

COMPUTER INFORMATION SYSTEMS (CIS)

Subject-area course lists indicate courses currently active for offering at the University of Louisville. Not all courses are scheduled in any given academic term. For class offerings in a specific semester, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>).

500-level courses generally are included in both the undergraduate- and graduate-level course listings; however, specific course/section offerings may vary between semesters. Students are responsible for ensuring that they enroll in courses that are applicable to their particular academic programs.

Course Fees

Some courses may carry fees beyond the standard tuition costs to cover additional support or materials. Program-, subject- and course-specific fee information can be found on the Office of the Bursar website (<http://louisville.edu/bursar/tuitionfee/>).

CIS 150. Fundamentals of Information Systems 3 Units

Term Typically Offered: Fall, Spring

Description: This course provides an overview of contemporary information systems, and how they are used in organizations. It presents an introduction to the discipline of CIS and how information systems can be used to create competitive advantage. Topics include application/web development, including the system development life cycle, information security, business process management, and emerging technologies. Students will develop basic web sites including the use of HTML, CSS, and Javascript.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

CIS 199. Software Development I 3 Units

Term Typically Offered: Fall, Spring

Prerequisite(s): CIS 150 (or concurrent).

Description: This course introduces object-oriented concepts such as the use of classes, methods, encapsulation, and inheritance. The course concentrates on using object-oriented programming to solve simple problems involving input and output. Computer lab sessions are used to reinforce programming concepts. Extensive programming assignments are required.

Note: Restricted to College of Business BSBA majors.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

CIS 200. Software Development II 3 Units

Term Typically Offered: Fall, Spring

Prerequisite(s): CIS 199.

Description: This course emphasizes object-oriented software development. Students study the object model and apply it to systems development problems. Topics include polymorphism, inheritance, and object interaction. Event-driven programming of graphical user interfaces is introduced. Application areas may include data structures, searching, sorting, and databases. Extensive programming assignments are required.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

CIS 201. Introduction to Web Programming 6 Units

Prerequisite(s): CIS 100 or CIS 250 (grade of C or better); MATH 107 (grade of C or better).

Description: This course provides an introduction to Web technologies and effective Web site design, implementation, and maintenance. The architecture of the Web, the use of the Web for sharing data, and models for using the Web to conduct business are explored. Students learn the fundamentals of web site design using languages such as HTML, JavaScript, and XML. Students become proficient in developing web sites for their own use. Additionally, this course introduces object-oriented programming using Java. Students learn the fundamentals of the object model, including the use of classes and encapsulation. The course concentrates on algorithmic development, with emphasis on sound techniques for designing, coding, debugging and documenting programs. Computer lab sessions are used to reinforce programming concepts. Extensive programming assignments are required.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

CIS 202. Software Development III 3 Units

Prerequisite(s): CIS 200 (grade of C or better) or CIS 201 (grade of C or better).

Description: This course is a continuation of CIS 200. It emphasizes object-oriented development using a strongly typed language. Students study the object model and apply its use to systems development problems. Topics include polymorphism, inheritance, and object interaction. Event-driven programming of graphic user interfaces is introduced. Application areas may include data structures, searching, sorting and databases. Extensive programming assignments are required.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

CIS 205. Information Systems in Organizations 3 Units

Term Typically Offered: Fall, Spring, Summer

Description: This course helps students develop a working understanding of the differences between information systems and information technology, and how to apply those concepts to facilitate business processes successfully. Broad information systems literacy is a goal since all business majors must take this course. This course does not include computer lab sessions.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

