DEPARTMENT OF APPLIED COMPUTING

The Department of Applied Computing provides students with opportunities to earn a Bachelor of Science degrees in computer information systems, cybersecurity, and in data science. An honors program is offered in the Computer Information Systems discipline. Minors are available in all disciplines including information technology. A degree in engineering is available through Lander University's dual-degree program with Clemson University. Students who complete this dual-degree program receive a bachelor's degree in Engineering from Clemson University and a bachelor's degree in computer information systems from Lander University.

The Department's webpage contains information about the individual programs of study, scholarships available for students majoring in computer information systems, and a link to an on-line application for these scholarships. (https://www.lander.edu/admissions/tuition-financial-aid/scholarships/departmental-scholarships.html).

Computer Information Systems Major

Computer information systems are prominent in the modern world. The Computer Information Systems (CIS) major allows students to develop the knowledge and skills required to understand these systems and participate in their creation and maintenance.

The computer information systems major at Lander has three components: core courses, a concentration within CIS, and a minor outside CIS. The core requirements form the basis of the program by providing the fundamentals necessary for advanced study. The concentration allows a student to develop a specialization within computer information systems. The minor provides a domain where CIS can be put into practice.

The curriculum and courses are designed and updated to accomplish the following program goals. All students graduating with a Bachelor of Science degree in Computer Information Systems will demonstrate:

- the skills needed to solve CIS problems;
- effective oral and written communications skills;
- the ability to independently research and complete a CIS project; and
- an understanding of the legal and ethical issues they may encounter as CIS professionals.

The CIS core includes courses in problem-solving and programming skills (CIS 130, CIS 230, CIS 231, CIS 234), productivity tools, (CIS 102), information management (CIS 120, CIS 320), data communications (CIS 240), computer organization (CIS 335), analysis and design (CIS 321), and database design (CIS 360). It also includes the senior level capstone experience (CIS 499).

Students can choose a concentration in software development, in networking, or in computer engineering. The software development concentration requires advanced courses in emerging environments and software development. The networking concentration covers data communications and computer networking in depth.

The computer engineering concentration is part of Lander's dual-degree program with Clemson University. Students in the computer information systems/computer engineering dual-degree program must complete specific mathematics and science courses at Lander in order to meet the program requirements of Clemson University. Students completing this program will be awarded both a BS in computer information systems from Lander University with a minor in mathematics, and a BS in computer engineering from Clemson University.

The computer information systems major requires that each student complete a minor. This minor provides competency in a secondary area where CIS can be applied. Students may choose from a number of minors, as indicated in the following table. Other minors (or a second major) offered across campus are eligible for consideration as well. The mathematics minor is suggested for students interested in pursuing graduate studies and is required for students in the computer engineering concentration.

Minor	Software Development	Networking	Dual Degree
Mathematics	√	√	√
Business Administration	√	√	
Health Care Management	√	√	
Sociology	√	√	
Psychology	√	√	
Political Science	√	√	
Music	√		
Cybersecurity	√	√	
Data Science	√	√	

In order to complete a computer information systems degree program in a timely fashion, students should complete the problem solving and programming skills sequence (CIS 130, CIS 230, CIS 231), along with CIS 102 and CIS 120, by the end of their third or fourth semester.

A grade of "C" or better is required in all computer information systems courses applied to the major, with the following exception: a grade of "D" will be allowed in at most one CIS course at the 300- or 400-level. Courses in oral and/or written communication skills (SPCH 101 and COM 275) are strongly encouraged.

All students pursuing a degree in computer information systems are required to participate in program assessment activities and an exit interview with the computer information systems faculty during their final year at Lander University.

The program requirements for the CIS major and the dual-degree program are articulated on the individual program worksheets. A successful graduate in the computer information systems major will have competency in the following areas:

Information System Principles. This includes systems theory and concepts, information systems in organizations, decision support systems, and evaluation of systems performance.

Programming Principles. This includes problem solving, algorithm development, and application programming using structured and object-oriented approaches that stress abstraction, programming style, two or more high-level languages, and various software development environments.

Data Organization and Management. This includes data and file structures, access methods, algorithm design and analysis, and relational database organization and design.

Computer Organization. This includes logical organization of computers, levels of abstraction, machine and assembly languages, data representation and addressing, and memory management.

Data Communications and Networking. This includes networking and telecommunications concepts and standards, distributed computing, networked information technologies, protocols, and e-commerce.

System Development Methodology. This includes requirements specifications, analysis, design, implementation, and testing. Also, software tools, system prototyping, robustness of systems, documentation, efficiency, ethics, human-computer interaction, and software development in a team environment.

Information Systems Applications. Each student will have demonstrated competency in an approved application area through completion of a minor or second major in that area.

The following courses will be offered as indicated.
(NOTE: PHYS 203 is offered in the Department of Physical Sciences.)

Every Fall	**Every Spring**
CIS 102	CIS 120
CIS 130	CIS 130
CIS 230	CIS 230
CIS 231	CIS 234
CIS 250	CIS 240
MATH 125	CIS 320
MATH 212	MATH 125
	MATH 212
	PHYS 203

Even Year Fall	**Odd Year Spring**
CIS 300	CIS 440
CIS 321	CIS 498
CIS 340	MATH 200

Odd Year Fall	**Even Year Spring**
CIS 202	CIS 330
CIS 335	
CIS 341	

Computer Information Systems Honors Program

Students majoring in computer information systems may earn a "BS Degree with Honors" in computer information systems. To qualify, a student must:

1. Complete the following courses:
   MATH 141, MATH 142, MATH 325, CIS 330, CIS 498, and any two of CIS 340, CIS 341, or CIS 440.
2. Complete six credit hours of a foreign language. This foreign language may not be English or the student's native language.
3. Submit a research proposal by January 15 of the junior year. The proposal must be approved by a majority of the computer information systems faculty and result in a finished product of sufficient quality to:
   a) Receive three hours of credit (CIS 390), and
   b) Be accepted for publication or presented at a meeting of a computing society such as the Association for Computing Machinery; or be presented as a seminar to faculty, students, and guests.
4. Graduate with a BS degree in computer information systems with a grade point average of 3.5 in both overall coursework and in computer information systems coursework.

