culture from the listings in Russian Studies or from another department. Examples: 80-180 Nature of Language, 85-421 Language and Thought. In addition, students may choose to take 82-580 Senior Seminar in Modern Languages (3 units). The selected course may not double count in the Electives category.

**Russian Studies and Interdisciplinary Electives (5 courses, 39 units minimum)**

Complete two courses from Russian Studies Electives or one course from Russian Studies Electives and one course from Interdisciplinary Electives in consultation with the concentration advisor.

**Russian Studies Electives:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>82-293</td>
<td>Russian Cinema: From the Bolshevik Revolution to Putin's Russia</td>
<td>Var.</td>
</tr>
<tr>
<td>82-391</td>
<td>Advanced Russian I - Berlin, Paris, New York, Harbin</td>
<td>9</td>
</tr>
<tr>
<td>82-392</td>
<td>Advanced Russian II: Great Short Works</td>
<td>9</td>
</tr>
<tr>
<td>82-394</td>
<td>Russian for Heritage Speakers: Babushka's Russia &amp; Beyond</td>
<td>9</td>
</tr>
<tr>
<td>82-397</td>
<td>Revolutionaries, Hackers, Russians Outlaws in Var. History, Literature, and Film</td>
<td>9</td>
</tr>
<tr>
<td>82-599</td>
<td>Russian Studies Thesis</td>
<td>9</td>
</tr>
</tbody>
</table>

* Students may repeat these courses with new topics.

**Interdisciplinary Electives:**

This list is compiled from possibilities such as but not limited to the following. Students should consult SIO and the concentration advisor for the most up to date interdisciplinary electives appropriate for the Russian Studies curriculum. Courses may be suggested to the concentration advisor for approval as a substitute. Note that not all courses are offered each semester.

**English**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>76-239</td>
<td>Introduction to Film Studies</td>
<td>9</td>
</tr>
</tbody>
</table>

**History**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>79-205</td>
<td>20th Century Europe</td>
<td>9</td>
</tr>
<tr>
<td>79-267</td>
<td>The Soviet Union in World War II: Military, Political, and Social History</td>
<td>9</td>
</tr>
<tr>
<td>79-322</td>
<td>Stalin and the Great Terror</td>
<td>9</td>
</tr>
</tbody>
</table>

**Institute for Politics and Strategy (Choose in consultation with the concentration advisor.)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>84-380</td>
<td>US Grand Strategy</td>
<td>9</td>
</tr>
<tr>
<td>84-405</td>
<td>The Future of Warfare</td>
<td>9</td>
</tr>
</tbody>
</table>

**Modern Languages**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>82-208</td>
<td>Eastern Europe: Society and Culture</td>
<td>9</td>
</tr>
<tr>
<td>82-280</td>
<td>Bilingual &amp; Bicultural Experiences in the US</td>
<td>9</td>
</tr>
<tr>
<td>82-282</td>
<td>Interpreting Global Texts &amp; Cultures</td>
<td>9</td>
</tr>
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<td>Multicultural Pittsburgh: VR Storytelling</td>
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</tr>
<tr>
<td>82-285</td>
<td>Podcasting: Language and Culture Through Storytelling</td>
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</tr>
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<td>82-286</td>
<td>Cultural Complexities</td>
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<td>Second Language Acquisition: Theories and Research</td>
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</tr>
<tr>
<td>82-480</td>
<td>Translation Technologies</td>
<td>9</td>
</tr>
</tbody>
</table>

**Philosophy**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>80-180</td>
<td>Nature of Language</td>
<td>9</td>
</tr>
<tr>
<td>80-280</td>
<td>Linguistic Analysis</td>
<td>9</td>
</tr>
<tr>
<td>80-380</td>
<td>Philosophy of Language</td>
<td>9</td>
</tr>
</tbody>
</table>

**Psychology**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>85-375</td>
<td>Crosscultural Psychology</td>
<td>9</td>
</tr>
<tr>
<td>85-421</td>
<td>Language and Thought</td>
<td>9</td>
</tr>
</tbody>
</table>

* Students may repeat these courses with new topics.

**Social & Political History Concentration (81 units minimum)**

The BHA concentration in Social & Political History focuses on new ways to understand the past and new ways to use what we know, as well as on connections between past and present and on how historical knowledge facilitates understanding of social, cultural and policy change. The History concentration emphasizes empirical methods and conceptual analysis, as well as specific research skills relevant to many types of jobs and further professional training. The History concentration combines a structured sequence of courses, training in research methods, theoretical concepts, and analytical writing skills, plus a considerable array of electives.

The BHA concentration in Social & Political History emphasizes broad-based, cumulative knowledge and interpretive skills in the study of the past. Offerings at the 200- and 300-level are designed to allow maximum flexibility in meeting requirements and maximum choice in focusing on particular themes, places, or eras. Upper-level courses aim to give students majoring in History more time together in smaller classes and more experience working with primary and secondary sources. The senior capstone seminar, Historical Research Seminar, provides training and experience in conducting original research and in interpretive, analytical writing—skills that prepare graduates for professional careers as well as for graduate or law school.

**Required History Courses (2 courses, 21 units)**

Students must earn a final grade of “C” or better for these courses to count toward the concentration.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>79-200</td>
<td>Introduction to Historical Research &amp; Writing - Sophomore or Junior year</td>
<td>9</td>
</tr>
<tr>
<td>79-420</td>
<td>Historical Research Seminar - Fall, Senior year</td>
<td>12</td>
</tr>
</tbody>
</table>

**Required Survey Courses (2 courses, 18 units)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>79-202</td>
<td>Flesh and Spirit: Early Modern Europe, 1400-1750</td>
<td>9</td>
</tr>
<tr>
<td>79-203</td>
<td>The Other Europe: The Habsburgs, Communist, &amp; Central/Eastern Europe, 1740-1990</td>
<td>9</td>
</tr>
<tr>
<td>79-204</td>
<td>American Environmental History</td>
<td>9</td>
</tr>
<tr>
<td>79-205</td>
<td>20th Century Europe</td>
<td>9</td>
</tr>
<tr>
<td>79-206</td>
<td>Crime and Punishment in Early Modern Europe</td>
<td>9</td>
</tr>
<tr>
<td>79-211</td>
<td>Modern Southeast Asia: Colonialism, Capitalism, and Cultural Exchange</td>
<td>9</td>
</tr>
<tr>
<td>79-212</td>
<td>Jim Crow America</td>
<td>9</td>
</tr>
<tr>
<td>79-223</td>
<td>Mexico: From the Aztec Empire to the Drug War</td>
<td>9</td>
</tr>
<tr>
<td>79-225</td>
<td>West African History in Film</td>
<td>9</td>
</tr>
<tr>
<td>79-226</td>
<td>African History: Earliest Times to 1780</td>
<td>9</td>
</tr>
<tr>
<td>79-227</td>
<td>Modern Africa: The Slave Trade to the End of Apartheid</td>
<td>9</td>
</tr>
</tbody>
</table>
The following courses offered by other departments in Dietrich College:

Students may satisfy the elective requirements in SPH with up to 27 units of coursework. These five courses are not counted as part of your DC Concentration. They may be used to satisfy general education or free elective requirements.

79-229 The Origins of the Palestinian-Israeli Conflict, 1880-1948
79-230 Arab-Israeli Conflict Since 1948
79-231 American Civil Rights Movement: From Garveyism to Black Power
79-233 The United States and the Middle East since 1945
79-240 Development of American Culture
79-241 African American History: Africa to the Civil War
79-242 African American History: Reconstruction to the Present
79-244 Women in American History
79-245 Capitalism and Individualism in American Culture
79-248 U.S. Constitution & the Presidency
79-249 20th Century U.S. History
79-250 Voting Rights: An Unexpected History
79-260 Nazi Germany
79-261 The Last Emperors: Chinese History and Society, 1600-1900
79-262 Modern China: From the Birth of Mao … to Now
79-265 Russian History: Game of Thrones
79-266 Russian History and Revolutionary Socialism
79-269 Russian History: From Socialism to Capitalism
79-282 Europe and the World Since 1800
79-288 Bananas, Baseball, and Borders: Latin America and the United States
79-291 Innovation and Entertainment: A Business History of American Popular Culture
79-299 Introduction to the History of Science
79-307 Religion and Politics in the Middle East
79-320 Women, Politics, and Protest

Social & Political History Elective Courses (5 courses, 42 units minimum)

A minimum of 42 additional History units must be approved with the History advisor. Any History courses not fulfilling another major requirement may be chosen as an elective. Any History (79-xxx) class can count as an SPH elective except for 79-198, 79-200, 79-400, 79-420, 79-449, 79-491. See the History Department website (www.cmu.edu/dietrich/history) or contact the History advisor for the most current elective offerings.

Students may satisfy the elective requirements in SPH with up to 27 units of coursework. These five courses are not counted as part of your DC Concentration. They may be used to satisfy general education or free elective requirements.

73-476 American Economic History
76-230 Literature & Culture in the 19th Century
76-239 Introduction to Film Studies
76-295 Russian Cinema: From the Bolshevik Revolution to Putin's Russia
76-449 Race and Media
80-135 Introduction to Political Philosophy
80-226 Revolutions in Science
80-355 Social and Political Philosophy
82-208 Eastern Europe: Society and Culture
82-245 New Directions in Hispanic Studies
82-247 The Hispanic World: History, Culture and Globalization
82-293 Russian Cinema: From the Bolshevik Revolution to Putin's Russia
82-327 The Emergence of the German Speaking World
82-420 The Crucible of Modernity: Vienna 1900
82-427 Nazi and Resistance Culture
84-275 Comparative Politics
84-308 Political Economy of Latin America
84-322 Nonviolent Conflict and Revolution
84-324 The Future of Democracy
84-325 Contemporary American Foreign Policy
84-362 Diplomacy and Statecraft
84-364 Comparative Presidential Behavior: Leadership, Personality, and Decision Making
84-366 The American Presidency
84-380 US Grant Strategy
84-386 The Privatization of Force
84-389 Terrorism and Insurgency
85-380 In Search of Mind: The History of Psychology
88-281 Topics in Law: 1st Amendment
88-284 Topics in Law: The Bill of Rights

Statistics Concentration

(81 units minimum)

In the BHA concentration in Statistics, students develop and master a wide array of skills in computing, mathematics, statistical theory, and the interpretation and display of complex data. In addition, students with a BHA concentration in Statistics gain experience in applying statistical tools to real problems in other fields and learn the nuances of interdisciplinary collaboration.

Mathematics Prerequisites

These courses are not counted as part of your DC Concentration. They may be used to satisfy general education or free elective requirements.

21-120 Differential and Integral Calculus
21-256 Multivariate Analysis
21-259 Calculus in Three Dimensions
21-240 Matrix Algebra with Applications
21-241 Matrices and Linear Transformations
21-242 Matrix Theory

Note: 21-240, 21-241, 21-242 must be completed before taking 36-401 Modern Regression. 21-241 and 21-242 are intended only for students with a very strong mathematical background.