CIS 211. Operating Systems 3 Units Prerequisite(s): CIS 200 (grade of C or better) or CIS 201 (grade of C or better). Description: The course surveys basic computer architecture and operating system concepts. The student learns how the computer is built and organized, and how the operating systems function to manage available resources. The course provides experience with different operating systems such as Windows XP, UNIX/Linux, and MS-DOS. Topics covered include: data representations in the computer and base conversions; the CPU and memory; instruction types; I/O facilities; computer peripherals; operating system internals; file management; programming tools; and an introduction to client/server and web-based computing and applications. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)	CIS 300. Computer Information Systems 3 Units Term Typically Offered: Occasionally Offered Prerequisite(s): CIS 100 or CIS 250. Fee: An additional \$45.00 is charged for this course. Description: The study of computer information systems as they support business processes. Topics include the role of data, data manipulation, database management, information management and decision making, systems analysis and design, historical vs. current methodology in data communications, hardware and software in telecommunications, an overview of automated information systems, policies and procedures needed to protect an information system, and advanced use of spreadsheet and database software. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)
CIS 215. Introduction to Computer Information Systems 2 Units Term Typically Offered: Occasionally Offered Prerequisite(s): CIS 199 (grade of C or better) or CIS 201 (grade of C or better). Description: This course provides an overview of computer information systems and how they are used in business. It emphasizes fundamental knowledge areas and skills expected of an information systems professional. Topics include the evolution of computing equipment, a survey of types of information systems used in business, and a discussion of professional responsibilities. Students learn team building, project planning, team coordination, and project reporting techniques. Career opportunities, co-op placement, and CIS program requirements are discussed. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)	CIS 305. Data Analysis for Decision-Making 3 Units Term Typically Offered: Fall, Spring, Summer Fee: An additional \$45.00 is charged for this course. Description: This project-based course provides students with an opportunity to explore data analysis using spreadsheet and database techniques, including incorporating contemporary decision-making tools in modern spreadsheet software. This course emphasizes the roles of business analysis and knowledge workers through projects and discussions and teaches students how creative use of strong analytical skills can lead to career advancement in any business domain. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)
CIS 250. Introduction to Data and Information Management 3 Units Term Typically Offered: Fall, Spring, Summer Description: This course provides an introduction to the role of computers and other information technologies in business. Sessions in the classroom will cover the basic concepts of computer use with special attention to current technological innovation in social and business environments. Topics include technology and organizational change, telecommunications, privacy in the information age, and business security on the internet. Sessions in the computer lab will emphasize business problem solving using critical thinking techniques and commonly used analytical tools. Note: A \$30 lab fee is charged for this course. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)	CIS 310. Database Design 3 Units Term Typically Offered: Fall, Spring Prerequisite(s): CIS 199 or CIS 443. Fee: An additional \$45.00 is charged for this course. Description: This course will provide a solid and practical foundation for the design and implementation of database systems. Emphasis will be on relational database models, with significant coverage of basic relational database concepts, normalization, E-R modeling, locking, SQL, and distributed databases. Additional topics include web database, database security, access control policies and procedures, risk management, and ethical aspects of information handling. Course software includes current database tools such as SQL server. Note: Course is restricted to approved COB BSBA majors and COB Data Analytics minors. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)