Engineering Dual-Degree Program

Students who wish to combine a study in computer information systems with a liberal arts program with further study in an engineering discipline may do so under the Lander University-Clemson University Engineering Dual-Degree Program. A student who completes this program of study will benefit from the experience of dividing their academic career between the liberal arts environment of a small university campus and the engineering climate of a large, technically-oriented university. This unique combination of study on two differently oriented campuses provides students with excellent engineering training strongly complemented by study in the humanities and social sciences.

Students apply for admission to Clemson during their third academic year at Lander University. Acceptance into the Clemson engineering program is at the discretion of that university. Clemson recommends that prospective students enroll in a summer school session at Clemson following their sophomore or junior year at Lander.

A grade of "C" or better is required in all courses applied to the dual-degree program and in all courses that must transfer to Clemson University.

Dual-degree engineering majors enter Clemson University at a level competitive with students already at that university. Successful completion of the program will result in the student being awarded a Bachelor of Science degree in Engineering from Clemson University and a Bachelor of Science degree in their major from Lander University.

Students will have competency in the following areas prior to leaving for Clemson University:

A. COMPUTER INFORMATION SYSTEMS/ENGINEERING DUAL DEGREE

Information System Principles. This includes systems theory and concepts, information systems in organizations, decision support systems, and evaluation of systems performance.

Programming Principles. This includes problem solving, algorithm development, and application programming using structured and object-oriented approaches that stress abstraction, programming style, two or more high-level languages, and various software development environments.

Data Organization and Management. This includes data and file structures, access methods, algorithm design and analysis, and relational database organization and design.

Computer Organization. This includes logical organization of computers, levels of abstraction, machine and assembly languages, data representation and addressing, and memory management.

Data Communications and Networking. Includes networking and telecommunications concepts and standards, distributed computing, networked information technologies, protocols, and electronic commerce.

System Development Methodology. This includes requirements specifications, analysis, design, implementation, and testing. Also, software tools, system prototyping, robustness of systems, documentation, efficiency, ethics, human-computer interaction, and software development in a team environment.

Cybersecurity Major

Lander University's BS in Cybersecurity prepares students for a career in technical and non-technical cybersecurity-related fields. Students completing the core courses of this program will gain deep technical knowledge to develop and maintain cybersecurity solutions along with an understanding of related non-technical areas including administrative, ethical, and legal aspects of cybersecurity.

The Cybersecurity program at Lander University has two components: core courses and a concentration. The core requirements form the basis of the program by providing the fundamentals necessary for advanced study. The concentration allows a student to develop a specialization within cybersecurity. The curriculum and courses are designed and updated to accomplish the following program goals. All students graduating with a Bachelor of Science degree in Cybersecurity will demonstrate:

- an understanding of the fundamental concepts, principles, and current trends in the cybersecurity discipline;
- an understanding of the federal, state, and local cyber defense laws and partners/structures, and ethics;
- an understanding of the fundamental concepts, technologies, components, and issues associated with components of modern computing environments;
- the knowledge to develop and maintain solutions for preserving confidentiality, integrity, and availability of information systems;
- an ability to assess risk management practices and policies for an organization;
- the ability to communicate orally and in writing; and
- the ability to self-learn.

The Cybersecurity core courses include courses in problem-solving and programming skills (CIS 130, CIS 230), productivity tools (CIS 102), information management (CIS 120), data communications (CIS 240), networks and computer systems administration (CYBR 140, CYBR 260), fundamentals of cybersecurity (CYBR 243), data-at-rest and data-in-motion forensics (CYBR 343, CYBR 344) , cryptography (CYBR 345), cybersecurity planning and management (CYBR 346), database design (CIS 360) and the senior-level capstone (CYBR 449).

Students can choose a concentration in Computer Information Systems or Political Science. The Computer Information Systems concentration focuses on deeper technical skills needed for the professional development and maintenance of cybersecurity solutions. The Political Science concentration focuses on policy development and compliance, and the legal aspects related to the field of cybersecurity.

A grade of "C" or better is required in all Cybersecurity courses applied to the major, with the following exception: a grade of "D" will be allowed in at most one Cybersecurity major course at the 300- or 400-level.

All students pursuing a degree in cybersecurity are required to participate in program assessment activities and an exit interview with the department faculty during their final year at Lander University.

The program requirements for both cybersecurity emphases are articulated on the individual program worksheets. A successful graduate in the cybersecurity major will have competency in the following areas:

Fundamentals of Cybersecurity. This includes security principles and policies, laws and regulations, basic cryptography, authentication, ethics, malware, computer and network forensics, threat and vulnerability detection, and protection.

Programming Principles. This includes problem-solving, algorithm development, and application programming using structured and object-oriented programming styles.

Forensics of Data-at-rest and Data-in-motion: This includes network and computer vulnerabilities and exploitation, protection against common threats, digital forensic analysis principles, and best practices for digital evidence collection and maintaining the chain of custody.

Cryptography: This includes the inner workings of cryptographic systems and their usage in real-world applications.

Cybersecurity Planning and Management: This includes procedures and processes for planning and management of cybersecurity operations in an organization.

Data Communications and Networking. This includes networking and telecommunications concepts and standards, distributed computing, networked information technologies, protocols, and e-commerce.

The following courses will be offered as indicated.

Every Fall	**Every Spring**
CIS 102	CIS 120
CIS 130	CIS 130
CIS 230	CIS 230
CYBR 243	CIS 231
CYBR 344	CIS 240
CYBR 346	CYBR 140
	CYBR 343
	CYBR 345
	CYBR 449
	MATH 125
	MATH 212
Even Year Fall	**Odd Year Spring**
CIS 341	CIS 360
	MATH 200
	Even Year Spring
	CIS 320
	MATH 208

Data Science Major

Data Science is an interdisciplinary field of study that deals with capturing, maintaining, processing, and analyzing data as well as effectively communicating the data analysis results. Effective data scientists are able to identify relevant questions, collect data from a multitude of data sources, clean and organize the information, analyze the information, translate results into solutions, and communicate the findings in a way that informs business decisions. Lander University's Data Science program educates and trains students in these skills. After completing our Data Science program, students will be equipped with both the underlying theory and the skills to apply that theory in the real world. All students graduating with a Bachelor of Science degree in Data Science will demonstrate:

1. an ability to apply computing concepts to use, manipulate, and analyze data;
2. the mathematical and statistical understanding of the central algorithms used in the field of data science;
3. the ability to communicate results of data analyses including data visualization;
4. an ability to apply data analyses in real-world scenarios in order to facilitate decision-making;
5. the ability to develop a high-performance machine learning and deep learning system using a large data set;
6. an understanding of ethical principles related to data science.

