INFORMATION SCIENCE (BS)

College of Agriculture and Life Sciences

Program Website (https://cals.cornell.edu/education/degrees-programs/information-science-major/)

CIP: 11.0401 | **HEGIS:** 0702.00 | **NYSED:** 28345

Program Description

Information Science is fundamentally concerned with the human-centered aspects of computing and information—ranging from how individuals interact with computing devices, to studying people through their social and information network use, and understanding the way computing systems affect our society and culture.

Who should major in Information Science?

Students interested in the human-centered aspects of computing and information, such as algorithmic fairness; ethics, law, and policy; computational social science; digital humanities; human-computer and human-robot interaction; interaction and critical design; machine learning; market and mechanism design, natural language processing; network analysis; science and technology studies; and user experience (UX) and design.

Who is eligible to major in Information Science?

Students in the College of Agriculture and Life Science (CALS) and the College of Arts and Sciences (A&S). A&S students earn a Bachelor of Arts (BA) in Information Science; students in CALS earn a Bachelor of Science (BS).

- The BA and BS in Information Science share the same requirements and elective course options.
- The differences are in each admitting college's foundational requirements.

Criteria for Good Standing

Students must meet the following criteria for good standing at the end of each semester:

- Earn an overall GPA of at least 2.3
- Earn a weighted GPA for the IS major of at least 2.5
- Complete all courses with a grade of C- or higher
- Complete at least 12 academic credits per semester
- Complete all core INFO courses prior to the start of the final semester of study (students must pre-enroll in any remaining core coursework by the end of their 3-2 semester)

Changing Majors to IS within CALS or Adding IS as a Second Major

Current CALS students looking to change majors to IS or add IS as a second major should start taking courses to meet the criteria for admission as outlined below. Contact the IS Advising office to schedule an advising meeting. Once students have met the admission criteria (or final courses needed are in progress), students should apply online (https://affiliations.coecis.cornell.edu/is/).

All potential majors are reviewed on a case-by-case basis relative to the following criteria:

Completion of 4 courses:

1) Introductory Programming: Choose one

Code	Title	Hours
CS 1110	Introduction to Computing: A Design and Development Perspective	4
CS 1112	Introduction to Computing: An Engineering and Science Perspective	4

Note:
Advanced Placement (AP) Computer Science A (score of 5), International Baccalaureate (IB) Computer Science (score of 6 or 7), or a passing Computer Science Advanced Standing Exam (CASE) score may be used to fulfill the programming requirement.

2) Calculus or Statistics: Choose one

Code	Title	Hours
Calculus		
MATH 1106	Modeling with Calculus for the Life Sciences	4
MATH 1110	Calculus I	4
MATH 1910	Calculus for Engineers	4
Statistics		
AEM 2100	Introductory Statistics	4
BTRY 3010	Statistics I (crosslisted)	4
CEE 3040	Uncertainty Analysis in Engineering	4
ECON 3110	Applied Probability and Statistics (crosslisted)	4
ECON 3130	Probability and Statistics	4
ENGRD 2700	Eng Probability and Statistics: Modeling and Data Science	4
ILRST 2100	Introductory Statistics and Data Science (crosslisted)	4
MATH 1710	Statistical Theory and Application in the Real World	4
PUBPOL 2100	Introduction to Statistics	4
PSYCH 2500	Statistics and Research Design	3
SOC 3010	Statistics for Sociological Research	4
STSCI 2100	Introductory Statistics and Data Science (crosslisted)	4
STSCI 2150	Introductory Statistics for Biology	4
STSCI 2200	Statistics I (crosslisted)	4

Note:
- AP Calculus AB (score of 4 or 5), AP Calculus BC (score of 4 or 5), IB Mathematics (AA or AI; score of 6 or 7), General Certificate of Education (GCE) Advanced ("A") Level Mathematics (score of A*, A, B, or C), or a passing Mathematics Department Placement Exam score may be used to fulfill the calculus requirement.
- AP Statistics is not accepted for the IS major.

3) Core Courses: Choose two

Code	Title	Hours
INFO 1200	Information Ethics, Law, and Policy (crosslisted)	3
or INFO 1260	Choices and Consequences in Computing	
INFO 1300	Introductory Design and Programming for the Web	4
INFO 2040	Networks (crosslisted)	3
INFO 2450	Communication and Technology (crosslisted)	3

INFO 2950	Introduction to Data Science [1]	4
or INFO 2951	Introduction to Data Science with R	

[1] Due to an overlap in content, students may only receive academic credit for INFO 2950 or INFO 2951, not both.

Note:

- Students may count CS 2800 + CS 2110 together in place of INFO 2950 for affiliation purposes only. Once admitted to the major, INFO 2950 or INFO 2951 must be completed.
- Students can count INFO 1380 in place of one core course for the purposes of affiliation, only. After affiliation, students will still need to complete all listed core classes.

Grade & GPA Requirement

- A grade of C or higher in each of the completed courses used to declare the major.
- A GPA of 2.5 or higher for courses used to declare the major.

Note

- Courses used for the purpose of declaring the major may be repeated if the original course grade was below a C. The most recent grade will be used for all repeated courses. Qualifying courses must be taken at Cornell.
- Students in their senior year of study intending to change majors to IS or add IS as a second major must submit a course plan to demonstrate they can complete all degree requirements by their current expected graduation date.

Program Information

- Instruction Mode: In Person
- Location: Ithaca, NY
- Minimum Credits for Degree: 120

Program Requirements

Majors are required to take core courses that introduce them to the variety of theories and methods of study within the discipline. Students will specialize in a particular area of interest in Information Science by choosing courses from one concentration that will provide in-depth study in that area. Courses under each concentration come from within and outside the department. In addition to the courses in their chosen concentration, students are required to complete three elective classes that will contribute to their studies in either breadth or depth.

- Students must complete the major's five core courses: INFO 1200 or INFO 1260, INFO 1300, INFO 2040, INFO 2450, and INFO 2950 or INFO 2951.
- Students must take Introductory Programming (CS 1110 or CS 1112), one Calculus course, and one Statistics course.
  - AP credit may be used to fulfill the CS 1110 and calculus requirements.
- Students must complete four courses in at least one Concentration from the options listed below.
- Students must complete three electives. See the Elective requirements guidelines.
- Counting courses for more than one requirement within the major is not permitted.
- Minimum number of credits required for the major = 50 credits.
- Students may apply transfer credit towards the introductory programming, calculus, or statistics requirement for the major. Transfer credit must be approved by the appropriate department (e.g., Computer Science for CS 1110 equivalency) and CALS before it can be applied towards the major.
- Students may petition the Director of Undergraduate Studies to count transfer credit or other relevant Cornell courses towards concentration or elective requirements. Transfer credit must be approved by the IS Department and CALS before it can be applied towards the major.
- Up to two courses from a qualified study abroad program may be counted towards the major in one of two ways: (1) one concentration course and one major elective or (2) two major electives. Courses must be approved in advance by the Director of Undergraduate Studies. See the IS Studying Abroad website (https://infosci.cornell.edu/undergraduate/studying-abroad/) for more information.

Grading

All courses in the major must be taken for a letter grade. Affiliated students must earn a C- or higher in all courses used for the major.

Requirements

Introductory Courses

Core (5 required courses):

Code	Title	Hours
INFO 1200	Information Ethics, Law, and Policy (crosslisted)	3
or INFO 1260	Choices and Consequences in Computing	
INFO 1300	Introductory Design and Programming for the Web	4
INFO 2040	Networks (crosslisted)	3
INFO 2450	Communication and Technology (crosslisted)	3
INFO 2950	Introduction to Data Science [1]	4
or INFO 2951	Introduction to Data Science with R	

[1] Due to an overlap in content, students may only receive academic credit for INFO 2950 or INFO 2951, not both.

Programming and Math Requirements

Programming Courses

- CS 1110 Introduction to Computing: A Design and Development Perspective or
- CS 1112 Introduction to Computing: An Engineering and Science Perspective
- Advanced Placement (AP) Computer Science A (score of 5), International Baccalaureate (IB) Computer Science (score of 6 or 7), or a passing Computer Science Advanced Standing Exam (CASE) score may be used to fulfill the programming requirement.