Statistics Core (6 courses, 54 units)

36-202 Methods for Statistics & Data Science
36-204 Statistical Computing
36-205 Introduction to Statistical Research Methodology
36-235 Probability and Statistical Inference I - (recommended)
36-225 Introduction to Probability Theory
36-236 Probability and Statistical Inference II - (recommended)
36-226 Introduction to Statistical Inference
36-350 Statistical Computing
36-401 Modern Regression
36-402 Advanced Methods for Data Analysis

Special Topics and Electives (3 courses, 27 units)

Students must take a total of three courses from Special Topics (numbered 36-46x) and Statistics Electives listed below. Students will consult with the concentration advisor to select the Special Topics and Electives courses that best fit for their areas of interest.

36-303 Sampling, Survey and Society
36-311 Statistical Analysis of Networks
36-313 Statistics of Inequality and Discrimination
36-315 Statistical Graphics and Visualization
36-318 Introduction to Causal Inference
36-46x Special Topics (topics and offerings vary)
36-490 Undergraduate Research
36-493 Sports Analytics Capstone
36-497 Corporate Capstone Project

Statistics & Machine Learning Concentration

(81 units minimum)

In the BHA concentration in Statistics & Machine Learning, develop and master a wide array of skills in computing, mathematics, statistical theory, and the interpretation and display of complex data. In addition, students with a BHA concentration in Statistics & Machine Learning gain experience in applying statistical tools to real problems in other fields and learn the nuances of interdisciplinary collaboration. This program is geared towards students interested in statistical computation, data science or “Big Data” problems.

Mathematics and Computer Science Prerequisites

These five courses are not counted as part of your DC Concentration. They may be used to satisfy general education or free elective requirements.
The concentration in Technical Writing is specifically designed to prepare students for successful careers involving scientific, technical, and computer-related communication, including writing and designing for digital media. Technical communicators develop and design web sites, explain science and technology to the public, develop print and multimedia materials, develop information management systems, design and deliver corporate training, and develop support systems for consumer products ranging from software for word processing or personal finances to complex data management systems. The Technical Writing concentration includes with a common core of foundation courses in print and on-line communication as well as a set of prerequisites in math, statistics and computer programming.

Students with a Technical Writing concentration take two Theory/ Specialization courses specific to either the Technical Communication (TC) or the Scientific and Medical Communication (SMC) track. In addition, students in the SMC track take one course in the natural sciences or engineering relevant to their areas of interest, while TC students take two electives in management, technology and social issues.

Prerequisite Courses

- 21-111 Calculus I
- 21-112 Calculus II
- 21-120 Differential and Integral Calculus
- 21-127 Concepts of Mathematics

Recommended Options:

- 86-389 Rhetorical Grammar
- 86-391 Document & Information Design
- 86-394 Technical Writing (recommended for SMC-track students)
- 86-395 Science Writing
- 86-396 Non-Profit Message Creation
- 86-397 Introduction to Writing (Nonfiction, Fiction, Poetry or Screenwriting)
- 86-398 Corporate Capstone Project
- 86-399 Rhetorical Analysis

Additional Options include but are not limited to the following:

- 86-403/703 Deep Reinforcement Learning & Control
- 86-405/605 Machine Learning with Large Datasets
- 86-413/715 Introduction to Parallel Distributed Processing
- 86-477 Software Engineering
- 86-478 Data Science
- 86-479 Data Analysis Electives (1 course, 9 units)

Students must take one course from the Statistics Electives listed below. Students will consult with the concentration advisor to select the Special Topics and Electives courses that best fit for their areas of interest.

- 36-235 Probability and Statistical Inference I - (recommended)
- 36-236 Probability and Statistical Inference II - (recommended)
- 36-226 Introduction to Statistical Inference

Data Analysis Electives (1 course, 9 units)

- 36-350 Statistical Computing
- 36-490 Undergraduate Research
- 36-493 Sports Analytics Capstone
- 36-497 Corporate Capstone Project

Machine Learning Core (2 courses, 22 units)

- 15-121 Principles of Imperative Computation -C or higher
- 10-301 Introduction to Machine Learning (Undergrad)

Machine Learning Elective (1 course, 9 units minimum)

Students must take one course from the ML Electives listed below. Students will consult with the Statistics & Machine Learning advisor to choose an elective that best fits their area of interest. This course may have additional pre-requisites. Keep in mind this is not an exhaustive list and other applicable courses can be reviewed to be approved as an ML elective – please speak with the concentration advisor about this.

- 05-434/11-344 Machine Learning in Practice
- 10-403/703 Deep Reinforcement Learning & Control
- 10-405/605 Machine Learning with Large Datasets
- 10-417 Intermediate Deep Learning
- 10-418 Machine Learning for Structured Data
- 10-707 Advanced Deep Learning
- 11-411 Natural Language Processing
- 11-441 Machine Learning for Text and Graph-based Mining
- 11-485 Introduction to Deep Learning
- 11-561 Introduction to Graph-based Learning
- 15-201 Artificial Intelligence: Representation and Problem Solving
- 15-386 Neural Computation
- 15-387 Computational Perception
- 16-311 Introduction to Robotics
- 16-385/720 Computer Vision
- 85-419 Introduction to Parallel Distributed Processing

Technical Writing Concentration (81 units minimum)
Intermediate Studios (3 courses, 30 units)

Complete three courses:
- Foundations: Paint/Print (2 courses, 60 units)
- Foundations: Expanded Media Sculpture (1 course, 10 units)
- Foundations: Digital Media (1 course, 10 units)
- Foundations: Time-Based Media (1 course, 10 units)
- Foundations: Sculpture (1 course, 10 units)
- Foundations: Art First-Year Seminar (1 course, 6 units)

Electives (1 course, 9 units)

Students with a Technical Writing concentration take one course outside of English to deepen their area of specialty in their track. Typically, students in the SMC track select courses from business, design, psychology, and social and decision sciences, or HCI. Students should work with the concentration advisor to select courses that are meaningful for their track.

COLLEGE OF FINE ARTS CONCENTRATION
(number of courses vary, 108-114 units minimum)

BHA students choose one of the following concentrations:
- Architecture (108 units)
- Art (114 units)
- Design (108 units)
- Drama (108 units)
- Music (108 units)

Architecture Concentration
(108 units minimum)

Architecture Required Courses (7 courses, 52 units minimum)

48-100 Architecture Design Studio: POIESIS STUDIO 1 - Fall, Freshman or Sophomore year 10-15
or 48-095 Spatial Concepts for Non-Architecture Majors 6
62-122 Digital Media I - Fall, Freshman year 6
62-125 Drawing I - Fall, Freshman year 6
62-123 Digital Media II - Spring, Freshman year 6
62-126 Drawing II - Spring, Freshman year 6
48-240 History of World Architecture, I - Spring, Freshman year 9
48-241 Modern Architecture - Fall, Sophomore year 9

Architecture Electives (56 units minimum)

A minimum of 56 additional Architecture units must be approved by the Architecture advisor. A list of these selected courses must be filed in the BXA office.

Art Concentration
(114 units minimum)

First-Year Seminar (1 course, 6 units)
60-104 Foundations: Art First-Year Seminar 6

Foundation Studios (3 courses, 30 units)

Complete three courses:
- Foundations: Time-Based Media (1 course, 10 units)
- Foundations: Digital Media (1 course, 10 units)
- Foundations: Sculpture (1 course, 10 units)
- Foundations: Expanded Media Sculpture (1 course, 10 units)
- Foundations: Drawing (1 course, 10 units)
- Foundations: Paint/Print (1 course, 10 units)

Intermediate Studios (3 courses, 30 units)

Complete three courses:
- Intermediate Studio Elective (10 units)
- Intermediate Studio Elective (10 units)
- Intermediate Studio Elective (10 units)

Advanced Studios (3 courses, 30 units)

Students may take courses in any media area (ETB, SIS, CP or DP3). They may take all courses in one media area if a focus is desired. With approval from the Art advisor, BXA students can take an additional intermediate studio in lieu of an advanced studio to increase breadth.

Complete three courses:
- Advanced Drawing, Painting, Print Media and Photography (DP3) (course numbers 60-450 through 60-498) 10
- Advanced Electronic and Time-Based Work (ETB) (course numbers 60-410 through 60-429) 10
- Advanced Sculpture, Installation and Site-Work (SIS) (course numbers 60-430 through 60-447) 10
- Advanced Contextual Practice (CP) (course numbers 60-448 through 60-449) 10
- Studio Independent Study (one only) 10

* Courses offered intermittently; speak with a BXA advisor to determine course availability.

Critical Studies (2 courses, 18 units)

60-105 Cultural History of the Visual Arts - Spring 9
60-3xx Critical Studies Elective 9

Review Requirement (2 required reviews, 0 units)

A review is required at the end of the sophomore and senior years. Pass/no pass only.
60-200 Sophomore Review - Spring 0
60-400 Senior Review - Spring 0

Design Concentration
(108 units minimum)

Design Required Courses (16 courses, 98 units)

51-101 Studio: Survey of Design - Fall, First-year 10
51-121 Visualizing - Fall, First-year 10
51-175 Design Studies: Place - Fall, First-year (mini-1) 5
51-177 Design Studies: Histories - Fall, First-year (mini-2) 5
51-102 Design Lab - Spring, First-year 10
51-122 Collaborative Visualizing - Spring, First-year 10
51-176 Design Studies: Futures - Spring, First-year (mini-3) 5
51-178 Design Studies: Experience - Spring, First-year (mini-4) 5
51-277 Design Studies: Systems - Fall, Sophomore year (mini-1) 5
51-279 Design Studies: Cultures - Fall, Sophomore year (mini-2) 5
51-282 Design Studies: Persuasion - Spring, Sophomore year (mini-3) 5
51-284 Design Studies: Power - Spring, Sophomore year (mini-4) 5

Choose Two Studios - Fall, Sophomore year: 4.5+4.5
51-225 Communications Studio I: Understanding Form & Context 4.5
or 51-245 Products Studio I: Understanding Form & Context 4.5
or 51-265 Environments Studio I: Understanding Form & Context 4.5

Choose Two Corresponding Labs - Fall, Sophomore year: 4.5+4.5
51-227 Prototyping Lab I: Communications 4.5
or 51-247 Prototyping Lab I: Products 4.5
or 51-267 Prototyping Lab I: Environments 4.5

Design Electives (10 units)

A minimum of 10 additional Design units must be approved by the Design advisor. A list of these selected courses must be filed in the BXA office.

Drama Concentration
(108 units minimum)

Options available in the following areas: 1) Design, 2) Directing, 3) Dramaturgy, 4) Production Technology and Management
Required Courses for All Concentration Options (5 courses, 20 units)

- 54-175-54-176 Conservatory Hour-Conservatory Hour (1 unit each) 2
- 54-177 Foundations of Drama I 6
- 54-281 Foundations of Drama II (prerequisite: 54-177) 6
- 54-381 Special Topics in Drama: History, Literature and Criticism 6
- 54-362 Anti-Racist & Equitable Practices in Theater (optional) 6

Work with Music Advisor to Approve Concentration Option (99 units minimum).

Design Required Courses (2 courses, 26 units)

- 54-151-54-152 Stagecraft-Stagecraft (13 units + 13 units) 26

A minimum of 62 additional Design units must be approved by the Design faculty option coordinator. A list of these selected courses must be filed in the BXA office.