Lander University’s Data Science program offers concentrations in three areas: Business Analytics, Computer Information Systems, and Mathematics. Each concentration is designed to provide courses to deepen the understanding in each area. If a student is more interested in discovering and applying business intelligence for organizations, Business Analytics concentration provides a curriculum with business contexts. For students interested in careers as data science developers, Computer Information Systems concentration should be an excellent choice. The Mathematics ~~sis~~

concentration offers an opportunity to study theoretical aspects in depth and provides the mathematical skills required by many graduate programs.

The Data Science core courses include courses in problem-solving and programming skills (CIS 130, CIS 230, CIS 234, DSCI 130, DSCI 230), information management (CIS 120), data visualization (DSCI 231), big data analysis (DSCI 330), applied machine and deep learning (DSCI 340, DSCI 440), discrete mathematics (MATH 125), applied linear algebra (MATH 208), supervised and unsupervised machine learning (MATH 213, MATH 214), database design (CIS 360) and the senior-level capstone (DSCI 499).

A grade of "C" or better is required in all Data Science courses applied to the major, with the following exception: a grade of "D" will be allowed in at most one Data Science major course at the 300- or 400-level

All students pursuing a degree in data science are required to participate in program assessment activities and an exit interview with the department faculty during their final year at Lander University.

The program requirements for data science emphases are articulated on the individual program worksheets. A successful graduate in the data science major will have competency in the following areas:

Fundamentals of Data Science. This includes data science history, fundamental data concepts, principles, problem definitions, algorithms, processes for extracting patterns, and legal and privacy issues.

Data Science Programming. This includes fundamental programming techniques for data science such as loading, cleaning, transforming, merging, and reshaping data.

Data Visualization and Analysis. This includes methods and software tools for the visual representation of data and advanced tools for big data analysis including unstructured databases and data management platforms.

Applied Machine Learning. This includes data preparation, pipeline construction, machine learning models and their hyperparameters, overfitting and underfitting, regularization, performance measurement, and application development in the cloud.

Applied Deep Learning. This includes artificial neural networks, deep neural networks, deep learning models and training algorithms, optimizers, preparation of training data, measuring performance, and developing applications over the cloud.

The following courses will be offered as indicated.

Every Fall	Every Spring	Odd Year Spring
CIS 130	CIS 120	CIS 360
CIS 230	CIS 130	
DSCI 130	CIS 230	
DSCI 230	CIS 234	
DSCI 231	DSCI 130	
DSCI 330	DSCI 230	
DSCI 340	DSCI 440	
MATH 213	DSCI 499	
	MATH 214	
	MATH 125	

Minors Offered

Computer Information Systems Minor

A minor in computer information systems consists of at least 22 credit hours distributed as follows:
- CIS 102, CIS 120, CIS 130, CIS 230, CIS 231, CIS 321, and
- one of the following courses: MATH 125, MATH 212, MATH 270, MATH 308, MATH 311, MATH 325.

A grade of "C" or better is required in each course applied to the computer information systems minor.

Cybersecurity Minor

A minor in cybersecurity consists of at least 18 credit hours distributed as follows:
- CIS 130, CIS 240, CYBR 140, CYBR 243, CYBR 260, and
- two of the following courses: CYBR 343, CYBR 344, CYBR 345, CYBR 443.

A grade of "C" or better is required in each course applied to the cybersecurity minor.

Data Science Minor

A minor in data science consists of 19 credit hours, distributed as follows:

DSCI 130: Introduction to Data Science	3
DSCI 230: Introduction to Data Science Programming	4
MATH 211: Statistical Methods I or MATH 311: Mathematical Statistics	3
Choose one of the following combinations	9

- CIS 360: Database Design,
  DSCI 231: Data Visualization, and
  DSCI 330: Big Data Analysis
- CIS 360: Database Design,
  BA 226: Introduction to Analytical Methods, and
  DSCI 330: Big Data Analysis
- MATH 208: Applied Linear Algebra or
  MATH 308: Linear Algebra,
  MATH 213: Supervised Machine Learning, and
  DSCI 340: Applied Machine Learning
- MATH 208: Applied Linear Algebra or
  MATH 308: Linear Algebra,
  MATH 214: Unsupervised Machine Learning, and
  DSCI 440: Applied Deep Learning

TOTAL	19

Some courses in this minor have prerequisites, such as CIS 120, CIS 230, CIS 102 or CIS 202, and MATH 125 or MATH 325

A grade of "C" or better is required in each course applied to the data science minor.

Information Technology Minor

A minor in information technology consists of at least 20 credit hours distributed as follows

- One mathematics requirement:

MATH 114: Precalculus	3
MATH 121: Mathematical Applications	3
MATH 123: Calculus and its Applications	3
MATH 141: Single Variable Calculus I	4
or MATH 211: Statistical Methods I	3

- One introductory computer applications courses

CIS 120: Fundamentals of Information Systems and Information Technology	3
and either	
CIS 102: Application Software	3
or CIS 202: Computer Applications for Engineers (6 credit hours)	3
(CIS 202 requires completion of MATH 141);	

- Two problem solving and computer programming courses

CIS 130: Problem Solving and Programming Methods	4
CIS 230: Computer Programming Principles I	4

- One computer networks or advanced computer information systems course chosen from the following:

CIS 240: Introduction to Data Communications	3
CIS 250: Introduction to E-Commerce	3
CIS 320: Information Systems and Practice	3
CIS 321: Analysis and Design	3
CIS 360: Database Design	3

Students must earn a 2.0 GPA in courses in the minor.