Note: Students are expected to learn the appropriate programming language(s) for their courses as needed, regardless of the language in which introductory programming was taught. It is assumed that all Information Science majors will have Python programming knowledge.

Math Courses

Choose one:

Code	Title	Hours
MATH 1106	Modeling with Calculus for the Life Sciences	4
MATH 1110	Calculus I	4
MATH 1910	Calculus for Engineers	4

Note:
AP Calculus AB (score of 4 or 5), AP Calculus BC (score of 4 or 5), IB Mathematics (AA or AI; score of 6 or 7), General Certificate of Education (GCE) Advanced ("A") Level Mathematics (score of A*, A, B, or C), or a passing Mathematics Department Placement Exam score may be used to fulfill the calculus requirement.

Statistics Courses

Choose one:

Code	Title	Hours
AEM 2100	Introductory Statistics	4
BTRY 3010	Statistics I (crosslisted)	4
CEE 3040	Uncertainty Analysis in Engineering	4
ECON 3110	Applied Probability and Statistics (crosslisted)	4
ECON 3130	Probability and Statistics	4
ENGRD 2700	Eng Probability and Statistics: Modeling and Data Science	4
ILRST 2100	Introductory Statistics and Data Science (crosslisted)	4
MATH 1710	Statistical Theory and Application in the Real World	4
PUBPOL 2100	Introduction to Statistics	4
PSYCH 2500	Statistics and Research Design	3
SOC 3010	Statistics for Sociological Research	4
STSCI 2100	Introductory Statistics and Data Science (crosslisted)	4
STSCI 2150	Introductory Statistics for Biology	4
STSCI 2200	Statistics I (crosslisted)	4

Concentrations

Each of the introductory Information Science courses is the beginning of a path of in-depth study. We call these paths Concentrations. Each one is described in further detail below. Students must complete 4 courses within their chosen concentration.

Select one:

Behavioral Science

This concentration provides students with an in-depth understanding of the behavioral and social aspects of interacting with and through information technology.

A. Understanding Social Behavior: Choose Two Courses

Code	Title	Hours
INFO 4430	Teams and Technology	3
INFO 4450	Computer-Mediated Communication (crosslisted)	3
INFO 4490	Social Behavior and Technology (crosslisted)	3
INFO 4500	Language and Technology (crosslisted)	3
INFO 4505	Computing and Global Development	3
INFO 4940	Special Topics in Information Science [1]	1-4
COMM 4380	Communication in Virtual Worlds	3
PSYCH 3800	Social Cognition	3

[1] Specific topics approved by advisor.

B. Social Data Analytics: Choose One Course

Code	Title	Hours
INFO 3300	Visual Data Analytics for the Web (crosslisted)	3
INFO 3950	Data Analytics for Information Science	3
INFO 4100	Learning Analytics	3
INFO 4300	Language and Information (crosslisted)	3
INFO 4350	Conversations and Information	3
INFO 4940	Special Topics in Information Science [1]	1-4
CS 4740	Natural Language Processing (crosslisted)	4
CS 3780	Introduction to Machine Learning	4

[1] Specific topics approved by advisor.

Choose One Course from Section C

*One course from any of the below "Behavior in Context" sections. You do not need to take one course from each.

Code	Title	Hours
C1. Behavior in Sociological Context		
INFO 3200	Technology, Behavior and Society (crosslisted)	3
INFO 4140	Law, Policy, and Politics of Cybersecurity	3
INFO 4940	Special Topics in Information Science [1]	1-4
C2. Behavior in Network Context		
INFO 4360	Communication Networks and Social Capital (crosslisted)	3
COMM 4940	Special Topics in Communication [1]	1-3
C3: Behavior in Design Context		
INFO 3450	Human-Computer Interaction Design (crosslisted)	3
INFO 4240	Designing Technology for Social Impact (crosslisted)	4
INFO 4400	Qualitative User Research and Design Methods (crosslisted)	3
INFO 4940	Special Topics in Information Science [1]	1-4

[1] Specific topics approved by advisor.

Data Science

This concentration will equip students to learn about the world through data analytics.

A. Data Analysis: Choose One Course

Code	Title	Hours
INFO 3300	Visual Data Analytics for the Web (crosslisted)	3
INFO 3900	Causal Inference (crosslisted)	3
INFO 3950	Data Analytics for Information Science	3
INFO 4940	Special Topics in Information Science [1]	1-4
CS 3780	Introduction to Machine Learning	4
ORIE 3120	Practical Tools for Operations Research, Machine Learning and Data Science	4

ORIE 4740	Statistical Data Mining I	4
STSCI 3740	Data Mining and Machine Learning	4

[1] Specific topics approved by advisor.

B. Domain Expertise: Choose One Course

Code	Title	Hours
INFO 2770	Excursions in Computational Sustainability (crosslisted)	3
INFO 3130	Data and the State: How Governments See People and Places	4
INFO 3350	Text Mining History and Literature	3
INFO 3370	Studying Social Inequality Using Data Science	3
INFO 4100	Learning Analytics	3
INFO 4120	Ubiquitous Computing	3
INFO 4300	Language and Information (crosslisted)	3
INFO 4350	Conversations and Information	3
INFO 4940	Special Topics in Information Science [1]	1-4
CS 4740	Natural Language Processing (crosslisted)	4

[1] Specific topics approved by advisor.

C. Big Data Ethics, Policy and Society: Choose One Course

Code	Title	Hours
INFO 3200	Technology, Behavior and Society (crosslisted)	3
INFO 4140	Law, Policy, and Politics of Cybersecurity	3
INFO 4145	Privacy and Security in the Data Economy	3
INFO 4200	Information Policy: Applied Research and Analysis (crosslisted)	3
INFO 4240	Designing Technology for Social Impact (crosslisted)	4
INFO 4250	Surveillance and Privacy	3
INFO 4260	Computing On Earth: Planetary Dimensions and Consequence of Computing (crosslisted)	3
INFO 4270		3
INFO 4390	Practical Principles for Designing Fair Algorithms	3
INFO 4561	Evaluation and Society (crosslisted)	3
INFO 4940	Special Topics in Information Science [1]	1-4
ENGL 3778	Free Speech, Censorship, and the Age of Global Media (crosslisted)	4
PUBPOL 3460	Culture, Law, and Politics of Information Policy	3

[1] Specific topics approved by advisor.

D. Data Communication: Choose One Course

Code	Title	Hours
INFO 3312	Data Communication	3
INFO 4310	Interactive Information Visualization	3
COMM 3150	Organizational Communication: Theory and Practice	3
COMM 3189	Taking America's Pulse: Creating and Conducting a National Opinion Poll (crosslisted)	3-4
COMM 4860	Risk Communication	3
COMM 4940	Special Topics in Communication [1]	1-3
SOC 3580	Big Data on the Social World	3

[1] Specific topics approved by advisor.

Digital Culture and Production

This concentration explores computing as a cultural phenomenon. It equips students to analyze technology's role in society and culture, understand it historically, and produce media artifacts.

This concentration can be completed by following either of the two options below:

- Option 1. One course each from A, B, and C, and an additional course from C.
- Option 2. One course each from A and B, and two additional courses from A.

For the Media, Art, Design (C) component: Any ARCH elective course or option studio at the 3000 level or higher that addresses IT as a significant component can work for this portion. Elective courses can be found on the College of Arts, Architecture, and Planning website (https://aap.cornell.edu/academics/architecture/). Please contact the IS Advising office for course approval.

A. Digital Culture and History: Choose One Course

Code	Title	Hours
INFO 2921	Inventing an Information Society (crosslisted)	3
INFO 3200	Technology, Behavior and Society (crosslisted)	3
INFO 4140	Law, Policy, and Politics of Cybersecurity	3
INFO 4260	Computing On Earth: Planetary Dimensions and Consequence of Computing (crosslisted)	3
INFO 4940	Special Topics in Information Science [1]	1-4
STS 4040	Digital Due Process Clinic	4

[1] Specific topics approved by advisor.