Directing Required Courses (10 courses, 64 units)

- 54-121-54-122 Directing I: A Director's Mindset - Directing I: A Director's Preparation 18
- 54-221-54-222 Directing II: In the Studio - Directing II: In The Room 18
- 54-159-54-159 Production Practicum-Production Practicum (two times) 12
- 54-517 Director's Colloquium (four times) 16

A minimum of 24 additional Directing units must be approved by the Directing faculty option coordinator. A list of these selected courses must be filed in the BXA office.

Dramaturgy Required Courses (9 courses, 53 units minimum)

- 54-109 Dramaturgy 1: Approaches to Text 9
- 54-184 Dramaturgy 2: Introduction to Production Dramaturgy 9
- 54-121 Directing I: A Director's Mindset 9
- 54-159-54-159 Production Practicum-Production Practicum (two times) 12
- 54-200-54-200 Dramaturgy Forum-Dramaturgy Forum -Fall (minimum of two; every semester it is offered while enrolled) 2
- 54-xxx Dramaturgy 3, 4, 5 or 6 (minimum of two; all four if enrolled as BXA for six semesters or more) 18

A minimum of 29 additional Dramaturgy units must be approved by the Dramaturgy faculty option coordinator. A list of these selected courses must be filed in the BXA office.

Production Technology and Management Required Courses (2 courses, 26 units)

- 54-151-54-152 Stagecraft-Stagecraft (13 units + 13 units) 26

A minimum of 62 additional PTM units must be approved by the PTM faculty option coordinator. A list of these selected courses must be filed in the BXA office.

Music Concentration (108 units minimum)

Options available in the following areas: 1) Audio Recording & Production, 2) Composition, 3) Music Performance (instrumental, organ, piano, voice), 4) Sound Theory & Practice

Required Course for All Concentration Options (1 course, 9 units)

- 57-152 Harmony I 9
- 57-149 Basic Harmony I

Work with Music Advisor to Approve Concentration Option (99 units minimum).

Audio Recording & Production Required Courses (7 courses, 40 units)

- 57-101 Introduction to Music Technology or 57-171 Introduction to Music Technology (self-paced) 6
- 57-181 Solfege I 3
- or 57-180 Basic Solfege I or 57-185 Advanced Solfege I
- 57-173 Survey of Western Music History (co-requisite: 57-188) 9
- 57-188 Repertoire and Listening for Musicians 1
- 57-337 Sound Recording 6
- 57-338 Sound Editing and Mastering 6
- 57-438 Multitrack Recording 9

Choose 59 units from:

- 57-153 Harmony II or 57-150 Basic Harmony II 9
- 57-182 Solfege II or 57-186 Advanced Solfege II 3
- 15-104 Introduction to Computing for Creative Practice 10
- 15-322 Introduction to Computer Music 9
- 18-090 Twisted Signals: Multimedia Processing for the Arts 10
- 33-114 Physics of Musical Sound 9
- 54-166 Introduction to Sound Design for Theatre 6
- 54-275 History of Sound Design 3
- 54-666 Production Audio 6
- 57-161 Eurhythmics I 3
- 57-344 Experimental Sound Synthesis 9
- 57-358 Introduction to Electronic Music (with instructor permission as space allows) 9
- 57-421 Exploded Ensemble 6
- 57-427 Advanced Seminar in Film Musicology 9
- 57-478 Survey of Historical Recording 6
- 57-622 Independent Study in Sound Recording Production 3
- 60-131 Foundations: Sculpture 10
- 60-210 Electronic Media Studio: Introduction to Interactivity 10

Note: Students completing an IDEATe minor may double-count up to two of the IDEATe minor courses towards the Audio Recording & Production concentration.

Composition Required Courses (12 courses, 76 units)

- 57-161 Eurhythmics I (recommended co-requisite: 57-181) 3
- 57-181 Solfege I or 57-180 Basic Solfege I or 57-185 Advanced Solfege I
- 57-173 Survey of Western Music History (co-requisite: 57-188) 9
- 57-188 Repertoire and Listening for Musicians 1
- 57-49x BXA Studio (4 semesters) 36
- 57-xxx Major Ensemble (4 semesters) 24

A minimum of 23 additional Music units must be approved by the Music advisor. A list of these selected courses must be filed in the BXA office.

Music Performance Required Courses (12 courses, 76 units)

- 57-161 Eurhythmics I (recommended co-requisite: 57-181) 3
- 57-181 Solfege I or 57-180 Basic Solfege I or 57-185 Advanced Solfege I
- 57-173 Survey of Western Music History (co-requisite: 57-188) 9
- 57-188 Repertoire and Listening for Musicians 1
- 57-49x BXA Studio (4 semesters) 36
- 57-xxx Major Ensemble (4 semesters) 24

A minimum of 23 additional Music units must be approved by the Music advisor. A list of these selected courses must be filed in the BXA office.
Sound Theory & Practice Required Courses (7 courses, 47 units)

- 57-101 Introduction to Music Technology 6
- or 57-171 Intro to Music Technology (self-paced)
- 57-181 Solfege I 3
- or 57-180 Basic Solfege I
- or 57-185 Advanced Solfege I
- 57-173 Survey of Western Music History (co-requisite: 57-188) 9
- 57-188 Repertoire and Listening for Musicians 1
- 18-090 Twisted Signals: Multimedia Processing for the Arts 10
- 57-911 Music Since 1945 9
- 57-616 Independent Study in Sound Studies 9

Choose 52 units from:

- 57-153 Harmony II 9
- or 57-150 Basic Harmony II
- 57-182 Solfege II 3
- or 57-186 Advanced Solfege II
- 15-104 Introduction to Computing for Creative Practice 10
- 15-322 Introduction to Computer Music (prerequisite: 15-112) 9
- 33-114 Physics of Musical Sound 9
- 57-327 Sound Recording 6
- 57-343 Music Technology, and Culture 9
- 57-344 Experimental Sound Synthesis 9
- 57-347 Electronic and Computer Music (prerequisite: 57-101 or 57-171) 6
- 57-358 Introduction to Electronic Music (with instructor permission as space allows) 9
- 57-421 Exploded Ensemble 6
- 57-438 Multitrack Recording 9
- 57-478 Survey of Historical Recording 6
- 60-131 Foundations: Sculpture 10
- 60-210 Electronic Media Studio: Introduction to Interactivity 10

Note: Students completing an IDeATe minor may double-count up to two of the IDeATe minor courses towards the Sound Theory & Practice concentration.

Free Electives
(approximately 8-9 courses, 72-78 units)

Take any Carnegie Mellon course. Many BHA students use their electives to broaden or deepen their concentrations. A maximum of 9 units of physical education and/or military science may be counted toward this requirement.

Bachelor of Science and Arts Degree Program

The Bachelor of Science and Arts (BSA) intercollege degree program combines the strengths of the College of Fine Arts (CFA) and the Mellon College of Science (MCS). This degree is designed for students who are gifted in both the fine arts and the natural sciences or mathematics, and who have the interest and the exceptional ability to pursue both disciplines simultaneously. Students choose their arts concentration from the following schools in CFA: Architecture, Art, Design, Drama or Music. Students choose their science concentration from among the departments in MCS: Biological Sciences, Chemistry, Environmental & Sustainability Studies, Mathematical Sciences, Neurobiology or Physics.

The BSA curriculum has three main components: general core requirements, fine arts concentration requirements and natural sciences/mathematics concentration requirements. Each student’s course of study is structured so they can complete this rigorous program in four years.

Students receive extensive advising support. The academic advisors in the BXA Intercollege Degree Programs are the primary advisors and liaisons between CFA and MCS. Each student has two additional academic advisors: an advisor in the admitting school of CFA to guide their focus in the arts and an advisor in MCS to guide their focus in the sciences.

BSA Curriculum

<table>
<thead>
<tr>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. BSA General Education 129</td>
</tr>
<tr>
<td>II. MCS Concentration 114-144</td>
</tr>
<tr>
<td>III. CFA Concentration 108-114</td>
</tr>
<tr>
<td>IV. Free Electives 0-29</td>
</tr>
</tbody>
</table>

Total BSA Degree Requirements 380

BSA General Education
(18 courses, 129 units minimum)

- Mathematics (2 courses, 20 units, 21-120 and 21-122 or 21-124 required)
- Science (3 courses, 31 units, 03-121, 09-105, and 33-121 or 33-151 required)
- First-year Courses (2 courses, 12 units, 76-101 and 99-101 required)
- ENGAGE (3 courses, 3 units)
- Cultural/Global Understanding (1 course, 9 units)
- Humanities and Social Sciences (2 courses, 18 units)
- BXA Required Courses (5 courses, 36 units, 52-190, 52-291, 52-392, 52-401, 52-402)

Technical Breadth Requirements (5 courses, 51 units)

As a 21st Century practicing scientist or mathematician, our graduates will work with others from a variety of technical backgrounds. Therefore, all of our students will be broadly trained within the technical fields of science and math. Students will fulfill this training by completing five (5) introductory technical courses in the Mellon College of Science at Carnegie Mellon University.

A student must take the five (5) courses listed below. AP/IB/Cambridge credit may be used to fulfill some of these requirements, but STEM electives must be taken at CMU or at another university for transfer credit to reach the total of five (5) Technical Breadth courses. A list of STEM electives can be found in the MCS general education requirements (http://ocatalog.web.cmu.edu/schools-colleges/melloncollegeofscience/#generaleducationrequirements#textcontainer).

Mathematics (2 courses, 20 units)

- 21-120 Differential and Integral Calculus 10
- 21-122 Integration and Approximation 10
- or 21-124 Calculus II for Biologists and Chemists

Science (3 courses, 31 units)

- 03-121 Modern Biology 9
- 09-105 Introduction to Modern Chemistry I 10
- 33-121 Physics I for Science Students 12
- or 33-151 Matter and Interactions I

Nontechnical Breadth Requirements (8 courses, 42 units)

MCS aspires for all of our undergraduates to leave our campus with a strong sense of personal integrity, social responsibility, ethics, working with diverse others, global engagement, and personal health and well-being. The following non-technical breadth requirements will require students to develop a personalized plan for their course selection and meta-curricular participation to maximize their CMU experience. Our graduates will be well trained to be life-long and life-wide learners that will lead the scientific community and the world at large.

All candidates for BSA degree must complete the following non-technical breadth requirements:

- First-year Courses (2 courses, 12 units)
- 76-101 Interpretation and Argument 9
- or 76-102 Advanced First Year Writing: Special Topics
- or 76-106 Writing about Literature, Art and Culture
- & 76-107 and Writing about Data
- & 76-108 and Writing about Public Problems
All undergraduate students must complete the First-Year Writing requirement—the Department of English does not accept any Advanced Placement exemptions. This requirement can be completed in two different ways. Enroll in one of two full-semester courses 101 or 102 (by invitation only), 9 units, or enroll in two of three half-semester mini courses (back-to-back within a single semester) 106/107/108, 4.5 + 4.5 units. Course options and topics: www.cmu.edu/hss/english/first_year/index.html

99-101 Computing @ Carnegie Mellon 3

ENGAGE (3 courses, 3 units)
The ENGAGE courses are self-directed learning opportunities (using the MyCORE online platform) designed to enhance students’ engagement with wellness and community service. Choose three courses from the list below:

38-110 ENGAGE in Service 1
38-230 ENGAGE in Wellness: Looking Inward 1
38-330 ENGAGE in Wellness: Looking Outward 1
38-430 ENGAGE in Wellness: Looking Forward 1

Cultural/Global Understanding (1 course, 9 units)
Cultural or global understanding course(s) may be taken at any time. Nine (9) or more units from the following group of courses will fulfill this requirement. Any student who finds an appropriate Carnegie Mellon course not on the list below that might fulfill this requirement should contact their academic advisor to review the course description to determine if it can be substituted. Cultural and global understanding courses that are taken while studying abroad can be used to fulfill this category. In addition, transfer courses will also be considered for this category. However, this course requirement cannot be satisfied with AP/IB/Cambridge exam credit.