2025-2026 PROGRAM REQUIREMENTS

DEGREE: BACHELOR OF SCIENCE
MAJOR: COMPUTER INFORMATION SYSTEMS
PROGRAM: DUAL ENGINEERING

Credit Hours

GENERAL EDUCATION REQUIREMENTS

(For approved courses, see General Education: www.lander.edu/gen-ed.)

A. Core Academic Skills (9 hours)

ENGL 101: Writing and Inquiry I	3
ENGL 102: Writing and Inquiry II	3
MATH 141: Calculus I	4

B. Humanities and Fine Arts

(6 hours selected from 2 different disciplines
To satisfy Literature requirement at Clemson

ENGL 201, ENGL 202, ENGL 204, ENGL 205, ENGL 220, ENGL 241, or ENGL 251	3
To satisfy non-literature requirement at Clemson: HUMA 285, HUM 330, PHIL 102, PHIL 103, PHIL 205, MUSI 101, MUSI 377, MUSI 378, MUSI 333, or THTR 201	3

C. Behavioral and Social Perspectives

(6 hours selected from 2 different disciplines)

ANTH 104, HIST 101, HIST 102, HIST 113, PSYC 101	3
ECON 201, ECON 202, POLS 103, SOCI 101, SOCI 202	3

If you already have credit for HIST 111, do not take HIST 111R; if you already have credit for HIST 112, do not take HIST 112R; if you already have credit for POLS 101, do not take POLS 101R.

D. Scientific and Mathematical Reasoning

(7 hours selected from 2 different disciplines, 1 lab science required)

CHEM 111: General Chemistry	4
PHYS 211: General Physics I	4

E. Founding Documents of the United States 3

HIST 111R: United States History to 1877 or
HIST 112R: United States History since 1877 or
POLS 101R: American National Government

If you already have credit for HIST 111, do not take HIST 111R; if you already have credit for HIST 112, do not take HIST 112R; if you already have credit for POLS 101, do not take POLS 101R.

F. World Cultures 3

(NOTE: MUSI 333 satisfies Non-Literature Humanities at Clemson)

G. LINK 101: Leadership, Involvement, Networking and Knowledge 1

LINK 101 is required of all new transfer students who have earned less than 24 credit hours of college-level work and all first-time freshmen.

TOTAL GENERAL EDUCATION REQUIREMENTS 37

If all of the General Education requirements are met and/or waived, and the credit hours do not add up to at least 30, the General Education requirements are not complete. If below 30, additional General Education courses from any category must be taken until the total hours add up to at least 30 hours.

NOTE: Clemson's Global Challenge (6 hours) requirement must be completed at Clemson.

MAJOR PROGRAM CORE REQUIREMENTS

CIS 120: Fundamentals of Information Systems and Information Technology	3
CIS 130: Problem Solving and Programming Methods	4
CIS 230: Computer Programming Principles I	4
CIS 231: Computer Programming Principles II	4
CIS 234: Introduction to C/C++ Programming	1
CIS 240: Introduction to Data Communications	3
CIS 320: Information Systems and Practice	3
CIS 321: Analysis and Design	3
ECE 272: Computer Organization (at Clemson)	
Students take EC 272 at Clemson in place of CIS 335: a core requirement at Lander	
CIS 360: Database Design	3
CIS 499: Project Implementation and Management	3

MAJOR PROGRAM ADDITIONAL REQUIREMENTS

CIS 202: Computer Applications for Engineers	3
MATH 134: Introduction to Mathematical Proof	3
PHYS 212: General Physics II	4

REQUIRED MATHEMATICS MINOR

MATH 142: Calculus II	4
MATH 241: Calculus III	4
MATH 242: Differential Equations	4
MATH 308: Linear Algebra or	3
MATH 325 Discrete Mathematics	3
TOTAL MAJOR PROGRAM REQUIREMENTS	59

ADDITIONAL ELECTIVES **24**

Students in this program must complete Clemson University requirements for a BS in Computer Engineering. Credits transferred from Clemson complete the required hours for graduation from Lander University.

NOTES: As schedule permits, the following courses recommended as they can be used to fulfill degree requirements at Clemson.

WRIT 450: (Technical Writing).
SPCH 101: (Oral Communications)
MATH 421, or MATH 431, or MATH 432 may be used for the advanced mathematics or special requirement at Clemson.

TOTAL FOR BS DEGREE	120

Coursework must include at least 30 credit hours earned at 300-level or above, of which 12 credit hours must be in the major.

See 4-year major guides for recommended order in which to take courses.
https://www.lander.edu/academics/registrars-office/major-guides.html

2025-2026 PROGRAM REQUIREMENTS

DEGREE: BACHELOR OF SCIENCE
MAJOR: COMPUTER INFORMATION SYSTEMS
CONCENTRATION: NETWORKING

Credit Hours

GENERAL EDUCATION REQUIREMENTS

(For approved courses see General Education: www.lander.edu/gen-ed.)

A. Core Academic Skills (9 hours)

ENGL 101: Writing and Inquiry I	3
ENGL 102: Writing and Inquiry II	3
Mathematics: Choose one of the following:	3-4
MATH 121: Mathematical Applications	
MATH 123: Calculus and its Applications	
MATH 141: Calculus I	

B. Humanities and Fine Arts

(*6 hours selected from 2 different disciplines)	6

C. Behavioral and Social Perspectives

(*6 hours selected from 2 different disciplines)	6

If you already have credit for HIST 111, do not take HIST 111R; if you already have credit for HIST 112, do not take HIST 112R; if you already have credit for POLS 101, do not take POLS 101R.

D. Scientific and Mathematical Reasoning

(7 hours selected from 2 different disciplines, 1 lab science required)

*MATH 212: Statistical Methods II or MATH 142: Calculus II	3-4
PHYS 203: Electronics	4

E. Founding Documents of the United States 3

HIST 111R: United States History to 1877 or
HIST 112R: United States History since 1877 or
POLS 101R: American National Government

If you already have credit for HIST 111, do not take HIST 111R; if you already have credit for HIST 112, do not take HIST 112R; if you already have credit for POLS 101, do not take POLS 101R.

F. World Cultures 3

G. LINK 101: Leadership, Involvement, Networking and Knowledge 1

LINK 101 is required of all new transfer students who have earned less than 24 credit hours of college-level work and all first-time freshmen.