B. Digital Production: Choose One Course

Code	Title	Hours
INFO 2300	Server-Side Web Development	4
INFO 2310	Interactive Web Development	4
INFO 3152	Introduction to Computer Game Design	4
INFO 3300	Visual Data Analytics for the Web (crosslisted)	3
INFO 4320	Introduction to Rapid Prototyping and Physical Computing	4
CS 4620	Introduction to Computer Graphics	3
CS 4758	Autonomous Mobile Robots (crosslisted)	3

C. Media, Art, Design: Students Pursuing Option 1 for This Concentration Choose One Course

Code	Title	Hours
INFO 3450	Human-Computer Interaction Design (crosslisted)	3
INFO 3660	History and Theory of Digital Art (crosslisted)	3
INFO 4152	Advanced Topics in Computer Game Design	3
INFO 4240	Designing Technology for Social Impact (crosslisted)	4
INFO 4400	Qualitative User Research and Design Methods (crosslisted)	3

INFO 4420	Human Computer Interaction Studio	4
INFO 4940	Special Topics in Information Science [1]	1-4
ART 3705	Media Arts, Performance, and Sound: Sound	4
ARTH 4151	Topics in Media Arts (crosslisted)	3
COML 3115	(crosslisted)	3

[1] Specific topics approved by advisor.

Students must take the INFO version of INFO 3152 and INFO 4152. CS 3152 and CS 4152 do not count towards the major.

Information Ethics, Law, and Policy

This concentration provides training and insight into the ethical, legal, and policy dimensions of contemporary information technology.

A. Frameworks and Institutions: Choose One Course

Code	Title	Hours
INFO 4113	Technology and Law Colloquium (crosslisted)	3
INFO 4140	Law, Policy, and Politics of Cybersecurity	3
INFO 4200	Information Policy: Applied Research and Analysis (crosslisted)	3
INFO 4250	Surveillance and Privacy	3
INFO 4301	Ethics in New Media, Technology, and Communication (crosslisted)	3
INFO 4940	Special Topics in Information Science [1]	1-4
HADM 4890	The Law of the Internet and E-Commerce	3
PUBPOL 3460	Culture, Law, and Politics of Information Policy	3

[1] Specific topics approved by advisor.

B. Methods and Analysis: Choose One Course

Code	Title	Hours
INFO 2921	Inventing an Information Society (crosslisted)	3
INFO 4240	Designing Technology for Social Impact (crosslisted)	4
INFO 4940	Special Topics in Information Science [1]	1-4
PUBPOL 2300	Introduction to Policy Analysis	4
PUBPOL 2301	Introduction to Public Policy	4

[1] Specific topics approved by advisor.

C. Cases/Topics: Choose One Course

Code	Title	Hours
COMM 4940	Special Topics in Communication [1]	1-3
INFO 3200	Technology, Behavior and Society (crosslisted)	3
INFO 4145	Privacy and Security in the Data Economy	3
INFO 4260	Computing On Earth: Planetary Dimensions and Consequence of Computing (crosslisted)	3
INFO 4270		3
INFO 4390	Practical Principles for Designing Fair Algorithms	3
INFO 4561	Evaluation and Society (crosslisted)	3
STS 4040	Digital Due Process Clinic	4

[1] Specific topics approved by advisor.

D. Tools and Technical Domains: Choose One Course

Code	Title	Hours
INFO 3300	Visual Data Analytics for the Web (crosslisted)	3
INFO 3350	Text Mining History and Literature	3
INFO 3370	Studying Social Inequality Using Data Science	3
INFO 4100	Learning Analytics	3
INFO 4120	Ubiquitous Computing	3
INFO 4300	Language and Information (crosslisted)	3
INFO 4350	Conversations and Information	3

Students may petition the Director of Undergraduate Studies to allow an upper-level (3000-level or above) technical IS course relevant to their work in Information Ethics, Law, and Policy to be used to satisfy this requirement.

Interactive Technologies

This concentration provides students with the analytical and technical skills they need to design and build functional technical systems.

Required Course

- CS 2110 Object-Oriented Programming and Data Structures (crosslisted)

A. Building (with Hardware): Choose One Course

Code	Title	Hours
INFO 4120	Ubiquitous Computing	3
INFO 4320	Introduction to Rapid Prototyping and Physical Computing	4
CS 4758	Autonomous Mobile Robots (crosslisted)	3

B. Working with Data/Software: Choose One Course

Code	Title	Hours
INFO 3300	Visual Data Analytics for the Web (crosslisted)	3
INFO 4340	App Design and Prototyping	3
INFO 4555	Business Intelligence Systems	4
CS 4620	Introduction to Computer Graphics	3
CS 3780	Introduction to Machine Learning	4
CS 5150	Software Engineering	4
ORIE 3120	Practical Tools for Operations Research, Machine Learning and Data Science	4
ORIE 4740	Statistical Data Mining I	4
ORIE 3741	Learning with Big Messy Data	4
STSCI 3740	Data Mining and Machine Learning	4

C. Context/Application Domains: Choose One Course

Code	Title	Hours
INFO 4152	Advanced Topics in Computer Game Design	3
INFO 4310	Interactive Information Visualization	3
INFO 4410	Re-Designing Robots (crosslisted)	3
INFO 4430	Teams and Technology	3
INFO 4505	Computing and Global Development	3
INFO 4940	Special Topics in Information Science [1]	1-4

[1] Specific topics approved by advisor.

- Students must take the INFO version of INFO 3152 and INFO 4152. CS 3152 and CS 4152 do not count towards the major.

Networks, Crowds, and Markets

This concentration helps students to understand formal models, data and policy issues surrounding networked systems.

A. Models: Choose Two Courses

Code	Title	Hours
INFO 4220	Networks II: Market Design (crosslisted)	3
INFO 4360	Communication Networks and Social Capital (crosslisted)	3
INFO 4940	Special Topics in Information Science [1]	1-4
COMM 3150	Organizational Communication: Theory and Practice	3
ECON 4020	Game Theory I	3
ECON 4610	Industrial Organization I	3
ECON 4660	Behavioral Economics	4
ORIE 4350	Introduction to Game Theory	4
SOC 3080	Social Networks and Power	3

[1] Specific topics approved by advisor.

B. Data: Choose One Course

Code	Title	Hours
INFO 3300	Visual Data Analytics for the Web (crosslisted)	3
INFO 3950	Data Analytics for Information Science	3
INFO 4300	Language and Information (crosslisted)	3
INFO 4350	Conversations and Information	3
INFO 4940	Special Topics in Information Science [1]	1-4
CS 4740	Natural Language Processing (crosslisted)	4
CS 3780	Introduction to Machine Learning	4
ECON 3120	Applied Econometrics	4
ECON 3140	Econometrics	4

[1] Specific topics approved by advisor.

C. Policy/Values: Choose One Course

Code	Title	Hours
INFO 4140	Law, Policy, and Politics of Cybersecurity	3
INFO 4145	Privacy and Security in the Data Economy	3
INFO 4200	Information Policy: Applied Research and Analysis (crosslisted)	3
INFO 4240	Designing Technology for Social Impact (crosslisted)	4
INFO 4250	Surveillance and Privacy	3
INFO 4940	Special Topics in Information Science [1]	1-4
COMM 4940	Special Topics in Communication [1]	1-3
PUBPOL 3460	Culture, Law, and Politics of Information Policy	3

[1] Specific topics approved by advisor.

UX (User Experience)

This concentration is designed to help students gain a better understanding of user experience design through studies in design and user perception.

A. Core Principles of Design: Choose One Course

Code	Title	Hours
INFO 3450	Human-Computer Interaction Design (crosslisted)	3
INFO 4410	Re-Designing Robots	3
INFO 4400	Qualitative User Research and Design Methods (crosslisted)	3
INFO 4940	Special Topics in Information Science [1]	1-4

[1] Specific topics approved by advisor.

B. Design in Context: Choose One Course

Code	Title	Hours
INFO 2921	Inventing an Information Society (crosslisted)	3
INFO 4240	Designing Technology for Social Impact (crosslisted)	4
INFO 4420	Human Computer Interaction Studio	4
INFO 4505	Computing and Global Development	3
INFO 4940	Special Topics in Information Science [1]	1-4

[1] Specific topics approved by advisor.