57-173 Survey of Western Music History 9
57-209 The Beatles 9
57-306 World Music 9
70-342 Managing Across Cultures 9
76-221 Books You Should Have Read By Now 9
76-232 Introduction to Black Literature 9
76-239 Introduction to Film Studies 9
76-241 Introduction to Gender Studies 9
76-386 Language & Culture 9
79-145 Genocide and Weapons of Mass Destruction 9
79-189 History of Democracy: Thinking Beyond the Self 9
79-201 Introduction to Anthropology 9
79-202 Flesh and Spirit: Early Modern Europe, 1400-1750 9
79-205 20th Century Europe 9
79-208 Witchcraft and Witch-Hunting 9
79-211 Modern Southeast Asia: Colonialism, Capitalism, and Cultural Exchange 9
79-223 Mexico: From the Aztec Empire to the Drug War 9
79-227 Modern Africa: The Slave Trade to the End of Apartheid 9
79-229 The Origins of the Palestinian-Israeli Conflict, 1880-1948 9
79-230 Arab-Israeli Conflict Since 1948 9
79-232 Arabian Peninsula Environmental History 9
79-233 The United States and the Middle East since 1945 9
79-234 Technology and Society 9
79-240 Development of American Culture 9
79-241 African American History: Africa to the Civil War 9
79-242 African American History: Reconstruction to the Present 9
79-244 Women in American History 9
79-245 Capitalism and Individualism in American Culture 9
79-261 The Last Emperors: Chinese History and Society, 1600-1900 9
79-262 Modern China: From the Birth of Mao … to Now 9
79-263 Mao and the Chinese Cultural Revolution 9
79-265 Russian History: Game of Thrones 9
79-266 Russian History and Revolutionary Socialism 9
79-267 The Soviet Union in World War II: Military, Political, and Social History 9

79-275 Introduction to Global Studies 9
79-280 Coffee and Capitalism 9
79-283 Hungry World: Food and Famine in Global Perspective 9
79-307 Religion and Politics in the Middle East 9
79-343 Education, Democracy, and Civil Rights 9
79-345 Roots of Rock & Roll 9
79-350 Early Christianity 9
79-377 Food, Culture, and Power: A History of Eating 9
80-100 Introduction to Philosophy 9
80-250 Ancient Philosophy 9
80-251 Modern Philosophy 9
80-253 Continental Philosophy 9
80-254 Analytic Philosophy 9
80-255 Pragmatism 9
80-276 Philosophy of Religion 9
82-xxx Any course from Modern Languages 9
84-380 US Grand Strategy 9

Humanities and Social Sciences (2 courses, 18 units)
To fulfill this requirement, students must complete a minimum of two (2) nontechnical courses totaling at least 18 units in the Tepper School of Business and/or the Dietrich College of Humanities and Social Sciences. Courses counted toward the Cultural/Global Understanding requirement, and 76-101, do not count toward this requirement.

Check our web site for courses from DC, CFA, and Tepper that may NOT be used (http://www.cmu.edu/mcs/undergrad/advising/hs-finearts/deletions.html) to satisfy this requirement because they are too technical in nature, plus a list of courses in other colleges (including SCS, CIT, Tepper, and Heinz College) that do satisfy (http://www.cmu.edu/mcs/undergrad/advising/hs-finearts/additions.html) this requirement.

BXA Required Courses (5 courses, 36 units)
BXA-specific courses give students the opportunity to integrate their areas of concentration by focusing on interdisciplinary approaches and arts-based research techniques.

52-190 BXA Seminar I: Building the Wunderkammer - Spring, Freshman (mini-4) 4.5
52-291 BXA Seminar II: Transferring Knowledge -Spring, Sophomore (mini-3) 4.5
52-392 BXA Seminar III: Deconstructing Disciplines 9
52-401 BXA Seminar IV: Capstone Project Research 9
52-402 BXA Seminar V: Capstone Project Production 9

Mellon College of Science Concentration
(number of courses vary, 114-144 units)
BSA students declare one of the following concentrations, through consultation with their BXA advisor and the MCS concentration advisors. A completed MCS Concentration Declaration form must be approved by the concentration advisor and submitted to the BXA office, by spring mid-semester break of the student’s first year.

Note: The BSA Physics concentration requires additional coursework totaling the degree requirements beyond 380 units.

- Biological Sciences (114 units)
- Chemistry (121 units)
- Environmental & Sustainability Studies (123 units)
- Mathematical Sciences (125 units)
- Neurobiology (114 units)
- Physics (144 units)

BSA students who are admitted as freshmen are undeclared until they have met with a concentration advisor and have submitted their signed Declaration form. BSA students who are admitted through internal transfer must have chosen an MCS concentration at the time of their application (which serves as declaration). All BSA students wishing to change their MCS concentration at any time following the initial declaration must meet with the advisor of their intended concentration area to complete a new Declaration form, which will be reviewed during the internal transfer application period.
### Biological Sciences Concentration

(114 units minimum)

#### Biological Sciences Required Courses (11 courses, 96 units minimum)

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>03-201 Undergraduate Colloquium for Sophomores</td>
<td>2</td>
</tr>
<tr>
<td>03-220 Genetics - Fall, Sophomore year</td>
<td>9</td>
</tr>
<tr>
<td>03-231 Honors Biochemistry - Spring, Sophomore year</td>
<td>9</td>
</tr>
<tr>
<td>03-320 Cell Biology - Fall, Junior year</td>
<td>9</td>
</tr>
<tr>
<td>03-343 Environmental Techniques in Molecular Biology - Fall, Junior year</td>
<td>12</td>
</tr>
<tr>
<td>09-106 Modern Chemistry II</td>
<td>10</td>
</tr>
<tr>
<td>09-207 Techniques in Quantitative Analysis</td>
<td>9</td>
</tr>
<tr>
<td>09-208 or 03-344 Experimental Biochemistry or Experimental Cell and Developmental Biology</td>
<td>9</td>
</tr>
<tr>
<td>09-217 Organic Chemistry I</td>
<td>9</td>
</tr>
<tr>
<td>09-218 Organic Chemistry II</td>
<td>9</td>
</tr>
<tr>
<td>33-122 Physics II for Biological Sciences &amp; Chemistry Students</td>
<td>9</td>
</tr>
</tbody>
</table>

#### Biological Sciences Electives (2 courses, 18 units)

One course must be an advanced elective selected from 03-3xx or higher, excluding 03-445 and 03-545.

#### Chemistry Concentration

(121 units minimum)

#### Chemistry Required Courses (14 courses, 103 units)

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>09-106 Modern Chemistry II</td>
<td>10</td>
</tr>
<tr>
<td>09-219 Modern Organic Chemistry</td>
<td>10</td>
</tr>
<tr>
<td>09-220 Modern Organic Chemistry II</td>
<td>10</td>
</tr>
<tr>
<td>09-331 Modern Analytical Instrumentation</td>
<td>9</td>
</tr>
<tr>
<td>09-348 Inorganic Chemistry</td>
<td>10</td>
</tr>
<tr>
<td>09-221 Laboratory I: Introduction to Chemical Analysis</td>
<td>12</td>
</tr>
<tr>
<td>09-222 Laboratory II: Organic Synthesis and Analysis</td>
<td>12</td>
</tr>
<tr>
<td>09-321 Laboratory III: Molecular Design and Synthesis</td>
<td>12</td>
</tr>
<tr>
<td>09-323 or 09-324 Bioinorganic Chemistry Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>09-201-09-202 Undergraduate Seminar I - Undergraduate Seminar II: Safety and Environmental Issues for Chemists - Undergraduate Seminar II</td>
<td>3</td>
</tr>
<tr>
<td>09-402 Undergraduate Seminar VI</td>
<td>3</td>
</tr>
<tr>
<td>33-122 Physics II for Biological Sciences &amp; Chemistry Students</td>
<td>9</td>
</tr>
</tbody>
</table>

Note: Students who have a strong chemistry background, should enroll in 09-107 rather than 09-105. Students who complete 09-107 with an 'A' grade will be exempted from the requirement to take 09-106 Modern Chemistry II.

#### Advanced Chemistry Electives (2 courses, 18 units)

May be any upper level chemistry course, 09-3xx or higher, or Biochemistry I, 03-231 or 03-232, with the exception of 09-435 Independent Study, which can be used only by permission of the Director of Undergraduate Studies.

#### Environmental & Sustainability Studies Concentration

(123 units minimum)

#### Additional Required Courses (2 courses, 18 units minimum)

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>09-217 Organic Chemistry I</td>
<td>9</td>
</tr>
<tr>
<td>33-122 Physics II for Biological Sciences &amp; Chemistry Students</td>
<td>9</td>
</tr>
<tr>
<td>or 33-142 Physics II for Engineering and Physics Students</td>
<td></td>
</tr>
</tbody>
</table>

#### Core Courses (4 courses, 30 units)

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>24/09-291 Environmental Systems on a Changing Planet</td>
<td>9</td>
</tr>
<tr>
<td>24/09-381 Environmental Systems on a Changing Planet: Science &amp; Engineering Addendum</td>
<td>3 (co-req: 24-291/09-291)</td>
</tr>
<tr>
<td>79-336 Introduction to Environmental Ideas</td>
<td>9</td>
</tr>
</tbody>
</table>

#### Earth and Environmental Science (1 course, 9 units)

Choose one course from the list below.

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>03-140 Ecology and Environmental Science</td>
<td>9</td>
</tr>
<tr>
<td>09-225 Climate Change: Chemistry, Physics and Planetary Science</td>
<td>9</td>
</tr>
<tr>
<td>09-510 Chemistry and Sustainability</td>
<td>9</td>
</tr>
<tr>
<td>09-524 Environmental Chemistry</td>
<td>9</td>
</tr>
<tr>
<td>09-529 Introduction to Sustainable Energy Science</td>
<td>9</td>
</tr>
<tr>
<td>33-226 Physics of Energy</td>
<td>9</td>
</tr>
</tbody>
</table>

* Prerequisites from the BSA general education curriculum

#### Global Course (1 course, 3 units)

99-xxx Each semester, a new course is offered on global themes, in partnership with University of Pittsburgh’s Global Studies Center.

#### Statistics and Data Science (1 course, 9 units)

36-xxx Any Statistics Course

#### Political Economy (1 course, 9 units minimum)

Choose one course from the list below.