TOTAL GENERAL EDUCATION REQUIREMENTS 35

If all of the General Education requirements are met and/or waived, and the credit hours do not add up to at least 30, the General Education requirements are not complete. If below 30, additional General Education courses from any category must be taken until the total hours add up to at least 30 hours.

MAJOR PROGRAM CORE REQUIREMENTS

CIS 120: Fundamentals of Information Systems and Information Technology	3
CIS 130: Problem Solving and Programming Methods	4
CIS 230: Computer Programming Principles I	4
CIS 231: Computer Programming Principles II	4
CIS 234: Introduction to C/C++ Programming	1
CIS 240: Introduction to Data Communications	3
CIS 320: Information Systems and Practice	3

CIS 321: Analysis and Design	3
CIS 335: Computer Organization	3
CIS 360: Database Design	3
CIS 499: Project Implementation and Management	3

MAJOR PROGRAM CONCENTRATION REQUIREMENTS

CIS 102: Application Software or successful completion of exemption exam, or CIS 202: Computer Applications for Engineers	0-3
CIS 250: Introduction to E-Commerce	3
CIS 340: Communication Protocols	3
CIS 341: Theory of Data Communications	3
CIS 440: Special Topics in Networking and Communication	3

MAJOR PROGRAM ADDITIONAL REQUIREMENTS

*MATH 125: or MATH 325: Discrete Mathematics	3
*MATH 211: Statistical Methods I or MATH 311: Mathematical Statistics	3
And one of the following MATH 200: Introduction to Modeling and Simulation MATH 208: Applied Linear Algebra MATH 242: Differential Equations MATH 300: Numerical Analysis MATH 308: Linear Algebra	3-4
TOTAL MAJOR PROGRAM REQUIREMENTS	55-59
ADDITIONAL ELECTIVES (including required minor*)	**26-30**
Up to 6 hours may need to be at the 300-level or above. The remaining hours may be at any level.	
TOTAL FOR BS DEGREE	120

*Select appropriate courses according to the chosen minor. Approved minors are listed in the catalog's description of the major.

Coursework must include at least 30 credit hours earned at 300-level or above, of which 12 credit hours must be in the major.

See 4-year major guides for recommended order in which to take courses.
https://www.lander.edu/academics/registrars-office/major-guides.html

2025-2026 PROGRAM REQUIREMENTS

DEGREE: BACHELOR OF SCIENCE
MAJOR: COMPUTER INFORMATION SYSTEMS
CONCENTRATION: SOFTWARE DEVELOPMENT

Credit Hours

GENERAL EDUCATION REQUIREMENTS

(For approved courses see General Education: www.lander.edu/gen-ed.)

A. Core Academic Skills (9 hours)

ENGL 101: Writing and Inquiry I	3
ENGL 102: Writing and Inquiry II	3
Mathematics: Choose one of the following:	3-4
MATH 121: Mathematical Applications	
MATH 123: Calculus and its Applications	
MATH 141: Calculus I	

B. Humanities and Fine Arts 6
(6 hours selected from 2 different disciplines)

C. Behavioral and Social Perspectives 6
(6 hours selected from 2 different disciplines)
If you already have credit for HIST 111, do not take HIST 111R; if you already have credit for HIST 112, do not take HIST 112R; if you already have credit for POLS 101, do not take POLS 101R.

D. Scientific and Mathematical Reasoning
(7 hours selected from 2 different disciplines, 1 lab science required)

*MATH 212: Statistical Methods II or MATH 142: Calculus II	3-4
PHYS 203: Electronics	4

E. Founding Documents of the United States 3
HIST 111R: United States History to 1877 or
HIST 112R: United States History since 1877 or
POLS 101R: American National Government
If you already have credit for HIST 111, do not take HIST 111R; if you already have credit for HIST 112, do not take HIST 112R; if you already have credit for POLS 101, do not take POLS 101R.

F. World Cultures 3

G. LINK 101: Leadership, Involvement, Networking and Knowledge 1

LINK 101 is required of all new transfer students who have earned less than 24 credit hours of college-level work and all first-time freshmen.

TOTAL GENERAL EDUCATION REQUIREMENTS 35

If all of the General Education requirements are met and/or waived, and the credit hours do not add up to at least 30, the General Education requirements are not complete. If below 30, additional General Education courses from any category must be taken until the total hours add up to at least 30 hours.

MAJOR PROGRAM CORE REQUIREMENTS

CIS 120: Fundamentals of Information Systems and Information Technology	3
CIS 130: Problem Solving and Programming Methods	4
CIS 230: Computer Programming Principles I	4
CIS 231: Computer Programming Principles II	4
CIS 234: Introduction to C/C++ Programming	1
CIS 240: Introduction to Data Communications	3
CIS 320: Information Systems and Practice	3
CIS 321: Analysis and Design	3

CIS 335: Computer Organization	3
CIS 360: Database Design	3
CIS 499: Project Implementation and Management	3

MAJOR PROGRAM CONCENTRATION REQUIREMENTS

CIS 102: Application Software or successful completion of exemption exam, or CIS 202: Computer Applications for Engineers	0-3
CIS 250: Introduction to E-Commerce	3
CIS 330: Software Development: Fundamentals and Techniques	3
CIS 498: Design and Implementation in Emerging Environments	3

MAJOR PROGRAM ADDITIONAL REQUIREMENTS

*MATH 125: or MATH 325: Discrete Mathematics	3
*MATH 211: Statistical Methods I or MATH 311: Mathematical Statistics	3
*And one of the following MATH 200: Introduction to Modeling and Simulation MATH 208: Applied Linear Algebra MATH 242: Differential Equations MATH 300: Numerical Analysis MATH 308: Linear Algebra	3-4
TOTAL MAJOR PROGRAM REQUIREMENTS	52-56
ADDITIONAL ELECTIVES (including required minor*)	**29-33**

Up to 9 credit hours may need to be 300-level or above.
The remaining hours may be at any level.

TOTAL FOR BS DEGREE	120

*Select appropriate courses according to the chosen minor. Approved minors are listed in the catalog's description of the major.

Coursework must include at least 30 credit hours earned at 300-level or above, of which 12 credit hours must be in the major.