C. Knowing the User: Choose One Course

Code	Title	Hours
INFO 4125	Project Management	3
INFO 4430	Teams and Technology	3
INFO 4450	Computer-Mediated Communication (crosslisted)	3
INFO 4490	Social Behavior and Technology (crosslisted)	3
COMM 4380	Communication in Virtual Worlds	3
PSYCH 3420	Human Perception: Application to Computer Graphics, Art, and Visual Display (crosslisted)	3

D. Knowing the Technology: Choose One Course

Code	Title	Hours
INFO 3152	Introduction to Computer Game Design	4
INFO 4152	Advanced Topics in Computer Game Design	3
INFO 4310	Interactive Information Visualization	3
INFO 4320	Introduction to Rapid Prototyping and Physical Computing	4
INFO 4340	App Design and Prototyping	3
CS 5150	Software Engineering	4

- **Students must take the INFO version of INFO 3152 and INFO 4152. CS 3152 and CS 4152 do not count towards the major.**

Electives

Majors must also complete three elective courses. Each elective course must be at least 3.0 credits, taken for a letter grade, and completed with a grade of "C-" or higher.

Approved Electives

Code	Title	Hours
INFO 3000-level or higher [1]		
INFO 2300	Server-Side Web Development (but not both)	4
or INFO 2310	Interactive Web Development	
CS 2110	Object-Oriented Programming and Data Structures	4

CS 3110	Data Structures and Functional Programming	4
CS 3410	Computer System Organization and Programming	4

[1] Except for INFO 4910, INFO 4997, and INFO 4998.

- Please note that students may only apply one semester (3.0 - 4.0 credits) of INFO 4900 Independent Reading and Research toward their elective coursework requirements.

University Graduation Requirements Requirements for All Students

In order to receive a Cornell degree, a student must satisfy academic and non-academic requirements.

Academic Requirements

A student's college determines degree requirements such as residency, number of credits, distribution of credits, and grade averages. It is the student's responsibility to be aware of the specific major, degree, distribution, college, and graduation requirements for completing their chosen program of study. See the individual requirements listed by each college or school or contact the college registrar's office (https://registrar.cornell.edu/service-resources/college-registrar-directory/) for more information.

Non-academic Requirements

Conduct Matters. Students must satisfy any outstanding sanctions, penalties or remedies imposed or agreed to under the Student Code of Conduct (Code) or Policy 6.4. Where a formal complaint under the Code or Policy 6.4 is pending, the University will withhold awarding a degree otherwise earned until the adjudication process set forth in those procedures is complete, including the satisfaction of any sanctions, penalties or remedies imposed.

Financial Obligations. Outstanding financial obligations will not impact the awarding of a degree otherwise earned or a student's ability to access their official transcript. However, the University may withhold issuing a diploma until any outstanding financial obligations owing to the University are satisfied.

Additional Requirements for Undergraduate Students

The University has two requirements for graduation that must be fulfilled by all undergraduate students: the swim requirement, and completion of two physical education courses. For additional information about fulfilling University Graduation Requirements, see the Physical Education website (https://scl.cornell.edu/pe/).

Physical Education

All incoming undergraduate students are required to take two credits (two courses) of Physical Education prior to graduation. It is recommended they complete the two courses during their first year at Cornell. Credit in Physical Education may be earned by participating in courses offered by the Department of Athletics and Physical Education (https://courses.cornell.edu/preview_program.php?catoid=60&poid=30232) and Cornell Outdoor Education, by being a registered participant on a varsity athletic team, or performing in the marching band.

Students with medical concerns should contact the Office of Student Disability Services (http://sds.cornell.edu/).

Swim Requirement

The Faculty Advisory Committee on Athletics and Physical Education has established a basic swimming and water safety competency requirement for all undergraduate students. Normally, the requirement is taken during the Fall Orientation process at Helen Newman Hall or Teagle Hall pools. The requirement consists of the following: jump or step feet-first into the deep end of the pool, float or tread for one minute, turn around in a full circle, swim 25 yards using any stroke(s) of choice without touching the bottom or holding on to the sides (there is no time limit) and exit from the water. Students who do not complete the swim requirement during their first year, during a PE swim class or during orientation subsequent years, will have to pay a $100 fee. Any student who cannot meet this requirement must register for PE 1100 Beginning Swimming as their physical education course before electives can be chosen.

If a student does not pass the swim requirement in their first Beginning Swimming PE class, then the student must take a second Beginning Swimming PE class (PE 1100 or PE 1101). Successful completion of two Beginning Swimming classes (based on attendance requirements) with the instructor's recommendation will fulfill the University's swim requirement.

Students unable to meet the swim requirement because of medical reasons should contact the Office of Student Disability Services (http://sds.cornell.edu/). When a waiver is granted by the Faculty Committee on Physical Education, an alternate requirement is imposed. The alternate requirement substitute is set by the Director of Physical Education.

CALS Graduation Requirements for the Bachelor of Science

Students are responsible for understanding and fulfilling all the requirements necessary for graduation. Additionally, students must promptly notify the college of any discrepancies or issues with their academic records.

CALS undergraduate students follow college distribution requirements corresponding to their matriculation/entry term and class standing. Students matriculating/entering before Fall 2025 will complete the existing CALS distribution requirements. First-year students matriculating/entering Fall 2025 or later will be subject to the new CALS 2025+ distribution requirements. However, sophomore and junior transfer students matriculating/entering in Fall 2025 will follow the existing CALS distribution requirement to align with students in their corresponding cohort year. All students must adhere to the requirements designated for their matriculation/entry term and class standing. *There are no exceptions to this policy.*

Although specific requirements vary between the curriculums, all students must complete the following Graduation Requirements to earn the Bachelor of Science degree:

1. University Graduation Requirements
2. Credit Requirements
3. Distribution Requirements
4. Residency Requirement
5. GPA Requirement

6. Major Requirements
7. Application to Graduate

Credit Requirement Policies

1. Minimum total credits: 120 academic credits are required for graduation.
   - Important Exceptions:
     - Repeated Cornell courses that do not allow repeat for credit will not count towards the number of credits required for graduation. These credits do count toward the minimum twelve (12) credits required for full-time status and good academic standing.
     - Forbidden Overlaps will not count towards credits required for graduation. These credits do count toward the minimum twelve (12) credits required for full-time status and good academic standing. More information can be found under the Course Enrollment and Credits page.
     - Review or supplemental courses (e.g., 1000- to 1099-level) do not count towards the number of credits required for graduation. These credits do not count toward the minimum twelve (12) credits required for full-time status or good academic standing.
     - Physical Education courses do not count toward the required 120 credits for graduation. They also do not count toward the minimum twelve (12) credits required for full-time status or good academic standing.
2. Minimum Credits at Cornell: Sixty (60) academic credits must be completed at Cornell (includes Cornell in Rome, Capital Semester, and Brooks School Cornell in Washington DC Connect Program, and Shoals Marine Laboratory).
3. Maximum Non-Cornell Credits: Sixty (60) non-Cornell credits (AP, CASE, IB, GCE, French Baccalauréat, Cambridge Pre-University, and external transfer coursework) can be applied toward degree requirements. A student can transfer in a maximum of fifteen (15) academic credits earned before matriculation as a first-year student at any accredited college/university (AP, CASE, IB, GCE, French Baccalauréat, and external transfer credits). Refer to Non-Cornell (Transfer) Credit under Policies and Procedures for additional information.
4. All CALS students are required to fulfill a minimum number of CALS Credits, structured credits, and letter-graded credits. Specific policies are in the curriculum sections below.

Residency Requirements

- Eight (8) semesters of full-time study are expected. External transfer students are credited with one (1) semester in residence for each full-time semester (or equivalent) completed at another accredited institution prior to matriculation at Cornell.
- Internal transfer students must complete two (2) semesters in residence in CALS.
- The final semester before graduation must be completed in a Cornell program as a full-time student. Summer or winter semesters cannot be counted as a final semester. (The School of Continuing Education does not count towards a final semester in residency.)
- Students in the ninth (9^{th}) (or equivalent) and final semester may be eligible to apply for prorated tuition. The eligibility criteria are listed online (https://cals.cornell.edu/undergraduate-students/cals-student-services/degree-advising/cals-graduation-requirements-for-bachelor-of-science/).
- The following programs are in residency: Cornell in Washington DC Connect Program (Fall or Spring only), Capital Semester, Shoals Summer Semester.