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>19-101 Introduction to Engineering and Public Policy</td>
<td>12</td>
</tr>
<tr>
<td>79-300 History of American Public Policy</td>
<td>9</td>
</tr>
<tr>
<td>84-110 Foundations of Political Economy</td>
<td>9</td>
</tr>
<tr>
<td>84-313 International Organizations and Law</td>
<td>9</td>
</tr>
<tr>
<td>84-325 Contemporary American Foreign Policy</td>
<td>9</td>
</tr>
<tr>
<td>88-344 Systems Analysis: Environmental Policy</td>
<td>9</td>
</tr>
</tbody>
</table>

#### Electives (5 courses, 45 units minimum)

Choose three MCS Electives and two DC Electives in consultation with the concentration advisor.

#### MCS Electives:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>03-140 Ecology and Environmental Science</td>
<td>9</td>
</tr>
<tr>
<td>09-225 Climate Change: Chemistry, Physics and Planetary Science</td>
<td>9</td>
</tr>
<tr>
<td>09-510 Chemistry and Sustainability</td>
<td>9</td>
</tr>
<tr>
<td>09-524 Environmental Chemistry</td>
<td>9</td>
</tr>
<tr>
<td>09-529 Introduction to Sustainable Energy Science</td>
<td>9</td>
</tr>
<tr>
<td>12-100 Exploring CEE: Infrastructure and Environment in a Changing World</td>
<td>12</td>
</tr>
<tr>
<td>12-201 Geology</td>
<td>9</td>
</tr>
<tr>
<td>19-101 Introduction to Engineering and Public Policy</td>
<td>12</td>
</tr>
<tr>
<td>19-425 Sustainable Energy for the Developing World</td>
<td>9</td>
</tr>
<tr>
<td>24-292 Renewable Energy Engineering</td>
<td>9</td>
</tr>
<tr>
<td>27-505 Exploration of Everyday Materials</td>
<td>9</td>
</tr>
<tr>
<td>33-226 Physics of Energy</td>
<td>9</td>
</tr>
</tbody>
</table>

#### DC Electives:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>76-241 Introduction to Gender Studies</td>
<td>9</td>
</tr>
<tr>
<td>76-291 Getting Heard/Making a Difference</td>
<td>9</td>
</tr>
<tr>
<td>76-354 Watchdog Journalism</td>
<td>9</td>
</tr>
<tr>
<td>76-395 Science Writing</td>
<td>9</td>
</tr>
<tr>
<td>76-450 Law, Culture, and the Humanities</td>
<td>9</td>
</tr>
<tr>
<td>79-201 Introduction to Anthropology</td>
<td>9</td>
</tr>
<tr>
<td>79-275 Introduction to Global Studies</td>
<td>9</td>
</tr>
<tr>
<td>79-278 How (Not) to Change the World</td>
<td>9</td>
</tr>
<tr>
<td>79-288 Bananas, Baseball, and Borders: Latin America and the United States</td>
<td>9</td>
</tr>
<tr>
<td>79-297 Technology and Work</td>
<td>9</td>
</tr>
<tr>
<td>79-331 Body Politics: Women and Health in America</td>
<td>9</td>
</tr>
<tr>
<td>79-372 The Rise and Fall of Pittsburgh Steel</td>
<td>6</td>
</tr>
<tr>
<td>79-377 Food, Culture, and Power: A History of Eating</td>
<td>9</td>
</tr>
<tr>
<td>79-379 Extreme Ethnography</td>
<td>9</td>
</tr>
<tr>
<td>79-383 The History of Capitalism</td>
<td>9</td>
</tr>
<tr>
<td>79-386 A Tale of Two Epidemics: Influenza 1918 and Covid 19</td>
<td>9</td>
</tr>
<tr>
<td>80-135 Introduction to Political Philosophy</td>
<td>9</td>
</tr>
</tbody>
</table>
Physics Concentration (135 units minimum)

One course must be an advanced elective selected from 03-3xx or higher.

Neurobiology Electives (2 courses, 18 units)

Neurobiology Required Courses (12 courses, 96 units)

(114 units minimum)

Mathematical Sciences Concentration

(125 units minimum)

Mathematical Sciences Required Courses (9 courses, 89 units minimum)

(Reasonable substitutions within the core program will be allowed.)

15-110 Principles of Computing 10
21-127 Concepts of Mathematics 12
or 21-128 Mathematical Concepts and Proofs 10
21-228 Discrete Mathematics 9
21-241 Matrices and Linear Transformations 10
or 21-242 Matrix Theory 9
21-259 Calculus in Three Dimensions 9
or 21-268 Multidimensional Calculus 9
21-260 Differential Equations 9
or 21-261 Introduction to Ordinary Differential Equations 10
or 33-231 Physical Analysis 9
21-355 Principles of Real Analysis I 9
21-373 Algebraic Structures 9
33-142 Physics II for Engineering and Physics Students 12
or 33-152 Matter and Interactions II 9

Mathematical Sciences Electives (2 courses, 18 units)

Students with a Music concentration should take 21-469 Computational Introduction to Partial Differential Equations.

Mathematical Sciences, Statistics, or Computer Science Electives (2 courses, 18 units)

May be computer science course above the 100-level, mathematical science courses beyond the calculus sequence, and statistics courses at the level of 36-225 or higher.

Neurobiology Concentration

(114 units minimum)

Neurobiology Required Courses (12 courses, 96 units)

03-161 Molecules to Mind 9
or 85-219 Biological Foundations of Behavior 9
03-201 Undergraduate Colloquium for Sophomores 2
03-220 Genetics - Fall, Sophomore year 9
03-231 Honors Biochemistry - Spring, Sophomore year 9
03-320 Cell Biology - Fall, Junior year 9
03-342 Introduction to Biological Laboratory Practices - Fall, Junior year 1
03-343 Experimental Techniques in Molecular Biology - Fall, Junior year 12
03-362 Cellular Neuroscience 9
03-363 Systems Neuroscience 9
09-217 Organic Chemistry I 9
33-122 Physics II for Biological Sciences & Chemistry Students 9
85-211 Cognitive Psychology 9

Neurobiology Electives (2 courses, 18 units)

One course must be an advanced elective selected from 03-3xx or higher.

Physics Concentration (135 units minimum)

Physics Required Courses (16 courses, 126 units)

21-259 Calculus in Three Dimensions 9
33-104 Experimental Physics 9
33-142 Physics II for Engineering and Physics Students 12
or 33-152 Matter and Interactions II 9
33-201 Physics Sophomore Colloquium I -Fall 2
33-202 Physics Sophomore Colloquium II -Spring 2
33-211 Physics III: Modern Essentials 10
33-228 Electronics I 10
33-231 Physical Analysis 10
33-232 Mathematical Methods of Physics 10
33-234 Quantum Physics 10
33-301 Physics Upperclass Colloquium I -Fall 1
33-302 Physics Upperclass Colloquium II -Spring 1
33-331 Physical Mechanics I 10
33-338 Intermediate Electricity and Magnetism I 10
33-340 Modern Physics Laboratory 10
33-341 Thermal Physics I 10

Qualifying Physics Electives (2 courses, 18 units)

Two 33-xxx qualifying physics elective courses pre-approved by the Physics Department. 33-114 Physics of Musical Sound is highly recommended for students with a Music concentration.

COLLEGE OF FINE ARTS CONCENTRATION

(number of courses vary, 108-114 units minimum)

BSA students choose one of the following concentrations:

• Architecture (108 units)
• Art (114 units)
• Design (108 units)
• Drama (108 units)
• Music (108 units)

Architecture Concentration

(108 units minimum)

Architecture Required Courses (7 courses, 52 units minimum)

48-100 Architecture Design Studio: POIESIS STUDIO 1 - Fall, Freshman or Sophomore year 10-15
or 48-095 Spatial Concepts for Non-Architecture Majors 9
62-122 Digital Media I -Fall, Freshman year 6
62-125 Drawing I -Fall, Freshman year 6
62-126 Drawing II -Spring, Freshman year 6
48-240 History of World Architecture, I -Spring, Freshman year 9
48-241 Modern Architecture -Fall, Sophomore year 9

Architecture Electives (56 units minimum)

A minimum of 56 additional Architecture units must be approved by the Architecture advisor. A list of these selected courses must be filed in the BXA office.

Art Concentration

(114 units minimum)

First-Year Seminar (1 course, 6 units)

60-104 Foundations: Art First-Year Seminar 6

Foundation Studios (3 courses, 30 units)

Complete three courses:

60-110 Foundations: Time-Based Media 10
60-120 Foundations: Digital Media 10
60-131 Foundations: Sculpture 10
60-135 Foundations: Expanded Media Sculpture 10
60-150 Foundations: Drawing 10
60-170 Foundations: Print/Print 10

Intermediate Studios (3 courses, 30 units)

Complete three courses:

60-2xx Intermediate Studio Elective 10
60-2xx Intermediate Studio Elective 10
60-2xx Intermediate Studio Elective 10

Advanced Studios (3 courses, 30 units)

Students may take courses in any media area (ETB, SIS, CP or DP3). They may take all courses in one media area if a focus is desired. With approval
from the Art advisor, BXA students can take an additional intermediate studio in lieu of an advanced studio to increase breadth.

Complete three courses:
- 60-401/402 Senior Studio 10
- 60-403 Senior Critique Seminar 10
- Advanced Electronic and Time-Based Work (ETB) (course numbers 60-410 through 60-429)
- Advanced Sculpture, Installation and Site-Work (SIS) (course numbers 60-430 through 60-448)
- Advanced Contextual Practice (CP) (course numbers 60-448 through 60-449)
- Advanced Drawing, Painting, Print Media and Photography (DP3) (course numbers 60-450 through 60-498)
- 60-499 Studio Independent Study 10

(108 units minimum)

* Courses offered intermittently; speak with a BXA advisor to determine course availability.

Critical Studies (2 courses, 18 units)
- 60-105 Cultural History of the Visual Arts -Spring 9
- 60-3xx Critical Studies Elective 9

Review Requirement (2 required reviews, 0 units)
A review is required at the end of the sophomore and senior years. Pass/no pass only.
- 60-200 Sophomore Review -Spring 0
- 60-400 Senior Review -Spring 0

Design Concentration
(108 units minimum)

Design Required Courses (16 courses, 98 units)
- 51-101 Studio: Survey of Design -Fall, First-year 10
- 51-121 Visualizing -Fall, First-year 10
- 51-175 Design Studies: Place -Fall, First-year (mini-1) 5
- 51-177 Design Studies: Histories -Fall, First-year (mini-2) 5
- 51-102 Design Lab -Spring, First-year 10
- 51-122 Collaborative Visualizing -Spring, First-year 10
- 51-176 Design Studies: Futures -Spring, First-year (mini-3) 5
- 51-178 Design Studies: Experience -Spring, First-year (mini-4) 5
- 51-277 Design Studies: Systems -Fall, Sophomore year (mini-1) 5
- 51-279 Design Studies: Cultures -Fall, Sophomore year (mini-2) 5
- 51-282 Design Studies: Persuasion -Spring, Sophomore year (mini-3) 5
- 51-284 Design Studies: Power -Spring, Sophomore year (mini-4) 5

Choose Two Studios -Fall, Sophomore year: 4.5+4.5
- 51-225 Communications Studio I: Understanding Form & Context
- or 51-245 Products Studio I: Understanding Form & Context
- or 51-265 Environments Studio I: Understanding Form & Context

Choose Two Corresponding Labs -Fall, Sophomore year: 4.5+4.5
- 51-227 Prototyping Lab I: Communications
- or 51-247 Prototyping Lab I: Products
- or 51-267 Prototyping Lab I: Environments

Design Electives (10 units)
A minimum of 10 additional Design units must be approved by the Design advisor. A list of these selected courses must be filed in the BXA office.

