

INFORMATION SYSTEMS, BACHELOR OF SCIENCE (B.S.)

The mission of the Bachelor of Science in Information Systems is to prepare students for successful careers as information systems professionals through a curriculum that combines technical computing knowledge, skills and techniques with relevant business knowledge.

INFO 202 and MATH 211 are prerequisites for many upper-level information systems courses. Students may wish to choose their upper-level information systems electives to gain enhanced proficiency in the following areas:

Course	Title	Hours
Application development		
INFO 450	Advanced Programming	3
INFO 451	Advanced Technology for E-business	3
Business analysis		
INFO 463	Business Process Engineering	3
INFO 468	Information Engineering	3
Information and communications technology		
INFO 472	Infrastructure Services	3
INFO 474	Advanced Networking and Security	3

Learning goals (program objectives)

The major in information systems provides a curriculum that:

- Prepares students to begin professional careers upon graduation by providing experience with the most current technologies needed to support the secure delivery and management of information systems
- Supports career advancement over time by giving our graduates the academic foundation in information systems needed for continued professional development
- Supports the information systems needs of the business community

Learning outcomes (student outcomes)

Upon completing this program, students will have:

- An ability to apply knowledge of computing and mathematics appropriate to the discipline
- An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
- An ability to design, implement and evaluate a computer-based system, process, component or program to meet desired needs
- An understanding of professional, ethical, legal, security and social issues and responsibilities
- An understanding of the processes that support the delivery and management of information systems within a specific application
- An ability to communicate effectively with a range of audiences
- An ability to analyze the local and global impact of computing on individuals, organizations and society
- Recognition of the need for and an ability to engage in continuing professional development
- An ability to use current techniques, skills and tools necessary for computing practice

- An understanding of processes that support the delivery and management of information systems within business application environments

Special requirements

The foundation program specifies course work required during the freshman and sophomore years. Students are eligible for admission into the advanced business program with a major in the School of Business upon meeting the minimum cumulative GPA requirement and successful completion of:

Course	Title	Hours
A minimum of 54 credits in the foundation program		54
ACCT 203 & ACCT 204	Introduction to Accounting I and Introduction to Accounting II	6
BUSN 201	Foundations of Business	3
BUSN 212	Differential Calculus and Optimization for Business	3
or MATH 200	Calculus with Analytic Geometry I	
BUSN 225	Winning Presentations	3
ECON 210	Principles of Microeconomics	3
ECON 211	Principles of Macroeconomics	3
INFO 160	Digital Literacy: Computer Concepts, Internet, Digital Devices	1
INFO 161	Digital Literacy: Word Processing Skills	1
INFO 162	Digital Literacy: Spreadsheets Skills I	1
INFO 165	Digital Literacy: Spreadsheet Skills II	1
UNIV 111 Play course video for Focused Inquiry I	Focused Inquiry I	3
UNIV 112 Play course video for Focused Inquiry II	Focused Inquiry II (with a minimum grade of C)	3
UNIV 200	Inquiry and the Craft of Argument (with a minimum grade of C)	3

The admission requirements for the School of Business (<http://bulletin.vcu.edu/undergraduate/business/undergraduate-information/academic-policies/>) detail the deadlines for students to be admitted to the advanced business program with a major in the school. At least 30 hours of the required business courses for the Bachelor of Science must be taken at VCU.

All baccalaureate degree programs in the School of Business require successful completion of the business knowledge exam as administered in BUSN 499.

Students may need to take additional mathematics courses as prerequisites to BUSN 212 or MATH 200. These credits will count as electives in the foundation program. The sample curriculum outline provides an example in which BUSN 171 is used as a prerequisite for BUSN 212.

The INFO 160, INFO 161, INFO 162 and INFO 165 requirements may be waived upon successful completion of a Knowledge Equivalency Test administered by the Undergraduate Studies Office. No more than two additional credits may be applied to the degree from the INFO 16x series.

A maximum of six credits in INFO 491 may be applied to the degree.

No more than four credits in physical education courses may be applied to the degree.

INTL 493 may not be counted toward a business degree.

Credit for SPCH 121 or SPCH 321 will substitute for BUSN 225, and no more than three credits of these courses may be applied toward a business degree. Credit for STAT 210 or STAT 212 will substitute for SCMA 301. Students who earned a minimum grade of B in ECON 203 at VCU may substitute that credit for ECON 210.

Degree requirements for Information Systems, Bachelor of Science (B.S.)

Business foundation (60 credits minimum) ¹

General Education requirements (34 credits minimum) ²

Course	Title	Hours
University Core Education Curriculum		
UNIV 111 Play course video for Focused Inquiry I	Focused Inquiry I	3
UNIV 112 Play course video for Focused Inquiry II	Focused Inquiry II	3
UNIV 200	Inquiry and the Craft of Argument	3
Approved humanities/fine arts		3
Approved natural/physical sciences		3-4
Approved quantitative literacy:		
BUSN 212 or MATH 200	Differential Calculus and Optimization for Business Calculus with Analytic Geometry I	3-4
Approved social/behavioral sciences		3-4
Total Hours		21-24

Course	Title	Hours
Business general education requirements		
ECON 210	Principles of Microeconomics	3
ECON 211	Principles of Macroeconomics	3
INFO 160	Digital Literacy: Computer Concepts, Internet, Digital Devices	1
INFO 161	Digital Literacy: Word Processing Skills	1
INFO 162	Digital Literacy: Spreadsheets Skills I	1
INFO 165	Digital Literacy: Spreadsheet Skills II	1
MATH 211	Mathematical Structures	3
Total Hours		13

Additional Business Foundation requirements

Course	Title	Hours
ACCT 203 & ACCT 204	Introduction to Accounting I and Introduction to Accounting II	6
BUSN 201	Foundations of Business	3
BUSN 225	Winning Presentations	3
INFO 202	Introduction to E-business Technologies	3
Open electives		8-11
Total Hours		23-26

¹

Students may complete additional course work (if needed) in electives to total 60 credit hours in business foundation.