- CIS 320. Systems Analysis and Design** **3 Units**
Term Typically Offered: Fall, Spring
Prerequisite(s): CIS 199, CIS 305 (or equivalent), and CIS 310 (or concurrent).
Fee: An additional \$45.00 is charged for this course.
Description: Introduces the fundamentals of object-oriented analysis and design, including experience with a CASE tool. Topics include requirements determination, feasibility analysis, modeling with Unified Modeling Language (UML) and data dictionary construction, data modeling and normalization, user interface requirements specification, and information security procedures. Development of problem and design specifications for an information systems project is required. Develops team skills, written and oral communication skills.
Course Attribute(s): CBL - This course includes Community-Based Learning (CBL). Students will engage in a community experience or project with an external partner in order to enhance understanding and application of academic content.
- For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- CIS 350. Infrastructure Technologies** **3 Units**
Term Typically Offered: Fall, Spring
Prerequisite(s): CIS 199.
Fee: An additional \$45.00 is charged for this course.
Description: This course provides an introduction to IT infrastructure issues and covers topics related to computer and systems architecture and communication networks, with an overall focus on the services and capabilities that IT infrastructure solutions enable in an organizational context. It gives students the knowledge and skills that they need for communicating effectively with professionals whose special focus is on hardware and systems software technology and for designing processes and solutions that require in-depth understanding of the IT infrastructure capabilities and limitations. It also prepares students for interaction with external vendors of IT infrastructure components and solutions.
For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- CIS 360. Business Data Communications** **3 Units**
Term Typically Offered: Occasionally Offered
Prerequisite(s): CIS 111 or CIS 202; CIS 115 or CIS 215; CIS 211; MATH 205.
Fee: An additional \$45.00 is charged for this course.
Description: This course explores the fundamental concepts of business data communications and networking. Preliminary discussion will trace the evolution of telecommunications, its regulation over the years, laws governing telecommunications, and the role of regulatory bodies. Primary focus will be on data communications technologies and infrastructure used shared data among business organizations. Students study common network technologies and learn how to apply them to business situations. Topics include data transmission, terminal-host communication, TCP/IP, OSI model, Local Area Network (LAN) technologies, network standards, Wide Area Network (WAN), wireless communication, network management, communication security, security tools, privacy and ethics, and laws governing data communications.
For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- CIS 371. Excel Programming with VBA** **1.5 Units**
Prerequisite(s): CIS 100 or CIS 250; CIS 300; restricted to non-CIS Business students.
Description: Practical information systems development experience using Microsoft Excel and Visual Basic for Applications (VBA). Students will learn to use Excel and VBA as a programming environment for creating information systems solutions. Topics might include an introduction to VBA, its main components and objects, and their properties, methods, and events. Through hands-on work, students will learn to develop solutions, debug, handle errors, and create custom reports.
For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- CIS 380. Software for Business I** **1-3 Units**
Prerequisite(s): CIS 300; restricted to Accounting and Finance majors.
Fee: An additional \$45.00 is charged for this course.
Description: Experience with contemporary software products used in business. Students will acquire hands-on experience using the software in analyzing business problems or in creating information systems useful in business. Software products will vary as technology evolves, and will address topics of current interest such as project management, data storage and use, decision support, and web authoring.
For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- CIS 381. Software for Business II** **1-3 Units**
Prerequisite(s): CIS 300; restricted to Accounting and Finance majors.
Description: A continuation of CIS 380 for students seeking additional experience with contemporary software products.
For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- CIS 390. Special Topics** **1-3 Units**
Term Typically Offered: Occasionally Offered
Prerequisite(s): CIS 199.
Fee: An additional \$45.00 is charged for this course.
Description: Practical information systems development experience using contemporary PC programming tools and environments. Topics will vary as technology evolves, and will include topics of current interest such as network administration, Rapid Application Development, and World Wide Web development.
For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

- CIS 391. Windows Network Administration** 1.5 Units
Grading Basis: Pass/Fail
Prerequisite(s): CIS 111 or CIS 202; CIS 115 or CIS 215; CIS 211; restricted to CIS students.
Description: Practical network administration experience using Microsoft's client/server operating system. Students will learn to perform fundamental network administration and installation tasks. Topics might include account policies, network resources, permission for files and folders, printer environments, partitions, network transport protocols, and network services. Through hands-on work, students will learn to install and configure the operating system, create user and group accounts, monitor and manage network resources, and install and configure network services.
For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- CIS 392. VB NET Programming** 1.5 Units
Term Typically Offered: Occasionally Offered
Prerequisite(s): CIS 111 or CIS 202; CIS 115 or CIS 215; CIS 211; restricted to CIS students.
Fee: An additional \$45.00 is charged for this course.
Description: Practical information systems development experience using Microsoft VB NET. Students will develop logical problem solving skills and methods for translating a problem description into appropriate logic structures and coding statements. Topics might include programming constructs, variables, arrays, procedures, commonly used VB controls, menus, and database access. Through hands-on-work, students will develop proficiency with programming logic, event-driven programming, objects and their use, and Windows application development.
For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- CIS 396. Zero-Credit Internship-Computer Information Systems** 0 Units
Grading Basis: Pass/Fail
Term Typically Offered: Occasionally Offered
Prerequisite(s): CIS 199 and CIS 305; good academic standing; validation through the Ulmer Career Management Center; students must be Computer Information Systems majors.
Fee: An additional \$45.00 is charged for this course.
Description: A new workplace experience in an approved Computer Information Systems position which offers a progression of learning in a level appropriate opportunity for practical application of classroom theory and tools. This program is available to students who have received the maximum number of co-op credit hours for their major. Application to the zero-credit internship program and completion of orientation processes should be accomplished prior to employment.
Note: This course is restricted and requires permission from the Ulmer Career Management Center.
For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- CIS 397. Co-op in Computer Information Systems I** 3 Units
Grading Basis: Pass/Fail
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): CIS 199 & CIS 305, good academic standing and validation from the Ulmer Career Center.
Description: Must be a CIS major. CIS majors only. A new workplace experience in an approved CIS position that offers the student an opportunity for practical application of classroom theory and tools.
Note: Application to the co-op program and completion of the orientation process should be completed prior to employment.
Note: Can be taken with CIS 398 for a total of six (6) hours of co-op credit, students may register for CIS 397 and CIS 398 in one or two semesters.
Course Attribute(s): CBL - This course includes Community-Based Learning (CBL). Students will engage in a community experience or project with an external partner in order to enhance understanding and application of academic content.
For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- CIS 398. Co-op in Computer Information Systems II** 1-3 Units
Grading Basis: Pass/Fail
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): CIS 397 (or concurrent); university GPA of 2.50; validation through the College of Business Co-op Office.
Description: A new or continued workplace experience in an approved CIS position which offers new learning and/or additional responsibilities that continue the student's progression of learning and opportunity for practical application of classroom concepts and tools.
Note: Usually taken concurrently with CIS 397 for a total of six hours of co-op credit for a six month, full-time work place experience; students may register for CIS 397 and CIS 398 in one or two semesters.
Course Attribute(s): CBL - This course includes Community-Based Learning (CBL). Students will engage in a community experience or project with an external partner in order to enhance understanding and application of academic content.
For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- CIS 399. Co-op in Computer Information Systems III** 3 Units
Grading Basis: Pass/Fail
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): Permission of College of Business Co-op Office.
Description: A new or continued workplace experience in an approved CIS position which offers new learning and/or additional responsibilities that continue the student's progression of learning and opportunity for practical application of classroom theory and tools.
Course Attribute(s): CBL - This course includes Community-Based Learning (CBL). Students will engage in a community experience or project with an external partner in order to enhance understanding and application of academic content.
For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