See 4-year major guides for recommended order in which to take courses.
https://www.lander.edu/academics/registrars-office/major-guides.html

2025-2026 PROGRAM REQUIREMENTS

DEGREE: BACHELOR OF SCIENCE
MAJOR: CYBERSECURITY
CONCENTRATION: COMPUTER INFORMATION SYSTEMS

Credit Hours

GENERAL EDUCATION REQUIREMENTS

(For approved courses see the General Education: www.lander.edu/gen-ed.)

A. Core Academic Skills (9 hours)

ENGL 101: Writing and Inquiry I	3
ENGL 102: Writing and Inquiry II	3
Mathematics One of the following:	3-4
MATH 121: Mathematical Applications	
MATH 123: Calculus and its Applications	
MATH 141: Calculus I	

B. Humanities and Fine Arts

(6 hours selected from 2 different disciplines)	6

C. Behavioral and Social Perspectives

(*6 hours selected from 2 different disciplines)	6

If you already have credit for HIST 111, do not take HIST 111R; if you already have credit for HIST 112, do not take HIST 112R; if you already have credit for POLS 101, do not take POLS 101R.

D. Scientific and Mathematical Reasoning

(7 hours selected from 2 different disciplines, 1 lab science required)	
MATH 212: Statistical Methods II	3
Laboratory Science	4

E. Founding Documents of the United States 3

HIST 111R: United States History to 1877 or
HIST 112R: United States History since 1877 or
POLS 101R: American National Government

If you already have credit for HIST 111, do not take HIST 111R; if you already have credit for HIST 112, do not take HIST 112R; if you already have credit for POLS 101, do not take POLS 101R.

F. World Cultures 3

G. LINK 101: Leadership, Involvement, Networking and Knowledge 1

LINK 101 is required of all new transfer students who have earned less than 24 credit hours of college-level work and all first-time freshmen.

TOTAL GENERAL EDUCATION REQUIREMENTS 35-36

If all of the General Education requirements are met and/or waived, and the credit hours do not add up to at least 30, the General Education requirements are not complete. If below 30, additional General Education courses from any category must be taken until the total hours add up to at least 30 hours.

MAJOR PROGRAM CORE REQUIREMENTS

CIS 102: Application Software or successful completion of exemption exam,	0-3
CIS 120: Fundamentals of Information Systems and Information Technology	3
CIS 130: Problem Solving and Programming Methods	4
CIS 230: Computer Programming Principles I	4
CIS 240: Introduction to Data Communications	3
CIS 360: Database Design	3
CYBR 449: Cybersecurity Capstone	3
CYBR 140: Networking Lab	1

CYBR 243: Fundamentals of Cybersecurity	3
CYBR 260: Network and Systems Administration	3
CYBR 343: Computer Forensics	3
CYBR 344: Network Security and Forensics	3
CYBR 345: Introduction to Cryptography	3
CYBR 346: Cybersecurity Planning and Management	3

MAJOR PROGRAM CONCENTRATION REQUIREMENTS

CIS 231: Computer Programming Principles II	4
CIS 320: Information Systems and Practice	3
CIS 341: Theory of Data Communications	3

MAJOR PROGRAM ADDITIONAL REQUIREMENTS

MATH 125: or MATH 325: Discrete Mathematics	3
MATH 211: Statistical Methods I or MATH 311: Mathematical Statistics	3
And one of the following:	3-4
MATH 200: Introduction to Modeling and Simulation	
MATH 208: Applied Linear Algebra	
MATH 242: Differential Equations	
MATH 300: Numerical Analysis	
MATH 308: Linear Algebra	
TOTAL MAJOR PROGRAM REQUIREMENTS	58-62
ADDITIONAL ELECTIVES	**22-27**
Up to 6 credit hours may need to be 300-level or above. The remaining hours may be at any level.	
TOTAL FOR BS DEGREE	120

* Recommended courses: SOC 101 and PSYC 101

Coursework must include at least 30 hours earned in 300 or above level courses, of which 12 hours must be in the major.

See 4-year major guides for recommended order in which to take courses.
https://www.lander.edu/academics/registrars-office/major-guides.html

2025-2026 PROGRAM REQUIREMENTS

DEGREE: BACHELOR OF SCIENCE
MAJOR: CYBERSECURITY
CONCENTRATION: POLITICAL SCIENCE

Credit Hours

GENERAL EDUCATION REQUIREMENTS
(For approved courses see the General Education: www.lander.edu/gen-ed.)

A. Core Academic Skills (9 hours)
ENGL 101: Writing and Inquiry I 3
ENGL 102: Writing and Inquiry II 3
Mathematics One of the following: 3-4
MATH 121: Mathematical Applications
MATH 123: Calculus and its Applications
MATH 141: Calculus I

B. Humanities and Fine Arts
(6 hours selected from 2 different disciplines) 6

C. Behavioral and Social Perspectives
(6 hours selected from 2 different disciplines)
POLS 103 3
*3 hours from a discipline other than POLS 3
If you already have credit for HIST 111, do not take HIST 111R; if you already have credit for HIST 112, do not take HIST 112R; if you already have credit for POLS 101, do not take POLS 101R

D. Scientific and Mathematical Reasoning
(7 hours selected from 2 different disciplines, 1 lab science required)
MATH 212: Statistical Methods II 3
Laboratory Science 4

E. Founding Documents of the United States 3
HIST 111R: United States History to 1877 or
HIST 112R: United States History since 1877 or
POLS 101R: American National Government
If you already have credit for HIST 111, do not take HIST 111R; if you already have credit for HIST 112, do not take HIST 112R; if you already have credit for POLS 101, do not take POLS 101R.

F. World Cultures 3

G. LINK 101: Leadership, Involvement, Networking and Knowledge 1

LINK 101 is required of all new transfer students who have earned less than 24 credit hours of college-level work and all first-time freshmen.

TOTAL GENERAL EDUCATION REQUIREMENTS 35-36

If all of the General Education requirements are met and/or waived, and the credit hours do not add up to at least 30, the General Education requirements are not complete. If below 30, additional General Education courses from any category must be taken until the total hours add up to at least 30 hours.