Grade Point Average (GPA) Requirements

Minimum cumulative GPA: 2.00 or above must be maintained. Students must earn a minimum cumulative GPA of 2.00 or better to graduate. The cumulative GPA includes all letter grades earned at Cornell.

CALS Degree Requirements Prior to 2025 (applies to Transfers entering Fall 2025)

These requirements apply to: First-year students who matriculated before Fall 2025, sophomore transfers who matriculate prior to Fall 2026, and junior transfers who matriculate before Fall 2027. All students must follow the requirements based on their matriculation and expected graduation dates. *There are no exceptions to this policy.*

Students are required to fulfill:

1. University Graduation Requirements:
   a. Physical Education.
   b. Swim Requirement.
2. Credit Requirements: 120 academic credits, of which a minimum of fifty-five (55) must be taken from the College of Agriculture and Life Sciences at Cornell. A minimum of one hundred (100) credits must be in courses for which a letter grade was received. PE and supplemental courses do not count as academic credit.
   a. Fifty-five (55) CALS Credits are required for graduation. CALS Credits consist of courses offered within CALS and in Applied Economics and Management, Biological Sciences, Biology & Society, Earth and Atmospheric Sciences, Environment and Sustainability, Information Science, Nutritional Science, and the Department of Statistics and Data Science. CALS Credits include all courses with the following subjects: AGSCI, AIISP, ALS, AEM, ANSC, BEE, BIOG, BIOAP, BIOCB, BIOEE, BIOMG, BIOMI, BIOMS, BIONB, BIOSM, BSOC, BTRY, COMM, DSOC, EAS, EDUC, ENTOM, ENVS, FDSC, GDEV, IARD, INFO, LA, LEAD, NS, NTRES, PLBIO, PLBRG, PLHRT, PLPPM, PLSCI, PLSCS , STSCI, VIEN.
   b. Minimum Letter-Graded Credits: One hundred (100) credits. Proration of letter-graded credits may be applicable to students that transfer non-Cornell credits (see Proration Chart for non-Cornell credit (https://experience.cornell.edu/sites/default/files/resource-files/Proration%20Chart%20for%20Students%20with%20Non%20Cornell%20Credit.pdf)).
   c. Maximum Credits earned through Special Studies (Independent Study, Research, Teaching Assistantships, and/or Internships): Fifteen (15) credits of "unstructured" coursework can be applied towards graduation requirements. Proration of structured credits may be applicable to students that transfer non-Cornell credits (see Proration Chart for non-Cornell credit (https://experience.cornell.edu/sites/default/files/resource-files/Proration%20Chart%20for%20Students%20with%20Non%20Cornell%20Credit.pdf)).
3. Residency: Eight (8) semesters of full-time study are expected. External transfer students are credited with one (1) semester of residence for each full-time semester (or equivalent) completed at another accredited institution prior to matriculating at Cornell.
4. GPA: Students must earn a minimum cumulative GPA of 2.00 or better to graduate. The cumulative GPA includes all letter grades earned at Cornell.

5. Physical and Life Sciences: Eighteen (18) credits, of which six (6) credits must be Introductory Life Sciences/Biology and three (3) credits must be Chemistry or Physics.
6. Quantitative Literacy: Faculty legislation requires minimum competency in quantitative literacy. This requirement can be satisfied by taking an approved calculus or statistics class.
7. Social Science and Humanities: Students must complete four (4) courses within the seven (7) categories of Humanities and Social Sciences. The courses MUST span at least three (3) different categories. Human Diversity (D) is a required category. Humanities courses must be a minimum of three (3) credits.
8. Written and Oral Expression: Nine (9) credits total, of which at least six (6) must be in Written Expression. Oral Expression is not required by the college but may be required for some majors. If Oral Expression is not required by the major, all nine credits may be in Written Expression.
9. Major: See individual department listings for major requirements.
10. Application to Graduate: See Graduation Resources (https://cals.cornell.edu/undergraduate-students/cals-student-services/graduation-resources/).

Distribution Requirements

The purpose of the distribution requirement is to have all students achieve common learning outcomes. It is expected that through college and major course requirements graduates will be able to:

- Explain, evaluate, and effectively interpret factual claims, theories, and assumptions in the student's discipline(s) (especially in one or more of the college's priority areas of Food & Energy Systems, Social Sciences, Life Sciences, and Environmental Sciences) and more broadly in the sciences and humanities.
- Find, access, critically evaluate, and ethically use information.
- Integrate quantitative and qualitative information to reach defensible and creative conclusions.
- Communicate effectively through writing, speech, and visual information.
- Articulate the views of people with diverse perspectives.
- Demonstrate the capability to work both independently and in cooperation with others.

Through the study of Physical and Life Sciences, students develop their understanding and appreciation of the physical sciences, enhance their quantitative reasoning skills, and gain an appreciation of the variability of living organisms. Social Sciences and Humanities gives students perspective on the structure and values of the society in which we live and prepares them to make decisions on ethical issues that will affect their work and role in society. Written and Oral Expression is designed to help students become competent and confident in the use of oral and written communication to express themselves and their ideas.

Important Notes:

- Credits received for independent study, fieldwork, teaching, research, work experience, and internships cannot be used to fulfill the distribution requirements
- Review or supplemental courses, such as 1000- to 1099-level courses, will not be counted in the distribution areas.
- First-Year Writing Seminars (FWS) cannot be used to satisfy the Physical and Life Sciences distribution area.
- Courses that fulfill distributions are approved by the CALS Curriculum Committee. Distributions cannot be applied to a course retroactively, and individual student petitions for Cornell courses to fulfill distributions will not be accepted. Students may request a review of external transfer courses for fulfilling distribution requirements.

Physical and Life Sciences:

Eighteen (18) credits, of which six (6) credits must be Introductory Life Sciences/Biology and three (3) credits in Chemistry or Physics. Courses that count for Introductory Life Sciences/ Biology, Chemistry/Physics, Quantitative Literacy, and Other Physical and Life Sciences count towards the eighteen (18) credits for this requirement

Introductory Life Sciences/Biology Requirement (BIO-AG):
Students must complete at least six (6) academic credits of Introductory Life Sciences/Biology. Courses that count towards this requirement have the BIO-AG distribution attribute. Note: CALS does NOT accept BIO-AS for BIO-AG.

Offerings in the area provide a foundation in the field of biology. Courses must include: an evolutionary component, instruction on applying the process of science and a significant student-centered teaching component.

Chemistry/Physics (CHPH-AG):
Students must complete a minimum of three (3) credits of Chemistry or Physics. Includes all Cornell courses with the CHEM or PHYS prefix (excluding courses that are supplemental, independent study, research, TA, internship, and First-Year Writing Seminar). Courses that count towards this requirement have a CHPH-AG distribution attribute. Additionally, courses with the prefix CHEM or PHYS of at least 11xx numbering and a minimum of three (3) credits are accepted as fulfilling CHPH-AG.

Courses that meet the CALS Chemistry or Physics (CHPH) requirement provide students with a foundational understanding of key scientific principles. These courses delve into the study of chemistry (focusing on the composition, properties, and transformations of substances) or physics (exploring the principles of matter, energy, and their interactions). Fulfilling this requirement equips students with essential scientific knowledge that supports practical and innovative applications in fields like agriculture, environmental science, and food science, thereby fostering their ability to address and solve critical challenges within these domains.

Quantitative Literacy (MQL-AG):
Students must complete one (1) Quantitative Literacy course. Courses that count towards these requirements have an MQL-AG distribution attribute. Additionally, courses of at least 11xx numbering with the MATH prefix may fulfill this category. Calculus courses and Introductory Statistics courses may also fulfill MQL-AG.