CIS 410. Management of Information Systems - CUE **3 Units**

Term Typically Offered: Fall, Spring

Prerequisite(s): CIS 310, CIS 320, and CIS 350; Senior standing.

Fee: An additional \$45.00 is charged for this course.

Description: Explores strategic development of information technology; value chain analysis and its application to information resource management; information systems planning; organizing, staffing, and controlling the deployment of information technology; the development of an IT platform and architecture consistent with organizational structure.

Course Attribute(s): CUE - This course fulfills the Culminating Undergraduate Experience (CUE) requirement for certain degree programs. CUE courses are advanced-level courses intended for majors with at least 90 earned credits/senior-level status., CBL - This course includes Community-Based Learning (CBL). Students will engage in a community experience or project with an external partner in order to enhance understanding and application of academic content.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

CIS 411. Web Application Development **3 Units**

Term Typically Offered: Fall, Spring

Prerequisite(s): CIS 200, CIS 310, and CIS 350.

Fee: An additional \$45.00 is charged for this course.

Description: This course introduces dynamic web applications and how they are developed. Students will understand the role of client-side and server-side technologies, and use web forms, various server controls and session objects to develop multipage web applications. Students will gain system development experience with current web development tools and platforms.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

CIS 415. Careers in Information Systems **1 Unit**

Grading Basis: Pass/Fail

Term Typically Offered: Occasionally Offered

Prerequisite(s): CIS 310; CIS 215 or CIS 315; CIS 320; CIS 360.

Fee: An additional \$45.00 is charged for this course.

Description: Provides an assessment of the student's development as an information systems professional. The emphasis of the course is on completion and presentation of the student's information systems portfolio. Career development activities include: resume preparation and review, career planning, professional information systems organizations and networking, and lifelong learning opportunities. Taught on pass-fail basis.

Note: Students are encouraged to enroll in this course during their last semester of CIS coursework.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

CIS 420. CIS Development Project **3 Units**

Term Typically Offered: Fall, Spring

Prerequisite(s): CIS 310, CIS 320 and CIS 350.

Fee: An additional \$45.00 is charged for this course.