Drama Concentration
(108 units minimum)
Options available in the following areas: 1) Design, 2) Directing, 3) Dramaturgy, 4) Production Technology and Management

Required Courses for All Concentration Options (5 courses, 20 units)
- 54-175-54-176 Conservatory Hour-Conservatory Hour 2 (1 unit each)
- 54-177 Foundations of Drama I 6
- 54-281 Foundations of Drama II (prerequisite: 54-177) 6
- 54-381 Special Topics in Drama: History, Literature and Criticism 6
- 54-362 Anti-Racist & Equitable Practices in Theater (optional) 6

Work with Drama Faculty Option Coordinator to Approve Concentration Option (88 units minimum).

Design Required Courses (2 courses, 26 units)
- 54-151-54-152 Stagecraft-Stagecraft (13 units + 13 units)

A minimum of 62 additional Design units must be approved by the Design faculty option coordinator. A list of these selected courses must be filed in the BXA office.

Directing Required Courses (10 courses, 64 units)
- 54-121-54-122 Directing I: A Director's Mindset - Directing I: A Director's Preparation 18
- 54-221-54-222 Directing II: In the Studio - Directing II: In The Room 18
- 54-159-54-159 Production Practicum-Production Practicum (two times) 12
- 54-517 Director's Colloquium (four times) 16

A minimum of 24 additional Directing units must be approved by the Directing faculty option coordinator. A list of these selected courses must be filed in the BXA office.

Dramaturgy Required Courses (9 courses, 53 units minimum)
- 54-109 Dramaturgy 1: Approaches to Text 9
- 54-184 Dramaturgy 2: Introduction to Production and Dramaturgy 9
- 54-121 Directing I: A Director's Mindset 9
- 54-159-54-159 Production Practicum-Production Practicum (two times) 12
- 54-200-54-200 Dramaturgy Forum-Dramaturgy Forum -Fall (minimum of two; every semester it is offered while enrolled) 2
- 54-xxx Dramaturgy 3, 4, 5 or 6 (minimum of two; all four if enrolled as BXA for six semesters or more) 18

A minimum of 29 additional Dramaturgy units must be approved by the Dramaturgy faculty option coordinator. A list of these selected courses must be filed in the BXA office.

Production Technology and Management Required Courses (2 courses, 26 units)
- 54-151-54-152 Stagecraft-Stagecraft (13 units + 13 units)

A minimum of 62 additional PTM units must be approved by the PTM faculty option coordinator. A list of these selected courses must be filed in the BXA office.

Music Concentration
(108 units minimum)
Options available in the following areas: 1) Audio Recording & Production, 2) Composition, 2) Music Performance (instrumental, organ, piano, voice), 4) Sound Theory & Practice

Required Course for All Concentration Options (1 course, 9 units)
- 57-152 Harmony I 9
- or 57-149 Basic Harmony I

Work with Music Advisor to Approve Concentration Option (99 units minimum).
Audio Recording & Production Required Courses (7 courses, 40 units)

57-101 Introduction to Music Technology 6
or 57-171 Introduction to Music Technology (self-paced)
57-181 Solfege I 3
or 57-180 Basic Solfege I
or 57-185 Advanced Solfege I
57-173 Survey of Western Music History 9
(co-requisite: 57-188)
57-188 Repertoire and Listening for Musicians 1
57-337 Sound Recording 6
57-338 Sound Editing and Mastering 6
57-438 Multitrack Recording 9

Choose 59 units from:

57-153 Harmony II 9
or 57-150 Basic Harmony II
57-182 Solfege II 3
or 57-186 Advanced Solfege II
15-104 Introduction to Computing for Creative Practice 10
15-322 Introduction to Computer Music 9
18-090 Twisted Signals: Multimedia Processing for the Arts 10

33-114 Physics of Musical Sound 9
54-166 Introduction to Sound Design for Theatre 6
54-275 History of Sound Design 3
54-666 Production Audio 6
57-161 Eurhythmics I 3
57-344 Experimental Sound Synthesis 9
57-358 Introduction to Electronic Music 9
(with instructor permission as space allows)
57-421 Exploded Ensemble 6
57-427 Advanced Seminar in Film Musicology 9
57-478 Survey of Historical Recording 6
57-622 Independent Study in Sound Recording Production 3
60-131 Foundations: Sculpture 10
60-210 Electronic Media Studio: Introduction to Interactivity 10

Note: Students completing an IDeATe minor may double-count up to two of the IDeATe minor courses towards the Audio Recording & Production concentration.

Composition Required Courses (12 courses, 76 units)

57-161 Eurhythmics I 3
(recommended co-requisite: 57-181)
57-181 Solfege I 3
or 57-180 Basic Solfege I
or 57-185 Advanced Solfege I
57-173 Survey of Western Music History 9
(co-requisite: 57-188)
57-188 Repertoire and Listening for Musicians 1
57-49x BXA Studio (4 semesters) 36
57-xxx Major Ensemble (4 semesters) 24

A minimum of 23 additional Music units must be approved by the Music advisor. A list of these selected courses must be filed in the BXA office.

Music Performance Required Courses (12 courses, 76 units)

57-161 Eurhythmics I 3
(recommended co-requisite: 57-181)
57-181 Solfege I 3
or 57-180 Basic Solfege I
or 57-185 Advanced Solfege I
57-173 Survey of Western Music History 9
(co-requisite: 57-188)
57-188 Repertoire and Listening for Musicians 1
57-49x BXA Studio (4 semesters) 36
57-xxx Major Ensemble (4 semesters) 24

A minimum of 23 additional Music units must be approved by the Music advisor. A list of these selected courses must be filed in the BXA office.

Sound Theory & Practice Required Courses (7 courses, 47 units)

57-101 Introduction to Music Technology 6
or 57-171 Introduction to Music Technology (self-paced)
57-181 Solfege I 3
or 57-180 Basic Solfege I
or 57-185 Advanced Solfege I
57-173 Survey of Western Music History 9
(co-requisite: 57-188)
57-188 Repertoire and Listening for Musicians 1
18-090 Twisted Signals: Multimedia Processing for the Arts 10
57-911 Music Since 1945 9
57-616 Independent Study in Sound Studies 9

Choose 52 units from:

57-153 Harmony II 9
or 57-150 Basic Harmony II
57-182 Solfege II 3
or 57-186 Advanced Solfege II
15-104 Introduction to Computing for Creative Practice 10
15-322 Introduction to Computer Music 9
(pre-requisite: 15-112)
33-114 Physics of Musical Sound 9
(prerequisite: 15-112)
57-337 Sound Recording 6
57-343 Music, Technology, and Culture 9
57-344 Experimental Sound Synthesis 9
57-347 Electronic and Computer Music 9
(prerequisite: 57-101 or 57-171)
57-358 Introduction to Electronic Music 9
(with instructor permission as space allows)
57-421 Exploded Ensemble 6
57-438 Multitrack Recording 9
57-478 Survey of Historical Recording 6
60-131 Foundations: Sculpture 10
60-210 Electronic Media Studio: Introduction to Interactivity 10

Note: Students completing an IDeATe minor may double-count up to two of the IDeATe minor courses towards the Sound Theory & Practice concentration.

Free Electives
(approximately 0-3 courses, 0-29 units)
Take any Carnegie Mellon course. A maximum of 9 units of physical education and/or military science may be counted toward this requirement. Physical education and military science courses will not be calculated in a student’s QPA.

Engineering and Arts Additional Major

The Engineering and Arts (EA) additional major combines the strengths of the College of Fine Arts (CFA) and the College of Engineering (ENG). This additional major provides students with formal practice and training in the creative arts that is more robust than a minor, as well as the foundation of interdisciplinary research to accomplish the integration of their interests. Students who currently have a primary major in engineering, choose their arts concentration from the following schools in CFA: Architecture, Art, Drama or Music.

The EA curriculum has two main components: BXA requirements and fine arts concentration requirements. Each student’s course of study is structured so it can be completed alongside their primary engineering major.

Students receive extensive advising support. The academic advisors in the BXA Intercollege Degree Programs are the advisors and liaisons between CFA and Engineering. Each student has two additional academic advisors: an advisor in the admitting school of CFA to guide their focus in the arts and their primary advisor in Engineering to guide their full major in engineering.
### EA Curriculum

<table>
<thead>
<tr>
<th></th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. BXA Requirements</strong></td>
<td>36</td>
</tr>
<tr>
<td><strong>II. CFA Concentration</strong></td>
<td>108-114</td>
</tr>
<tr>
<td><strong>Total EA Additional Major Requirements</strong></td>
<td>144-150</td>
</tr>
</tbody>
</table>

### BXA Requirements

**BXA Required Courses (5 courses, 36 units)**

BXA-specific courses give students the opportunity to integrate their areas of concentration by focusing on interdisciplinary approaches and arts-based research techniques.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>52-190</td>
<td>BXA Seminar I: Building the Wunderkammer - Spring, Freshman (mini-4)</td>
<td>4.5</td>
</tr>
<tr>
<td>52-291</td>
<td>BXA Seminar II: Transferring Knowledge -Spring, Sophomore (mini-3)</td>
<td>4.5</td>
</tr>
<tr>
<td>52-392</td>
<td>BXA Seminar III: Deconstructing Disciplines</td>
<td>9</td>
</tr>
<tr>
<td>52-401</td>
<td>BXA Seminar IV: Capstone Project Research</td>
<td>9</td>
</tr>
<tr>
<td>52-402</td>
<td>BXA Seminar V: Capstone Project Production</td>
<td>9</td>
</tr>
</tbody>
</table>

### COLLEGE OF FINE ARTS CONCENTRATION

*(number of courses vary, 108-114 units minimum)*

EA students choose one of the following concentrations:

- Architecture (108 units)
- Art (114 units)
- Drama (108 units)
- Music (108 units)

#### Architecture Concentration

*(108 units minimum)*

**Architecture Required Courses (7 courses, 52 units minimum)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>48-100</td>
<td>Architecture Design Studio: POIESIS STUDIO 1 - Fall, Freshman or Sophomore year</td>
<td>10-15</td>
</tr>
<tr>
<td>or 48-095</td>
<td>Spatial Concepts for Non-Architecture Majors</td>
<td></td>
</tr>
<tr>
<td>62-122</td>
<td>Digital Media I -Fall, Freshman year</td>
<td>6</td>
</tr>
<tr>
<td>62-125</td>
<td>Drawing I -Fall, Freshman year</td>
<td>6</td>
</tr>
<tr>
<td>62-123</td>
<td>Digital Media II -Spring, Freshman year</td>
<td>6</td>
</tr>
<tr>
<td>62-126</td>
<td>Drawing II -Spring, Freshman year</td>
<td>6</td>
</tr>
<tr>
<td>48-240</td>
<td>History of World Architecture, I -Spring, Freshman year</td>
<td>9</td>
</tr>
<tr>
<td>48-241</td>
<td>Modern Architecture -Fall, Sophomore year</td>
<td>9</td>
</tr>
</tbody>
</table>

**Architecture Electives (56 units minimum)**

A minimum of 56 additional Architecture units must be approved by the Architecture advisor. A list of these selected courses must be filed in the BXA office.