MAJOR PROGRAM CORE REQUIREMENTS

CIS 102: Application Software or successful completion of exemption exam 0-3
CIS 120: Fundamentals of Information Systems and Information Technology 3
CIS 130: Problem Solving and Programming Methods 4
CIS 230: Computer Programming Principles I 4
CIS 240: Introduction to Data Communications 3

CIS 360: Database Design	3
CYBR 140: Networking Lab	1
CYBR 243: Fundamentals of Cybersecurity	3
CYBR 260: Network and Systems Administration	3
CYBR 343: Computer Forensics	3
CYBR 344: Network Security and Forensics	3
CYBR 345: Introduction to Cryptography	3
CYBR 346: Cybersecurity Planning and Management	3
CYBR 449: Cybersecurity Capstone	3
MAJOR PROGRAM CONCENTRATION REQUIREMENTS	
POLS 391: Homeland Security Policy	3
And two of the following	6
POLS 303: International Relations	
POLS 311: Constitutional Law	
POLS 312: Civil Liberties and Civil Rights	
POLS 325: International Conflict and Terrorism	
POLS 366: International Law	
POLS 390: Globalization	
MAJOR PROGRAM ADDITIONAL REQUIREMENTS	
MATH 125: or MATH 325: Discrete Mathematics	3
MATH 211: Statistical Methods I or MATH 311: Mathematical Statistics	3
And one of the following:	3-4
MATH 200: Introduction to Modeling and Simulation	
MATH 208: Applied Linear Algebra	
MATH 242: Differential Equations	
MATH 300: Numerical Analysis	
MATH 308: Linear Algebra	
TOTAL MAJOR PROGRAM REQUIREMENTS	57-61
ADDITIONAL ELECTIVES	**23-28**
TOTAL FOR BS DEGREE	120

* Recommended courses: SOCI 101 or PSYC 101

Coursework must include at least 30 hours earned in 300 or above level courses, of which 12 hours must be in the major.

See 4-year major guides for recommended order in which to take courses.
https://www.lander.edu/academics/registrars-office/major-guides.html

2025-2026 PROGRAM REQUIREMENTS

DEGREE: BACHELOR OF SCIENCE
MAJOR: DATA SCIENCE
CONCENTRATION: BUSINESS ANALYTICS

Credit Hours

GENERAL EDUCATION REQUIREMENTS

(For approved courses, see General Education: www.lander.edu/gen-ed.)

A. Core Academic Skills

ENGL 101: Writing and Inquiry I	3
ENGL 102: Writing and Inquiry II	3
MATH 123: Calculus and Its Applications	3

B. Humanities and Fine Arts

(6 hours selected from 2 different disciplines)	6

C. Behavioral and Social Perspectives

(6 hours selected from 2 different disciplines)

ECON 101: Economics in Society	3
Behavioral and Social Perspectives	3

If you already have credit for HIST 111, do not take HIST 111R; if you already have credit for HIST 112, do not take HIST 112R; if you already have credit for POLS 101, do not take POLS 101R.

D. Scientific and Mathematical Reasoning

(7 hours selected from 2 different disciplines, 1 lab science required)

MATH 211	3
Laboratory Science	4

E. Founding Documents of the United States 3

HIST 111R: United States History to 1877 or
HIST 112R: United States History since 1877 or
POLS 101R: American National Government

If you already have credit for HIST 111, do not take HIST 111R; if you already have credit for HIST 112, do not take HIST 112R; if you already have credit for POLS 101, do not take POLS 101R.

F. World Cultures 3

G. LINK 101: Leadership, Involvement, Networking and Knowledge 1

LINK 101 is required of all new transfer students who have earned less than 24 credit hours of college-level work and all first-time freshmen.

TOTAL GENERAL EDUCATION REQUIREMENTS 35

If all of the General Education requirements are met and/or waived, and the credit hours do not add up to at least 30, the General Education requirements are not complete. If below 30, additional General Education courses from any category must be taken until the total hours add up to at least 30 hours.

MAJOR PROGRAM CORE REQUIREMENTS

CIS 120: Fundamentals of Information Systems and Information Technology	3
CIS 130: Problem Solving and Programming Methods	4
CIS 230: Computer Programming Principles I	4
CIS 234: Introduction to C/C++ Programming	1
CIS 360: Database Design	3
DSCI 130: Introduction to Data Science	3
DSCI 230: Introduction to Data Science Programming	4
DSCI 231: Data Visualization	3
DSCI 330: Big Data Analysis	3

DSCI 340: Applied Machine Learning	3
DSCI 440: Applied Deep Learning	3
DSCI 499: Data Science Capstone	3
MATH 125: Introduction to Discrete Mathematics	3
MATH 208: Applied Linear Algebra	3
MATH 213: Supervised Machine Learning	3
MATH 214: Unsupervised Machine Learning	3
MAJOR PROGRAM CONCENTRATION REQUIREMENTS	
ACCT 201: Financial Accounting Principles	3
BA 226: Introduction to Analytical Methods	3
BA 304: Management Information Systems	3
BA 325: Advanced Analytical Methods	3
COM 275: Professional Communication	3
TOTAL MAJOR PROGRAM REQUIREMENTS	64
ADDITIONAL ELECTIVES	**21**
Up to 9 credit hours may need to be 300-level or above. The remaining hours may be at any level.	
TOTAL FOR BS DEGREE	120

Coursework must include at least 30 credit hours earned at 300-level or above, of which 12 credit hours must be in the major.

See 4-year major guides for recommended order in which to take courses.
https://www.lander.edu/academics/registrars-office/major-guides.html

2025-2026 PROGRAM REQUIREMENTS

DEGREE: BACHELOR OF SCIENCE
MAJOR: DATA SCIENCE
CONCENTRATION: COMPUTER INFORMATION SYSTEMS

Credit Hours

GENERAL EDUCATION REQUIREMENTS

(For approved courses, see General Education: www.lander.edu/gen-ed.)

A. Core Academic Skills

ENGL 101: Writing and Inquiry I	3
ENGL 102: Writing and Inquiry II	3
MATH 123: Calculus and Its Applications	3

B. Humanities and Fine Arts 6
(6 hours selected from 2 different disciplines)

C. Behavioral and Social Perspectives 6
(6 hours selected from 2 different disciplines)
If you already have credit for HIST 111, do not take HIST 111R; if you already have credit for HIST 112, do not take HIST 112R; if you already have credit for POLS 101, do not take POLS 101R.