Description: A continuation of CIS 320, this course focuses on the detailed design and implementation phases of the system development life cycle, including user acceptance testing, test planning, design reviews, and change procedures. Specifications created in CIS 320 are used to implement, test, and install a working version of an information system. System deployment emphasizes a web-based architecture. A prototyping approach is taken to develop and test the system in an iterative manner. Students are grouped into project teams, and each team member accepts task assignments necessary to deliver the information system prototype.

Course Attribute(s): CBL - This course includes Community-Based Learning (CBL). Students will engage in a community experience or project with an external partner in order to enhance understanding and application of academic content.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

CIS 430. User Interface Design **3 Units**

Prerequisite(s): CIS 320.

Description: This course provides a conceptual basis and practical guidelines for the design and development of graphical user interfaces. The course introduces Human-Computer interaction and human factor concepts. Design emphasis is placed on effective information presentation and usability concerns. Development of prototype user interfaces using contemporary GUI software, such as Visual Basic or Web development tools is required.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

CIS 440. Object-Oriented Methods **3 Units**

Prerequisite(s): CIS 310; CIS 215 or CIS 315; CIS 320; CIS 360.

Description: Information System analysis, design, and implementation using the object-oriented paradigm. Topics include inheritance, encapsulation, and polymorphism, and their use in design and implementing effective object-oriented systems. Exposure to an object-oriented CASE tool and programming with object-oriented language, such as C++, are expected.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

CIS 443. Analytics Programming **3 Units**

Term Typically Offered: Fall, Spring

Prerequisite(s): One of the following: BSTA 301, BSTA 201, MATH 109, PSYC 301, SOC 301, CJ 326, MGMT 201 or equivalent.

Fee: An additional \$45.00 is charged for this course.

Description: Open to all UofL students. This course introduces general programming concepts and techniques to a data analytics audience with no prior programming experience. Students will learn programming techniques that support business analytics with hands-on programming including accessing data, creating informative data graphics, writing functions, debugging, and organizing code. Examples are drawn from the problems and programming patterns often encountered in data analysis. It will use a popular analytics programming language such as Python.

For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)