**Art Concentration**

*(114 units minimum)*

**First-Year Seminar (1 course, 6 units)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>60-104</td>
<td>Foundations: Art First-Year Seminar</td>
<td>6</td>
</tr>
</tbody>
</table>

**Foundation Studios (3 courses, 30 units)**

Complete three courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>60-110</td>
<td>Foundations: Time-Based Media</td>
<td>10</td>
</tr>
<tr>
<td>60-120</td>
<td>Foundations: Digital Media</td>
<td>10</td>
</tr>
<tr>
<td>60-131</td>
<td>Foundations: Sculpture</td>
<td>10</td>
</tr>
<tr>
<td>60-135</td>
<td>Foundations: Expanded Media Sculpture</td>
<td>10</td>
</tr>
<tr>
<td>60-150</td>
<td>Foundations: Drawing</td>
<td>10</td>
</tr>
<tr>
<td>60-170</td>
<td>Foundations: Print/Print</td>
<td>10</td>
</tr>
</tbody>
</table>

**Intermediate Studios (3 courses, 30 units)**

Complete three courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>60-2xx</td>
<td>Intermediate Studio Elective</td>
<td>10</td>
</tr>
<tr>
<td>60-2xx</td>
<td>Intermediate Studio Elective</td>
<td>10</td>
</tr>
<tr>
<td>60-2xx</td>
<td>Intermediate Studio Elective</td>
<td>10</td>
</tr>
</tbody>
</table>

**Advanced Studios (3 courses, 30 units)**

Students may take courses in any media area (ETB, SIS, CP or DP3). They may take all courses in one media area if a focus is desired. With approval from the Art advisor, BXA students can take an additional intermediate studio in lieu of an advanced studio to increase breadth.

Complete three courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>60-401/402</td>
<td>Senior Studio</td>
<td>10</td>
</tr>
<tr>
<td>60-403</td>
<td>Senior Critique Seminar</td>
<td>10</td>
</tr>
<tr>
<td>60-410 through 60-429</td>
<td>Advanced Electronic and Time-Based Work (ETB) (course numbers 60-410 through 60-429)</td>
<td>10</td>
</tr>
<tr>
<td>60-430 through 60-447</td>
<td>Advanced Sculpture, Installation and Site-Work (SIS) (course numbers 60-430 through 60-447)</td>
<td>10</td>
</tr>
<tr>
<td>60-448 through 60-449</td>
<td>Advanced Contextual Practice (CP) (course numbers 60-448 through 60-449)</td>
<td>10</td>
</tr>
<tr>
<td>60-498</td>
<td>Studio Independent Study</td>
<td>10</td>
</tr>
</tbody>
</table>

*Courses offered intermittently; speak with a BXA advisor to determine course availability.

#### Critical Studies (2 courses, 18 units)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>60-105</td>
<td>Cultural History of the Visual Arts -Spring</td>
<td>9</td>
</tr>
<tr>
<td>60-3xx</td>
<td>Critical Studies Elective</td>
<td>9</td>
</tr>
</tbody>
</table>

#### Review Requirement (2 required reviews, 0 units)

A review is required at the end of the sophomore and senior years. Pass/no pass only.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>60-200</td>
<td>Sophomore Review -Spring</td>
<td>0</td>
</tr>
<tr>
<td>60-400</td>
<td>Senior Review -Spring</td>
<td>0</td>
</tr>
</tbody>
</table>

#### Drama Concentration

*(108 units minimum)*

Options available in the following areas: 1) Design, 2) Directing, 3) Dramaturgy, 4) Production Technology and Management

**Required Courses for All Concentration Options (5 courses, 20 units)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>54-175-54-176</td>
<td>Conservatory Hour-Conservatory Hour (1 unit each)</td>
<td>2</td>
</tr>
<tr>
<td>54-177</td>
<td>Foundations of Drama I</td>
<td>6</td>
</tr>
<tr>
<td>54-201</td>
<td>Foundations of Drama II</td>
<td>6</td>
</tr>
<tr>
<td>(prerequisite: 54-177)</td>
<td>Special Topics in Drama: History, Literature and Criticism</td>
<td>6</td>
</tr>
<tr>
<td>54-362</td>
<td>Anti-Racist &amp; Equitable Practices in Theater</td>
<td>6</td>
</tr>
</tbody>
</table>

*Work with Drama Faculty Option Coordinator to Approve Concentration Option (88 units minimum).*

**Design Required Courses (2 courses, 26 units)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>54-151-54-152</td>
<td>Stagecraft-Stagecraft (13 units + 13 units)</td>
<td>26</td>
</tr>
</tbody>
</table>

A minimum of 62 additional Design units must be approved by the Design faculty option coordinator. A list of these selected courses must be filed in the BXA office.

**Directing Required Courses (10 courses, 64 units)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>54-121-54-122</td>
<td>Directing I: A Director's Mindset - Directing I: A Director's Preparation</td>
<td>18</td>
</tr>
<tr>
<td>54-221-54-222</td>
<td>Directing II: In the Studio - Directing II: In The Room</td>
<td>18</td>
</tr>
<tr>
<td>54-159-54-159</td>
<td>Production Practicum-Production Practicum (two times)</td>
<td>12</td>
</tr>
<tr>
<td>54-517</td>
<td>Director's Colloquium (four times)</td>
<td>16</td>
</tr>
</tbody>
</table>
A minimum of 24 additional Directing units must be approved by the Directing faculty option coordinator. A list of these selected courses must be filed in the BXA office.

**Dramaturgy Required Courses (9 courses, 53 units minimum)**

- 54-109 Dramaturgy 1: Approaches to Text 9
- 54-184 Dramaturgy 2: Introduction to Production 9
- 54-121 Directing I: A Director's Mindset 9
- 54-159-54-159 Production Practicum-Production Practicum (two times) 12
- 54-200-54-200 Dramaturgy Forum-Dramaturgy Forum -Fail (minimum of two; every semester it is offered while enrolled) 2
- 54-xxx Dramaturgy 3, 4, 5 or 6 (minimum of two; all four if enrolled as BXA for six semesters or more) 18

A minimum of 29 additional Dramaturgy units must be approved by the Dramaturgy faculty option coordinator. A list of these selected courses must be filed in the BXA office.

**Production Technology and Management Required Courses (2 courses, 26 units)**

- 54-151-54-152 Stagecraft-Stagecraft (13 units + 13 units) 26

A minimum of 62 additional PTM units must be approved by the PTM faculty option coordinator. A list of these selected courses must be filed in the BXA office.

**Music Concentration (108 units minimum)**

Options available in the following areas: 1) Audio Recording & Production, 2) Composition, 2) Music Performance (instrumental, organ, piano, voice), 4) Sound Theory & Practice

**Required Course for All Concentration Options (1 course, 9 units)**

- 57-152 Harmony I 9
  or 57-149 Basic Harmony I

Work with Music Advisor to Approve Concentration Option (99 units minimum).

**Audio Recording & Production Required Courses (7 courses, 40 units)**

- 57-101 Introduction to Music Technology 6
  or 57-171 Introduction to Music Technology (self-paced)
- 57-181 Solfege I 3
  or 57-180 Basic Solfege I
  or 57-185 Advanced Solfege I
- 57-173 Survey of Western Music History (co-requisite: 57-188) 9
- 57-188 Repertoire and Listening for Musicians 1
- 57-337 Sound Recording 6
- 57-338 Sound Editing and Mastering 6
- 57-438 Multitrack Recording 9

Choose 59 units from:

- 57-153 Harmony II 9
  or 57-150 Basic Harmony II
- 57-182 Solfege II 3
  or 57-186 Advanced Solfege II
- 15-104 Introduction to Computing for Creative Practice 10
- 15-322 Introduction to Computer Music 9
- 18-090 Twisted Signals: Multimedia Processing for the Arts 10
- 33-114 Physics of Musical Sound 9
- 54-166 Introduction to Sound Design for Theatre 6
- 54-275 History of Sound Design 6
- 54-666 Production Audio 6
- 57-161 Eurhythmics I 3
- 57-344 Experimental Sound Synthesis 9
- 57-358 Introduction to Electronic Music (with instructor permission as space allows) 9
- 57-421 Exploded Ensemble 6

- 57-427 Advanced Seminar in Film Musicology 9
- 57-478 Survey of Historical Recording 6
- 57-622 Independent Study in Sound Recording Production 3
- 60-131 Foundations: Sculpture 10
- 60-210 Electronic Media Studio: Introduction to Interactivity 10

Note: Students completing an IDeATe minor may double-count up to two of the IDeATe minor courses towards the Audio Recording & Production concentration.

**Composition Required Courses (12 courses, 76 units)**

- 57-161 Eurhythmics I (recommended co-requisite: 57-181) 3
- 57-181 Solfege I 3
  or 57-180 Basic Solfege I
  or 57-185 Advanced Solfege I
- 57-173 Survey of Western Music History (co-requisite: 57-188) 9
- 57-188 Repertoire and Listening for Musicians 1
- 57-49x BXA Studio (4 semesters) 36
- 57-xxx Major Ensemble (4 semesters) 24

A minimum of 23 additional Music units must be approved by the Music advisor. A list of these selected courses must be filed in the BXA office.

**Music Performance Required Courses (12 courses, 76 units)**

- 57-161 Eurhythmics I (recommended co-requisite: 57-181) 3
- 57-181 Solfege I 3
  or 57-180 Basic Solfege I
  or 57-185 Advanced Solfege I
- 57-173 Survey of Western Music History (co-requisite: 57-188) 9
- 57-188 Repertoire and Listening for Musicians 1
- 57-49x BXA Studio (4 semesters) 36
- 57-xxx Major Ensemble (4 semesters) 24

A minimum of 23 additional Music units must be approved by the Music advisor. A list of these selected courses must be filed in the BXA office.

**Sound Theory & Practice Required Courses (7 courses, 47 units)**

- 57-101 Introduction to Music Technology 6
  or 57-171 Introduction to Music Technology (self-paced)
- 57-181 Solfege I 3
  or 57-180 Basic Solfege I
  or 57-185 Advanced Solfege I
- 57-173 Survey of Western Music History (co-requisite: 57-188) 9
- 57-188 Repertoire and Listening for Musicians 1
- 18-090 Twisted Signals: Multimedia Processing for the Arts 10
- 57-911 Music Since 1945 9
- 57-616 Independent Study in Sound Studies 9

Choose 52 units from:

- 57-153 Harmony II 9
  or 57-150 Basic Harmony II
- 57-182 Solfege II 3
  or 57-186 Advanced Solfege II
- 15-104 Introduction to Computing for Creative Practice 10
- 15-322 Introduction to Computer Music (pre-requisite: 15-112) 9
- 33-114 Physics of Musical Sound (prerequisite: 15-112) 9
- 57-337 Sound Recording 6
- 57-343 Music, Technology, and Culture 9
- 57-344 Experimental Sound Synthesis 9
- 57-347 Electronic and Computer Music (prerequisite: 57-101 or 57-171) 6
- 57-358 Introduction to Electronic Music (with instructor permission as space allows) 9
- 57-421 Exploded Ensemble 6
Academic Standards and Actions

The College of Fine Arts reviews every CFA student’s academic performance and progress towards graduation at the end of each semester. If a student’s academic record falls below the standards outlined in their student handbook, they receive an academic action. These actions are designed to notify the student of specific academic and graduation requirements, outline goals for completion, and identify avenues of support to help them succeed.