Faculty legislation requires minimum competency in quantitative literacy. Courses that fulfill the Mathematics and Quantitative Literacy distribution in CALS enhance students' problem-solving skills by teaching them to understand abstract, logical relationships. These classes focus on the mathematical analysis of data, modeling natural and man-made systems, and developing algorithms critical for computation. Students will learn various quantitative methods and how to apply quantitative reasoning across different fields.

This requirement can also be satisfied by earning a score of four (4) or five (5) on the AP Calculus exam or a score of five (5) on the AP Statistics exam, or transfer of an approved calculus or statistics course with a minimum letter grade of "C" or better.

Other Physical Life Sciences (OPHLS-AG):
Other Physical Life Sciences courses count towards the eighteen (18) credit total for the Physical and Life Sciences requirement. Courses that count towards this requirement have the OPHLS-AG distribution attribute. The number of OPHLS-AG courses taken will vary by student. Courses with the following distributions are also accepted for the CALS OPHLS-AG distribution: PBS-HE, BIO-AS, PHS,AS, SDS-AS. Additionally, any course with BIO-AG, CHPH-AG or MQL-AG may alternatively fulfill OPHLS-AG.

Offerings in this area explore additional physical and life science subjects as well as quantitative literacy (math) courses. Courses satisfying this requirement help students understand and appreciate the physical sciences, enhance quantitative reasoning skills, or explore the variability of living organisms.

Social Sciences and Humanities:

Students must complete four (4) courses within the seven (7) categories of Humanities and Social Sciences. The courses MUST span at least three (3) different categories. Human Diversity (D) is a required category. Humanities courses must be a minimum of three (3) credits.

No more than two (2) courses in the same department will be counted toward the distribution requirement. Social Sciences & Humanities Categories:

(Also refer to Distribution Requirement Codes (https://catalog.cornell.edu/general-information/distribution-codes/))

Cultural Analysis (CA-AG)
These courses study human life in particular cultural contexts through interpretive analysis of individual behavior, discourse, and social practice. Topics include belief systems (science, medicine, religion), expressive arts and symbolic behavior (visual arts, performance, poetry, myth, narrative, ritual), identity (nationality, race, ethnicity, gender, sexuality), social groups and institutions (family, market, community), and power and politics (states, colonialism, inequality).

CALS also accepts courses of at least three (3) credits with the following distributions as fulfilling CA-AG: ALC-AS, ALC-HA, ALC-AAP, CA-HE, CA-AAP, GLC-AS

Foreign Language (FL-AG)
Foreign Language courses available for CALS students at Cornell are offered by several departments, including Africana Studies and Research Center (AS&RC – language courses only), Asian Studies with languages such as Bangla-Bengali, Burmese, Chinese, Hindi, Indonesian, Japanese, Khmer, Korean, Sanskrit, Tagalog, Thai, and Vietnamese, and Classics (CLASS – language courses only). Additional offerings are provided by German Studies, which includes German, Dutch, and Swedish (language courses only), Linguistics (LING – language courses only), Near Eastern Studies (NES - language courses only), Romance Studies with languages like Catalan, French, Italian, Portuguese, Quechua, and Spanish, and Russian Studies, covering Russian, Hungarian, Polish, Serbian/Croatian, and Ukrainian. CALS will recognize these Foreign Language (FL) classifications by any college at Cornell, provided the class is taken for three (3) or more credits. Transfer students may have non-Cornell courses that meet SUNY World Languages requirements and are a minimum of three (3) credits reviewed as fulfilling FL-AG.

Human Diversity (D-AG)
These courses analyze historical or contemporary marginalized communities and the culturally specific contexts that produce unequal power relations in terms of race, nationality, ethnicity, indigeneity, sexuality, disability, religion, gender, or economic status.

Definition of "marginalize": Any groups with reduced access to social status, political influence, economic advancement, educational advancement, healthcare, information, or any of the goods, services, and powers of a society can be considered "marginalized." Causes of marginalization may be related to ethnic status, religion, country of origin, sexual orientation, geography, economics, and government policies. Those who exist on the furthest margins of a society are frequently subject to several of these forces.

CALS also accepts courses of at least three (3) credits with the following distributions as fulfilling D-AG: SCD-AS, SCD-HA, D-HE.

Non-equated external transfer courses will only be considered for junior transfer students who have taken an appropriate course at their prior institution and whose schedule does not allow space to take a Human Diversity (D-AG) course at Cornell. These situations will be reviewed individually after a required appointment with CALS Student Services.

Historical Analysis (HA-AG)
These courses interpret continuities and changes—political, social, economic, diplomatic, religious, intellectual, artistic, scientific—through time. The focus may be on groups of people, dominant or subordinate, a specific country or region, an event, a process, or a time period.

CALS also accepts courses of at least three (3) credits with the following distributions as fulfilling HA-AG: HA-AAP, HST-AAP, HST-AS, HST-HA, HA-HE

Knowledge, Cognition, and Moral Reasoning (KCM-AG)
These courses investigate the bases of human knowledge in its broadest sense, ranging from cognitive faculties shared by humans and animals such as perception, to abstract reasoning, to the ability to form and justify moral judgments. Courses investigating the sources, structure, and limits of cognition may use the methodologies of science, cognitive psychology, linguistics, or philosophy. Courses focusing on moral reasoning explore ways of reflecting on ethical questions that concern the nature of justice, the good life, or human values in general.

CALS also accepts courses of at least three (3) credits with the following distributions as fulfilling KCM-AG: ETM-AAP, ETM-AS, ETM-HA, KCM-AAP, KCM-HE

Literature and the Arts (LA-AG)
These courses explore literature and the arts in two different but related ways. Some courses focus on the critical study of artworks and on their history, aesthetics, and theory. These courses develop skills of reading, observing, and hearing and encourage reflection on such experiences; many investigate the interplay among individual achievement, artistic tradition, and historical context. Other courses are devoted to the production and performance of artworks (in creative writing, performing arts, and media such as film and video). These courses emphasize the interaction among technical mastery, cognitive knowledge, and creative imagination.

CALS also accepts courses of at least three (3) credits with the following distributions as fulfilling LA-AG, ALC-AS, ALC-HA, ALC-AAP, LA-AAP

Social and Behavioral Analysis (SBA-AG)
These courses examine human life in its social context through the use of social scientific methods, often including hypothesis testing, scientific sampling techniques, and statistical analysis. Topics studied range from the thoughts, feelings, beliefs, and attitudes of individuals to interpersonal relations between individuals (e.g., in friendship, love, conflict) to larger social organizations (e.g., the family, society, religious or educational or civic institutions, the economy, government)

to the relationships and conflicts among groups or individuals (e.g., discrimination, inequality, prejudice, stigmas, conflict resolution).

CALS also accepts courses of at least three (3) credits with the following distributions as fulfilling SBA-AG: SSC-AS, SBA-HE, SBA-AAP, SSC-AAP

Written and Oral Expression:

Nine (9) credits total, of which at least six (6) must be in Written Expression. Oral Expression is not required by the college but may be required for some majors. If Oral Expression is not required by the major, all nine (9) credits may be in Written Expression. Writing in the Majors (WIM) courses do not count towards Written Expression.

Written Expression (WRT-AG)

All students are required to take at least six (6) credits of Written Expression and may take nine (9) credits to fulfill the Written and Oral Expression requirement. Courses that fulfill the Written Expression requirement in CALS focus on enhancing students' writing skills. Courses meeting this requirement devote at least 50% of class time to writing proficiency, involve at least five (5) writing assignments with detailed feedback, and emphasize revision and development. These courses ensure personalized attention and help students articulate ideas clearly, argue effectively, and engage with evidence critically. This structure supports students in improving both their writing mechanics and their ability to communicate persuasively across contexts.

CALS also accepts FWS courses as fulfilling WRT-AG. Transfer students may have courses that meet the SUNY Writing Requirement considered to fulfill this requirement.