<p>CIS 444. Data Analytics Term Typically Offered: Fall, Spring Prerequisite(s): For CIS 444: One of the following: BSTA 301, BSTA 201, MATH 109, PSYC 301, SOC 301, CJ 326, MGMT 201 or equivalent. Fee: An additional \$45.00 is charged for this course. Description: Open to all UofL students. For MGMT 459: BSTA 301 (or BSTA 201, MATH 109, PSYC 301, SOC 301, CJ 326, MGMT 201 or equivalent), CIS 205, AND CIS 305. Restricted to College of Business MGMT majors and minors. This course reviews and builds on the fundamental statistical concepts and techniques covered in the undergraduate Business Statistics course. Students will learn to model data and use analytical skills to solve real business problems. Topics include exploratory data analysis, estimation, statistical inference about populations, hypothesis testing, ANOVA, linear and multiple regression, and logistic regression. Note: CIS 444 is cross listed with MGMT 459.</p> <p>For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>3 Units</p>	<p>CIS 447. Advanced Business Analytics Prerequisite(s): CIS 445 and CIS 446. Fee: An additional \$45.00 is charged for this course. Description: This course teaches students how to use state of the art analytical tools (e.g.; Hadoop, SAS Enterprise Miner) to handle data that comes in a variety of forms and sizes in more complex, less structured business situations. Students will participate in extensive hands-on work solving realistic business problems. This course guides students with handling optimization models, Monte Carlo simulations, and decision analysis. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>3 Units</p>
<p>CIS 445. Machine Learning Term Typically Offered: Fall Only Prerequisite(s): CIS 310, CIS 443, CIS 444. Fee: An additional \$45.00 is charged for this course. Description: Open to all UofL students. This course introduces basic machine learning concepts, techniques and its application to business problems. Topics include data preparation, feature selection, predictive modeling, classification, clustering, evaluation, validation, supervised & unsupervised, reinforcement, deep learning and scalability. The emphasis will be on the application of machine learning techniques to problems in a business context. While there will be discussion about use of machine learning tool and common techniques, the math behind those techniques is not the focus of this course. Machine learning techniques about both structured and unstructured data (such as natural text) are discussed. Heavy use of a machine learning software (e.g., SAS, SPSS) is expected. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>3 Units</p>	<p>CIS 450. Special Topics in Data Analytics Term Typically Offered: Spring Only Prerequisite(s): CIS 310, CIS 443, CIS 444. Description: Open to all students. Explore current topics of interest in data science such as data visualization, blockchain, and cloud computing. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>1.5-3 Units</p>
<p>CIS 446. Business Analytics Prerequisite(s): CIS 444. Fee: An additional \$45.00 is charged for this course. Description: This course provides a hands-on learning experience using advanced statistical tools (e.g., SAS and SPSS) that can be leveraged to work with structured data and generate business knowledge. This course covers sophisticated techniques, such as predictive modeling, time-series analysis, and growth modeling. After taking this course, students are expected to be able to: (1) solve common analytical business problems; (2) think systematically about if and how data can help make better-informed decisions; (3) and use business analytical tools. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>3 Units</p>	<p>CIS 455. Computer Ethics, Social Issues and the Law Prerequisite(s): CIS 150 and CIS 300. Description: Provides an introductory examination of the ethical, social, and legal aspects of computing. Topics include responsibilities for computer professionals, intellectual property, privacy, social interaction in electronic forums, policy and other current issues. Case studies, in-class discussion, and position papers are used extensively. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>3 Units</p>
<p>CIS 447. Business Analytics Prerequisite(s): CIS 444. Fee: An additional \$45.00 is charged for this course. Description: This course provides a hands-on learning experience using advanced statistical tools (e.g., SAS and SPSS) that can be leveraged to work with structured data and generate business knowledge. This course covers sophisticated techniques, such as predictive modeling, time-series analysis, and growth modeling. After taking this course, students are expected to be able to: (1) solve common analytical business problems; (2) think systematically about if and how data can help make better-informed decisions; (3) and use business analytical tools. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>3 Units</p>	<p>CIS 460. Advanced Networking Prerequisite(s): CIS 360. Description: This course will cover material relating to network primarily, with several hands-on lab sessions using Cisco and other routers. The principal topics to be covered are: TCP/IP architecture, OSI 7-layer model, IP addressing, Subnet masking, study of protocols such as RIP, BGP, IGRP, IS-IS, X.25, ATM, ARP, OSPF, and networks such as DEC-net and AppleTalk. We will also discuss concepts involving hub, bridge, switch, router, cabling, Voice over IP, Telnet, FTP, Frame Relay, Virtual LAN, network security, security policies and procedures, and risk analysis. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>3 Units</p>
<p>CIS 448. Business Analytics Prerequisite(s): CIS 444. Fee: An additional \$45.00 is charged for this course. Description: This course provides a hands-on learning experience using advanced statistical tools (e.g., SAS and SPSS) that can be leveraged to work with structured data and generate business knowledge. This course covers sophisticated techniques, such as predictive modeling, time-series analysis, and growth modeling. After taking this course, students are expected to be able to: (1) solve common analytical business problems; (2) think systematically about if and how data can help make better-informed decisions; (3) and use business analytical tools. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>3 Units</p>	<p>CIS 465. Advanced Cobol Prerequisite(s): CIS 310; CIS 215 or CIS 315; CIS 320; CIS 360. Description: Analysis, design and implementation of advanced business information systems using the COBOL programming language. The course focuses on the COBOL 85 standard and covers aspects of the previous COBOL 74 standard so that students have the abilities needed to maintain and modify older "legacy" systems. Topics covered include: array processing and multilevel tables; advanced file sorting, merging, and searching; indexed and interactive file processing; subroutines; ALL statement; COPY statement; VSAM file concepts; and CICS and SQL concepts. The IBM COBOL compiler is used on a system running under the VM/CMS operating system. For class offerings for a specific term, refer to the Schedule of Classes (http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm)</p>	<p>3 Units</p>