D. Scientific and Mathematical Reasoning
(7 hours selected from 2 different disciplines, 1 lab science required)

MATH 211	3
Laboratory Science	4

E. Founding Documents of the United States 3
HIST 111R: United States History to 1877 or
HIST 112R: United States History since 1877 or
POLS 101R: American National Government
If you already have credit for HIST 111, do not take HIST 111R; if you already have credit for HIST 112, do not take HIST 112R; if you already have credit for POLS 101, do not take POLS 101R.

F. World Cultures 3

G. LINK 101: Leadership, Involvement, Networking and Knowledge 1

LINK 101 is required of all new transfer students who have earned less than 24 credit hours of college-level work and all first-time freshmen.

TOTAL GENERAL EDUCATION REQUIREMENTS 35

If all of the General Education requirements are met and/or waived, and the credit hours do not add up to at least 30, the General Education requirements are not complete. If below 30, additional General Education courses from any category must be taken until the total hours add up to at least 30 hours.

MAJOR PROGRAM CORE REQUIREMENTS

CIS 120: Fundamentals of Information Systems and Information Technology	3
CIS 130: Problem Solving and Programming Methods	4
CIS 230: Computer Programming Principles I	4
CIS 234: Introduction to C/C++ Programming	1
CIS 360: Database Design	3
DSCI 130: Introduction to Data Science	3
DSCI 230: Introduction to Data Science Programming	4
DSCI 231: Data Visualization	3
DSCI 330: Big Data Analysis	3
DSCI 340: Applied Machine Learning	3
DSCI 440: Applied Deep Learning	3

DSCI 499: Data Science Capstone	3
MATH 125: Introduction to Discrete Mathematics	3
MATH 208: Applied Linear Algebra	3
MATH 213: Supervised Machine Learning	3
MATH 214: Unsupervised Machine Learning	3
MAJOR PROGRAM CONCENTRATION REQUIREMENTS	
Choose 15 credit hours from the following: CIS 231: Computer Programming Principles CIS 240: Introduction to Data Communication CIS 250: Introduction to E-Commerce CIS 320: Information Systems and Practice CIS 321: Analysis and Design CIS 498: Design and Implementation in Emerging Environments CYBR 140: Networking Lab	15
TOTAL MAJOR PROGRAM REQUIREMENTS	64
ADDITIONAL ELECTIVES	**21**
Up to 15 credit hours may need to be 300-level or above. The remaining hours may be at any level.	
TOTAL FOR BS DEGREE	120

Coursework must include at least 30 credit hours earned at 300-level or above, of which 12 credit hours must be in the major.

See 4-year major guides for recommended order in which to take courses.
https://www.lander.edu/academics/registrars-office/major-guides.html

2025-2026 PROGRAM REQUIREMENTS

DEGREE: BACHELOR OF SCIENCE
MAJOR: DATA SCIENCE
CONCENTRATION: MATHEMATICS

Credit Hours

GENERAL EDUCATION REQUIREMENTS

(For approved courses, see General Education: www.lander.edu/gen-ed.)

A. Core Academic Skills

ENGL 101: Writing and Inquiry I	3
ENGL 102: Writing and Inquiry II	3
MATH 141: Calculus I	4

B. Humanities and Fine Arts 6
(6 hours selected from 2 different disciplines)

C. Behavioral and Social Perspectives 6
(6 hours selected from 2 different disciplines)
If you already have credit for HIST 111, do not take HIST 111R; if you already have credit for HIST 112, do not take HIST 112R; if you already have credit for POLS 101, do not take POLS 101R.

D. Scientific and Mathematical Reasoning
(7 hours selected from 2 different disciplines, 1 lab science required)

MATH 211	3
Laboratory Science	4

E. Founding Documents of the United States 3
HIST 111R: United States History to 1877 or
HIST 112R: United States History since 1877 or
POLS 101R: American National Government
If you already have credit for HIST 111, do not take HIST 111R; if you already have credit for HIST 112, do not take HIST 112R; if you already have credit for POLS 101, do not take POLS 101R.

F. World Cultures 3

G. LINK 101: Leadership, Involvement, Networking and Knowledge 1

LINK 101 is required of all new transfer students who have earned less than 24 credit hours of college-level work and all first-time freshmen.

TOTAL GENERAL EDUCATION REQUIREMENTS 36

If all of the General Education requirements are met and/or waived, and the credit hours do not add up to at least 30, the General Education requirements are not complete. If below 30, additional General Education courses from any category must be taken until the total hours add up to at least 30 hours.

MAJOR PROGRAM CORE REQUIREMENTS

CIS 120: Fundamentals of Information Systems and Information Technology	3
CIS 130: Problem Solving and Programming Methods	4
CIS 230: Computer Programming Principles I	4
CIS 234: Introduction to C/C++ Programming	1
CIS 360: Database Design	3
DSCI 130: Introduction to Data Science	3
DSCI 230: Introduction to Data Science Programming	4
DSCI 231: Data Visualization	3
DSCI 330: Big Data Analysis	3
DSCI 340: Applied Machine Learning	3
DSCI 440: Applied Deep Learning	3

DSCI 499: Data Science Capstone	3
MATH 125: Introduction to Discrete Mathematics	3
MATH 208: Applied Linear Algebra	3
MATH 213: Supervised Machine Learning	3
MATH 214: Unsupervised Machine Learning	3
MAJOR PROGRAM CONCENTRATION REQUIREMENTS	
MATH 142: Single Variable Calculus II	4
MATH 241: Multivariable Calculus	4
MATH 242: Differential Equations	4
MATH 300, MATH 431, or MATH 432	3
TOTAL MAJOR PROGRAM REQUIREMENTS	64
ADDITIONAL ELECTIVES	**20**
Up to 12 credit hours may need to be 300-level or above. The remaining hours may be at any level.	
TOTAL FOR BS DEGREE	120

Coursework must include at least 30 credit hours earned at 300-level or above, of which 12 credit hours must be in the major.

See 4-year major guides for recommended order in which to take courses.
https://www.lander.edu/academics/registrars-office/major-guides.html