Oral Expression (ORL-AG)

Students may take one (1) Oral Expression course towards the nine (9) required credits for Written and Oral Expression. Courses that fulfill the CALS Oral Expression requirement enhance students' public speaking and communication skills. Courses meeting this requirement center on improving oral proficiency, dedicating over 50% of class time to the principles of effective communication. Each course involves at least five (5) formal oral presentations, with four (4) undergoing detailed revisions based on structured feedback that focuses on speech organization, clarity, evidence use, and delivery. These courses offer personalized guidance and encourage students to apply feedback to subsequent presentations. The aim is to refine students' abilities to articulate ideas persuasively and adapt messages for different contexts, ensuring they can communicate effectively on any topic.

CALS 2025+ Degree Requirements (applies to first-year students who start Fall 2025 or after)

The 2025+ CALS Curriculum applies to first-year students who enter CALS starting Fall 2025 and all semesters after. Transfer students entering Fall 2025 and all continuing students will follow the Prior to Fall 2025 Requirements. There are no exceptions to this policy.

All students are required to complete:

1. University Graduation Requirements
2. Credit Requirements
3. 120 Credits are required to graduate, of the 120:
    - A minimum seventy-five (75) must be CALS Credits (fifty-five (55) for transfer students).
    - A minimum of 105 must be structured academic credits (transfer courses can count towards this requirement).
    - A minimum of one hundred (100) letter-graded academic credits (transfer courses can count towards this requirement).
    - The following courses do not count towards the 120: PE course, courses numbered 1000-1099, forbidden overlap courses, and repeated courses (that do not allow repeats).
4. Residency Requirement
5. GPA Requirement
6. Distribution Requirements
7. E3 Learning Milestone
8. Major Requirements: See individual department listings for major requirements.
9. Application to Graduate: Information can be found on graduation webpage.

75 CALS Credits

Students are required to take seventy-five (75) CALS Credits. The following counts as CALS Credit:

- Any course with the following prefixes: AGSCI, AIIS, ALS, ANSC, BEE, BIOG, BIOAP, BIOCB, BIOEE, BIOMG, BIOMI, BIOMS, BIONB, BIOSM, BSOC, BTRY, COMM, EAS, EDUC, ENTOM, ENVS, FDSC, GDEV, INFO, LA, LEAD, NS, NTRES, PLSCI, STSCI, VIEN
- Courses with the FWS attribute (two (2) courses maximum)
- For BSBU students only: prefix AEM
    - AEM courses will not count towards the required seventy-five (75) CALS Credits, except for students who have officially been accepted to the AEM major. CALS students who choose to complete an AEM minor cannot count AEM courses towards their seventy-five (75) required CALS courses.

Students with matriculation status of Transfer will have a requirement of fifty-five (55) CALS Credits.

Distribution Requirements

The College of Agriculture and Life Sciences (CALS) college distribution requirements are the cornerstone of a diverse and comprehensive education.

These requirements encourage our students to venture beyond familiar subjects, develop a deeper understanding of others, uncover insights that can spark new interests, and pave the way toward meaningful careers that can shape a just and sustainable future.

The CALS distribution requirements consist of:

- A minimum of thirty-nine (39) credit hours of coursework.
- A single course may not fulfill more than one college distribution requirement. However, a single course can simultaneously fulfill college and major requirements.
- Students in CALS have the option to take some of these courses either for a grade or using S/U grading. However, letter grades may be required for some majors.
- Non-academic credit courses (numbered 1000-1099 and PE) do not fulfill distribution requirements. Special Topics Courses (numbered 4940) do not fulfill distribution requirements.
- Courses that fulfill distributions are approved by the CALS Curriculum Committee. Distributions cannot be applied to a course retroactively, and individual student petitions for Cornell courses to fulfill distributions will not be accepted. Students may request a review of external transfer courses for fulfilling distribution requirements.

Students must complete all of the following:

Agriculture, Food Systems & Human Nutrition (AFS-AG)

- Take one (1) Agriculture, Food Systems & Human Nutrition (AFS-AG) course.

The Agriculture, Food Systems & Human Nutrition distribution requirement at CALS emphasizes a comprehensive understanding of the food system, including production, processing, distribution, consumption, and waste, with a focus on the integration of these multiple components. Students must learn to describe, analyze, and understand the interdependent nature and the environmental and nutritional impacts of the food system. To fulfill the requirement, a course must cover at least two components of the food system, analyze their interactions, and dedicate at least half of its content to this holistic view, potentially including topics like agricultural history, food sustainability, and nutrition access.

Biological Sciences (BSC-AG)

- Take one (1) Biological Sciences (BSC-AG) course. Note: the following are NOT accepted as fulfilling BSC-AG: BIO-AG, BIO-AS.

Courses that meet the Biological Sciences requirement for CALS dedicate most of their content (at least 75%) to exploring one or more of the following biological concepts: evolution, structure and function, the flow, exchange and storage of information, pathways and transformations of energy and matter, or living systems. These courses include an evolutionary component, teach students how to apply scientific methods, and include at least one of the following competencies: quantitative reasoning, modeling and simulation, interdisciplinary thinking, interdisciplinary collaboration and communication, or science and society relational understanding. Courses also emphasize student-centered learning activities such as labs, problem solving, case studies, research projects, or collaborative projects. Some courses within this distribution are identified as suitable for non-life sciences majors— these courses have no prerequisites and require only high school-level science knowledge.

Physical Sciences (PSC-AG)

- Take one (1) Physical Sciences (PSC-AG) course.

CALS Physical Sciences courses cover at least 75% of their content in fields such as chemistry, physics, earth science, atmospheric science, or astronomy, connecting theoretical knowledge to practical applications. Courses also emphasize student-centered learning activities such as labs, problem solving, case studies, research projects, or collaborative projects. Some courses within this distribution are identified as suitable for non-sciences majors - these courses have no prerequisites and require only high school-level science knowledge.

Sustainability Challenges (SCH-AG)

- Take one (1) Sustainability Challenges (SCH-AG) course.

Courses that satisfy the sustainability distribution requirement in CALS must allocate at least 30% of content or learning outcomes to examining the intricate interplay between economic, socio-political, and environmental aspects of sustainability issues or their solutions or to exploring the connections among three or more UN Sustainable Development Goals in relation to the main class topic. Additionally, the course must incorporate a learning outcome focused on one of three key proficiencies: systems thinking, decision-making amidst uncertainty, or understanding the factors that constrain sustainability, thereby ensuring students gain a comprehensive and interdisciplinary perspective on sustainability challenges.

Data Literacy (DLG-AG and DLS-AG)

Two required courses:

- Take one (1) course with attribute Data Literacy Statistics (DLS-AG).
- Take one (1) course with attribute Data Literacy General (DLG-AG) OR one (1) course with attribute Data Literacy Statistics (DLS-AG).

CALS courses fulfilling the Data Literacy General (DLG-AG) requirement are designed to teach students how to interpret and articulate insights from both quantitative and qualitative data, with an emphasis on various competencies such as data analysis, acquisition methods, curation, and security. Students will be expected to understand the types of data, their applications, and the ethical implications of data misuse upon completion of these courses. The courses must dedicate a significant portion of content to at least three (3) specific data literacy competencies and include at least one of these competencies as a main learning outcome.

Courses that fulfill Data Literacy Statistics (DLS-AG) additionally provide explicit instruction on mathematical approaches to collection, description, analysis, and inference of conclusions from quantitative data. Course content focuses on the Data Manipulating & Analysis competency: Ability to draw conclusions from data with quantitative and/or qualitative methods, which may include statistical or computational methods and may include tools like R, Python, Stata, Tableau, Unix, NVivo, QGIS, Excel, SPSS, etc.

Ethics (ETH-AG)

- Take one (1) course with attribute Ethics (ETH-AG). Note the following are NOT accepted as fulfilling ETH-AG: KCM-AG, ETM-AAP, ETM-AS, ETM-HA, KCM-AAP, KCM-HE.

Courses that fulfill the CALS Ethics requirement are designed to immerse students in the study of ethical principles impacting various facets of life, including personal, social, and global spheres, as well as in research and professional practices. These courses aim for students to critically engage with their values, understand diverse ethical perspectives, and articulate reasoned ethical positions. To satisfy the Ethics requirement, a course must devote over half of its content to ethical issues relevant to its main topic, incorporate historical or modern ethical debates, foster personal ethical reflection, and include specific learning outcomes focused on ethics.