A student who is not making satisfactory progress toward meeting course standards, or toward completing graduation requirements in their declared degree path, will receive an academic action. Each academic action will be reviewed by the relevant school’s appointed reviewers and then confirmed by the CFA Academic Advisory Committee, which makes the final decision. The CFA Dean’s office will disseminate the academic action letters directly to the students and their advisors via their CMU email.

Actions are assigned based on the most recent semester under review but include a cumulative review of a student’s performance to date. The actions listed below may be given out of sequence, if a student meets the listed criteria.

Incomplete grades will be conditionally actioned by the default grades until the student completes the missing coursework. If the student does not complete their missing coursework by the faculty deadline agreed upon, their default grade and action will become permanent.

In order to support academic success, a student placed on an escalated academic action (probation and final probation) is not permitted to overload, undertake independent studies, or study abroad until they return to good standing. (See school/program handbook for specifics.)

Warning

A Warning notifies the student of unsatisfactory performance and suggests that the student take steps to determine and correct the cause of the difficulty. Warnings are issued when one or more of the listed criteria are met within the semester under review:

- Receiving an R, D, N, or W in one elective or general education course;
- Failure to complete the semester’s coursework as required by the student’s major curriculum (one course);
- Failure to earn the minimum 2.00 quality point average.

If the student meets new actionable criteria in the following semesters, they may be assigned an escalated academic action.

Probation

Probation notifies the student of severe and/or continuous performance issues and suggests that the student take immediate steps to correct the cause of the difficulty. A previous action is not required. A student will be placed on Probation for failure to meet the academic and professional standards of their program including:

- Receiving one or more R, D, N, or W grades(s) in a required major course(s);
• Receive a C or better in all courses in the next semester;
• Complete required courses within the defined school timeline;
• Have a minimum of 2.00 GPA.

If the student does not meet these standards, they may be considered for an Academic Drop.

A student who has been suspended from the university is required to leave the campus, including residence halls and fraternity/sorority houses, within a maximum of two days after the action and to remain off the campus for the duration of the time specified in the suspension letter. In addition, the student may not:
• register for courses at Carnegie Mellon
• attend classes
• live in residence halls or fraternity/sorority housing
• use campus facilities, including athletic facilities, library and computer clusters
• participate in student activities
• be members of student organizations
• have student jobs

(Note: students on academic suspension may still be eligible for a summer campus job if they accepted the job before they were suspended.) Go to the university policy webpage on student life for more information on a University Suspension: https://www.cmu.edu/policies/student-and-student-life/suspension-required-withdrawal-policy.html

Academic Drop

Students receive an Academic Drop from their School only when the student’s academic progress is insufficient to warrant continuing in the current professional field of study. This action terminates the student’s enrollment in their current School/Program but is not intended to prejudice admission to another academic program within Carnegie Mellon University, or to another institution. Once a student receives an Academic Drop they may choose to:
1. Transfer to another CMU Department or School. Noting that the student must successfully transfer prior to resuming study at Carnegie Mellon.
2. Withdraw from Carnegie Mellon University. A link to the application for Withdrawal/Leave of Absence form is embedded with the letter notifying the student of this academic action, and is also available at https://www.cmu.edu/hub/.

Appeal of Academic Action

Students have the right to appeal academic actions. If a student believes an academic action is inconsistent with BXA policies or merits additional review, a student should submit a formal written appeal, as specified in the initial academic action letter, to the associate/dean listed below, with a copy to the deans of both CFA and their academic college. Appeals should include all relevant materials to substantiate their case and support their concerns.

A student may appeal to the relevant assistant/associate dean within seven days from the date of their academic action letter. All appeals should be in written form, under three pages in length (not including appendices) and authored by the student.

BCSA Appeals should be addressed to:
Kristen Letts Kovak, Senior Associate Dean for Academics, College of Fine Arts

Guy Billich, Associate Dean for Undergraduate Education, Computer Science Department

BESA Appeals should be addressed to:
Kristen Letts Kovak, Senior Associate Dean for Academics, College of Fine Arts

Conrad Zapanta, Associate Dean for Undergraduate Studies, College of Engineering

BHA Appeals should be addressed to:
Kristen Letts Kovak, Senior Associate Dean for Academics, College of Fine Arts

Kell Maxwell, Associate Dean of Student Success, Dietrich College of Humanities and Social Sciences

BSA Appeals should be addressed to:
Kristen Letts Kovak, Senior Associate Dean for Academics, College of Fine Arts

Maggie Braun, Associate Dean for Undergraduate Affairs, Mellon College of Science

If, after carrying out the steps of the process described above, the student believes that the matter has not been adequately resolved, or if no decision has been rendered by the appropriate date, the student may appeal at the university level. To appeal at the university level, the student must present copies of all previously submitted documents and a formal letter of appeal to the provost. The provost or another designated university officer will respond in writing with a final resolution, including the basis for it, within thirty (30) days when possible.

Disabilities

Students with a learning disability or a physical disability are encouraged to email access@andrew.cmu.edu. The circumstances will remain confidential to the extent desired. The university has a formal procedure for documenting disabilities, notifying advisors and faculty, and making arrangements to utilize university resources in support of expressed needs, but will take no action until contacted by the student. The BXA academic advisors will work with the student to coordinate assistance. Please note that requests for accommodations are not retroactive; you must ask that accommodation requests be put in place before you anticipate needing them.

Grading Policies

University grading policies may vary depending on the particular school/department. Please consult the Undergraduate Academic Regulations (http://coursecatalog.web.cmu.edu/servicesandoptions/undergraduateacademicregulations/).

Intercollege Deans’ List

Students who earn 36 graded units (no “pass/no pass” grades) with a grade point average of 3.5 or higher, no “incompletes” and “no grades” qualify for BCSA, BESA, BHA or BSA Deans’ List. The BXA Intercollege Deans’ List Honors are posted online each semester.

Intercollege Honors

BXA students who successfully complete a BXA Capstone Project under the guidance of a faculty member will graduate with BCSA, BESA, BHA, BSA or EA Intercollge Honors if all of the following conditions are met:
• grade of “A” achieved in 62-401 and 62-402;
• overall QPA of 3.25 or higher;
• research results presented at Meeting of the Minds Undergraduate Research Symposium.

As a citizen of two colleges, a BXA student also has the opportunity to graduate with CFA College Honors, DC College Honors, ENG College Honors, MCS College Honors and SCS College Honors. These particular honors are defined by each college. BXA students will receive honors color cords during Commencement Weekend.

University Honors

Students who graduate with an overall QPA of 3.5 or higher will graduate with University Honors. Students will receive an honors medallion during Commencement Weekend.

Internal Transfer/Additional Major Process

For current Carnegie Mellon students who wish to apply to a BXA program, an internal transfer and additional major (EA) application process takes place in both the fall and spring semester. Applications are available online and are reviewed by a committee of BCSA, BESA, BHA, BSA and EA advisors in October and in March. However, certain concentrations consider applications only once a year; please consult with a BXA advisor for guidance on scheduling your application.

All students applying for internal transfer should meet with their current advisor, a BXA advisor and an advisor in their target area, as well as take preliminary coursework in their target area and complete their first semester before applying. For all concentrations, there are required courses that must be taken before an application will be considered; please consult with a BXA advisor for guidance on scheduling these courses.

Current BXA students who wish to change their BXA program (e.g. BHA to BCSA) or change their CFA concentration (e.g. BHA architecture to BHA art) or delineated options within CFA concentrations (e.g. music performance to music composition) must apply for that change through the internal transfer process. Current BESA, BHA and BSA students who wish to change their academic college concentration after declaring (e.g. BHA creative writing to BHA psychology, BSA physics to BSA mathematical sciences) or delineated options within their academic college concentration (e.g. BESA
Students must have prior approval to transfer courses from their BXA major to BCSA. Some departments may not accept transfer credit from online courses. Individual departments may impose stricter limits regarding the number or type of courses students propose to take elsewhere to fulfill requirements. To receive permission, students must work with their study abroad advisor and your BXA advisor to plan the most appropriate courses.

Study Abroad

Studying abroad is encouraged to broaden BXA students’ interdisciplinary experiences through traditional and non-traditional study abroad, from coursework and artistic studios to for-credit internships, volunteer service and research opportunities. Courses taken while studying abroad may count toward your BXA concentration requirements, your general education requirements or your free electives. Studying abroad should not delay your graduation, as long as you work with your study abroad advisor and your BXA advisor to plan the most appropriate courses.

The timing and length of program are important considerations while planning. Due to required BXA coursework, students should avoid studying abroad in their last three semesters (junior spring, senior fall/spring). Spending an entire year abroad is not typically possible for BXA students without intending to take an additional semester at Carnegie Mellon. Many students study abroad during the spring of their sophomore year or the fall semester of their junior year, as well during the summer, and over winter and spring breaks. Talk to your BXA academic advisor early in your academic career to identify the best time for study abroad.

When studying abroad, students are still enrolled at Carnegie Mellon. A student never takes a leave of absence to study abroad. Prior to studying abroad, all students must attend a required pre-departure orientation offered by the Office of International Education (OIE).

Students must also complete a Study Abroad Transfer Credit (SATC) form prior to departure for study abroad, which must be signed after completion by the BXA advisor. The SATC will guarantee transfer credit for courses taken abroad, and is filled out by the corresponding departments to the coursework being transferred. Unlike regular transfer credit, there is no limit to the number of courses transferable from study abroad, but there may exist stricter limits on the use of coursework to fulfill concentration or general education requirements.

Students will receive credit for courses for which they receive a grade of “C” or better. However, grades received abroad do not count toward a student’s Carnegie Mellon University QPA.

Transfer Credit

Once a BXA student enrolls at Carnegie Mellon University as a degree candidate, they may transfer a maximum of five courses from another institution (excepting official study abroad programs through the CMU Office of International Education) for credit towards their BXA degree. This applies to courses taken at other institutions in the United States, as well as courses taken internationally in the student’s home country.

Individual departments may impose stricter limits regarding the number or type of courses students propose to take elsewhere to fulfill requirements. Some departments may not accept transfer credit from online courses.

Students must have prior approval to transfer courses from their BXA advisor, as well as concentration advisors, to use coursework towards requirements. To receive permission, students must provide course information (syllabi) to the corresponding department for evaluation of appropriate credit. When the course is finished, official transcripts must be sent to Carnegie Mellon University before credit will be recorded.

Transfer courses must be taken for a letter grade and students must earn a C (2.00) or above (B or above at a community college). Transfer credit is not factored into a student’s CMU QPA.

The following courses must be taken at CMU and cannot be transferred in:

- First-Year Writing Requirement Course (76-101, 76-102, 76-106/7/8)
- Reflecting: Societies and Cultures (79-104, 79-145, 79-189)
- 36-200: Statistical Reasoning (AP credit only)
- 99-101: Computing @ Carnegie Mellon

Students currently on university suspension are permitted to take no more than three courses per semester at another institution and no more than a total of five courses.