- CIS 475. Enterprise Internet Computing** **3 Units**
Prerequisite(s): CIS 310; CIS 215 or CIS 315; CIS 320; CIS 360.
Description: Provides a framework to understand and evaluate current and emerging Internet-based technologies. The focus of the course is on understanding, designing, and implementing enterprise-level Internet systems. These secure, robust, scalable, and integrated solutions will be implemented using current web services architecture, such as J2EE. Case studies and projects provide hands-on exposure to these technologies and their applications.
 For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- CIS 480. Introduction to Network Security** **3 Units**
Term Typically Offered: Fall Only
Prerequisite(s): CIS 350, CIS 481.
Fee: An additional \$45.00 is charged for this course.
Description: Basic concepts of networking, operations security, protocol features for security, transmission security, packet filtering, TCP wrappers, firewalls, computer viruses, physical protection, legal protection, liability issues, significance of National Security Directive 42, implications of Computer Security Act, CERT recommendations, assessment of threats and vulnerabilities of systems, security countermeasures, contingency planning, disaster recovery, risk management, and auditing and monitoring, policies and procedures dealing with storage and disposition of sensitive data.
 For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- CIS 481. Introduction to Information Security** **3 Units**
Term Typically Offered: Summer Only
Prerequisite(s): CIS 350.
Fee: An additional \$45.00 is charged for this course.
Description: Basic notions of confidentiality, integrity, availability, authentication models, protection models, security kernels, audit, intrusion detection, operational security issues, physical security issues, security system life cycle management, personnel security, policy formation and enforcement, trust modeling, risks and vulnerabilities assessment, basic issues of law and privacy, trade secrets, employee covenants, copyright, database protection, software and hardware validation, verification and certification.
 For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- CIS 482. Introduction to Cryptography** **3 Units**
Term Typically Offered: Occasionally Offered
Prerequisite(s): CIS 300; MATH 180 or MATH 205 or EAC 101.
Fee: An additional \$45.00 is charged for this course.
Description: Basic concepts of cryptology, historical ciphers, modern symmetric ciphers such as DES, public key cryptography (RSA, elliptic curve cryptosystems), efficient hardware and software implementations of cryptographic primitives, copyright protection (including the Digital Millennium Copyright Act), requirements for implementation of cryptographic modules, data integrity and authentication, digital signature schemes, key exchange and key management, standard protocols for secure mail, electronic payments, security aspects of mobile communications, key escrow schemes, Smart cards, and social implications of new technologies.
 For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- CIS 483. Introduction to Database Security** **3 Units**
Term Typically Offered: Spring Only
Prerequisite(s): CIS 310 and CIS 481.
Fee: An additional \$45.00 is charged for this course.
Description: Basic data protection methods such as discretionary and mandatory access controls, secure database design, data integrity, secure architectures, secure transaction processing, information flow controls, and auditing, copyright and database protection, privacy issues (including employee records and HIPAA). Security models for relational and object-oriented databases, security of databases in a distributed environment, survey of commercial systems, and research prototypes.
 For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- CIS 484. Computer Forensics** **3 Units**
Term Typically Offered: Spring Only
Prerequisite(s): CIS 350 and CIS 481.
Fee: An additional \$45.00 is charged for this course.
Description: Basic computer forensics concepts involving evidence collection, preservation, and presentation in court. Technology tools to analyze files, implications on privacy, ethics, policies, risk management and legal aspects will be covered.
 For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- CIS 490. Special Topics in Computer Information Systems** **3 Units**
Term Typically Offered: Fall Only
Prerequisite(s): One of the following: BSTA 301, BSTA 201, MATH 109, PSYC 301, SOC 301, CJ 326, MGMT 201 or equivalent.
Fee: An additional \$45.00 is charged for this course.
Description: Explores contemporary topics of current interest in information systems, such as emerging telecommunications technologies, decision support, end-user computing, and distributed database management.
 For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- CIS 499. Independent Study Computer Information Systems** **3 Units**
Term Typically Offered: Fall, Spring, Summer
Prerequisite(s): CIS 310, CIS 320, and CIS 350.
Fee: An additional \$45.00 is charged for this course.
Description: Written proposal must be sponsored by at least one faculty member and approved by the Department Chair.
 For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)
- CIS 500. Computer Concepts for Managers** **1.5 Units**
Grading Basis: Pass/Fail
Prerequisite(s): ISDP 154 and ISDP 155; CIS 300.
Description: Fundamentals of application based software including spreadsheet, data manipulation and reporting, presentation graphics, and public network access.
Note: Pass/fail grading.
 For class offerings for a specific term, refer to the Schedule of Classes (<http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>)