Human Diversity (D-AG)

- Take one (1) course with attribute Human Diversity (D-AG).

CALS Human Diversity courses foster a comprehensive understanding of the complexities surrounding historically or contemporarily marginalized communities, emphasizing the critical analysis of unequal power dynamics shaped by factors such as race, nationality, ethnicity, indigeneity, sexuality, disability, religion, gender, or economic status. To meet this requirement, a course must allocate at least 50% of its content to examining these issues, be a minimum of three (3) credits, and achieve specific learning outcomes. These outcomes include demonstrating knowledge of diverse cultural practices, understanding systemic oppression, and assessing personal cultural perspectives to identify potential biases.

CALS also accepts courses of at least three (3) credits with the following distributions as fulfilling D-AG: SCD-AS, SCD-HA, D-HE.

Non-equated external transfer courses will only be considered for junior transfer students who have taken an appropriate course at their prior institution and whose schedule does not allow space to take a Human

Diversity (D-AG) course at Cornell. These situations will be reviewed individually after a required appointment with CALS Student Services.

Cultural, Social & Historical Understanding

Take two (2) courses of the below distributions, with a maximum of one (1) course in each category: CA-AG, FL-AG, HA-AG, LA-AG, SBA-AG.

Cultural Analysis (CA-AG)

These courses study human life in particular cultural contexts through interpretive analysis of individual behavior, discourse, and social practice. Topics include belief systems (science, medicine, religion), expressive arts and symbolic behavior (visual arts, performance, poetry, myth, narrative, ritual), identity (nationality, race, ethnicity, gender, sexuality), social groups and institutions (family, market, community), and power and politics (states, colonialism, inequality).

CALS also accepts courses of at least three (3) credits with the following distributions as fulfilling CA-AG: ALC-AS, ALC-HA, ALC-AAP, CA-HE, CA-AAP, GLC-AS.

Foreign Language (FL-AG)

Foreign Language - Foreign Language courses available for CALS students at Cornell are offered by several departments, including Africana Studies and Research Center (AS&RC – language courses only), Asian Studies with languages such as Bangla-Bengali, Burmese, Chinese, Hindi, Indonesian, Japanese, Khmer, Korean, Sanskrit, Tagalog, Thai, and Vietnamese, and Classics (CLASS – language courses only). Additional offerings are provided by German Studies, which includes German, Dutch, and Swedish (language courses only), Linguistics (LING – language courses only), Near Eastern Studies (NES - language courses only), Romance Studies with languages like Catalan, French, Italian, Portuguese, Quechua, and Spanish, and Russian Studies, covering Russian, Hungarian, Polish, Serbian/Croatian, and Ukrainian. CALS will recognize these Foreign Language (FL) classifications by any college at Cornell, provided the class is taken for three (3) or more credits. Transfer students may have non-Cornell courses that meet SUNY World Languages and are a minimum of three (3) credits reviewed as fulfilling FL-AG.

Historical Analysis (HA-AG)

These courses interpret continuities and changes - political, social, economic, diplomatic, religious, intellectual, artistic, scientific - through time. The focus may be on groups of people, dominant or subordinate, a specific country or region, an event, a process, or a time period.

CALS also accepts courses of at least three (3) credits with the following distributions as fulfilling HA-AG: HA-AAP, HST-AAP, HST-AS, HST-HA, HA-HE.

Literature and the Arts (LA-AG)

These courses explore literature and the arts in two different but related ways. Some courses focus on the critical study of artworks and on their history, aesthetics, and theory. These courses develop skills of reading, observing, and hearing and encourage reflection on such experiences; many investigate the interplay among individual achievement, artistic tradition, and historical context. Other courses are devoted to the production and performance of artworks (in creative writing, performing arts, and media such as film and video). These courses emphasize the interaction among technical mastery, cognitive knowledge, and creative imagination.

CALS also accepts courses of at least three (3) credits with the following distributions as fulfilling LA-AG: ALC-AS, ALC-HA, ALC-AAP, LA-AAP.

Social and Behavioral Analysis (SBA-AG)

These courses examine human life in its social context through the use of social scientific methods, often including hypothesis testing, scientific sampling techniques, and statistical analysis. Topics studied range from the thoughts, feelings, beliefs, and attitudes of individuals to interpersonal relations between individuals (e.g., in friendship, love, conflict) to larger social organizations (e.g., the family, society, religious or educational or civic institutions, the economy, government) to the relationships and conflicts among groups or individuals (e.g., discrimination, inequality, prejudice, stigmas, conflict resolution).

CALS also accepts courses of at least three (3) credits with the following distributions as fulfilling SBA-AG: SSC-AS, SBA-HE, SBA-AAP, SSC-AAP.

Written and Oral Expression

Nine (9) credits total, of which at least six (6) must be in Written Expression. Oral Expression is not required by the college but may be required for some majors. If Oral Expression is not required by the major, all nine (9) credits may be in Written Expression. Writing in the Majors (WIM) courses do not count towards Written Expression.

Written Expression (WRT-AG)

All students are required to take at least six (6) credits of Written Expression and may take nine (9) credits to fulfill the Written and Oral Expression requirement. Courses that fulfill the Written Expression requirement in CALS focus on enhancing students' writing skills. Courses meeting this requirement devote at least 50% of class time to writing proficiency, involve at least five (5) writing assignments with detailed feedback, and emphasize revision and development. These courses ensure personalized attention and help students articulate ideas clearly, argue effectively, and engage with evidence critically. This structure supports students in improving both their writing mechanics and their ability to communicate persuasively across contexts.

CALS also accepts FWS courses as fulfilling WRT-AG. Transfer students may have courses that meet the SUNY Writing Requirement considered to fulfill this requirement.

Oral Expression (ORL-AG)

Students may take one (1) Oral Expression course towards the nine (9) required credits for Written and Oral Expression. Courses that fulfill the CALS Oral Expression requirement enhance students' public speaking and communication skills. Courses meeting this requirement center on improving oral proficiency, dedicating over 50% of class time to the principles of effective communication. Each course involves at least five (5) formal oral presentations, with four (4) undergoing detailed revisions based on structured feedback that focuses on speech organization, clarity, evidence use, and delivery. These courses offer personalized guidance and encourage students to apply feedback to subsequent presentations. The aim is to refine students' abilities to articulate ideas persuasively and adapt messages for different contexts, ensuring they can communicate effectively on any topic.

Engaged, Experiential, Entrepreneurial (E3) Learning Milestone

The E3 Learning Milestone allows students to blend experiential learning with academics, apply theory to practice, and deepen their community and professional engagement. This milestone emphasizes learning through experience, engagement, and/or entrepreneurship, encouraging students to apply their academic knowledge in real-world settings in collaboration with diverse groups and community partners. By completing an E3-designated course or experience, students are able to link their classroom learning with practical application, understand how their experiences align with their academic goals at Cornell, and recognize their contributions to a broader community. Eligible E3

experiences include community-engaged courses, undergraduate research, internships, study-abroad programs, and more—each designed to foster these outcomes and enhance the student's role in their field and community.

Learning Outcomes
Upon completion of a course or experience that fulfills the E3 Learning Milestone requirement, students should be able to:

- Make connections between their disciplinary and scholarly learning and the practice or application of that knowledge.
- Explain how their course/experience contributes to and is informed by their learning goals at Cornell (i.e. in their major or course of study, as they define it).
- Explain how they engaged with and contributed to, or served, a community or cause greater than themselves.

The E3 Learning Milestone can be fulfilled by courses or non-course-based experiences. Courses cannot apply to another distribution requirement if used for E3.

The following courses are accepted as fulfilling E3:

- Any course with CU-CEL attribute.
- Any course with EEE-AG distribution.
- CALS E3 Research and Teaching courses with EEE-AG. With advisor approval some Independent Study (4970) and Internship academic components (4960) may fulfill this requirement.

Courses and experiences that fulfill the E3 Learning Milestone must meet the following requirements:

1. Involve practice and application of knowledge in a real context.
2. Provide learning outcomes at the outset of the course or experience, including but not limited to the learning outcomes articulated above.
3. Include an assignment or activity that promotes student reflection on their experience.