²

Students who receive waivers to these required courses must complete additional business general education electives to reach the 34-credit minimum.

Advanced business program (60 credits minimum)

Course	Title	Hours
Advanced business core		
BUSN 325	Organizational Communication	3
BUSN 499	Business Knowledge Exam	0
FIRE 311	Financial Management	3
MGMT 303	Creativity and Ideation	3
MGMT 310	Managing People in Organizations	3
MGMT 434	Strategic Management (capstone)	3
MKTG 301	Marketing Principles	3
SCMA 301	Business Statistics I	3
Major requirements		
Advanced core (flexible by major)		
INFO 320	Business Intelligence and Data Mining	3
BUSN 323	Legal Environment of Business	3
INFO 361	Systems Analysis and Design	3
INFO 461	Information Systems Planning and Project Management	3
SCMA 302	Business Statistics II	3
Major-specific courses		
INFO 300	Information Technology Infrastructure	3
INFO 350	Programming	3
INFO 364	Database Systems	3
INFO 370	Fundamentals of Data Communications	3
INFO 465	Projects in Information Systems	3
Approved INFO electives		9
Total Hours		60

The minimum total of credit hours required for this degree is 120.

Business general education electives

Course	Title	Hours
Additional University Core Education Curriculum approved courses		
Any AFAM, ANTH, ANTZ, ARTH, BIOL, BIOZ, CHEM, CHEZ, CRJS, DANC, ENGL, ENVS, FRSC, FRSZ, HIST, INNO, INSC, INTL (except INTL 493), MASC, MATH, PHIL, PHYS, PHYZ, POLI, PSYC (except PSYC 214), RELS, SOCS, SOCY, USRP or WRLD course		
Any foreign language course		
Any honors-designated course taught outside of the School of Business		
Any of the following UNIV courses:		
UNIV 211	Food for Thought	

UNIV 213 Play course video for The Truth About Lying	The Truth About Lying	
UNIV 217	Finding Your Voice in Contemporary Society	
UNIV 222	Pseudoscience	
UNIV 299	What's the Big Idea?	

Information systems electives

Course	Title	Hours
BUSN 400 & BUSN 401	Principles of Consulting and International Consulting Practicum (if this option is chosen, both must be taken)	6
INFO 450	Advanced Programming	3
INFO 451	Advanced Technology for E-business	3
INFO 463	Business Process Engineering	3
INFO 468	Information Engineering	3
INFO 472	Infrastructure Services	3
INFO 474	Advanced Networking and Security	3
INFO 481	Information Technology Auditing	3
INFO 482	Introduction to Enterprise Resource Planning Systems	3
INFO 491	Topics in Information Systems	1-3
INFO 492	Independent Study in Information Systems (requires departmental approval)	1-3
INFO 493	Internship in Information Systems (requires departmental approval)	3

What follows is a sample plan that meets the prescribed requirements within a four-year course of study at VCU. Please contact your adviser before beginning course work toward a degree.

Freshman year

Fall semester		Hours
BUSN 171	Mathematical Applications for Business	3
INFO 160	Digital Literacy: Computer Concepts, Internet, Digital Devices	1
INFO 162	Digital Literacy: Spreadsheets Skills I	1
UNIV 101	Introduction to the University (satisfies open elective)	1
UNIV 111 Play course video for Focused Inquiry I	Focused Inquiry I	3
University Core Education Curriculum approved courses		6
Term Hours:		15

Spring semester

BUSN 212	Differential Calculus and Optimization for Business	3
BUSN 225	Winning Presentations	3
INFO 161	Digital Literacy: Word Processing Skills	1
INFO 165	Digital Literacy: Spreadsheet Skills II	1

UNIV 112 Play course video for Focused Inquiry II	Focused Inquiry II	3
University Core Education Curriculum approved course		3
Term Hours:		14

Sophomore year

Fall semester

ACCT 203	Introduction to Accounting I	3
BUSN 201	Foundations of Business	3
ECON 210	Principles of Microeconomics	3
INFO 202	Introduction to E-business Technologies	3
UNIV 200	Inquiry and the Craft of Argument	3
Term Hours:		15

Spring semester

ACCT 204	Introduction to Accounting II	3
BUSN 323	Legal Environment of Business	3
ECON 211	Principles of Macroeconomics	3
MATH 211	Mathematical Structures	3
MKTG 301	Marketing Principles	3
Term Hours:		15

Junior year

Fall semester

BUSN 325	Organizational Communication	3
INFO 361	Systems Analysis and Design	3
MGMT 303	Creativity and Ideation	3
MGMT 310	Managing People in Organizations	3
SCMA 301	Business Statistics I	3
Term Hours:		15

Spring semester

INFO 300	Information Technology Infrastructure	3
INFO 364	Database Systems	3
INFO 461	Information Systems Planning and Project Management	3
SCMA 302	Business Statistics II	3
Business general education elective		3
Term Hours:		15

Senior year

Fall semester

FIRE 311	Financial Management	3
INFO 320	Business Intelligence and Data Mining	3
INFO 350	Programming	3
INFO 370	Fundamentals of Data Communications	3
Approved information systems elective		3
Term Hours:		15

Spring semester

BUSN 499	Business Knowledge Exam	0
INFO 465	Projects in Information Systems	3
MGMT 434	Strategic Management	3
Approved information systems electives		6

Open electives	4
Term Hours:	16
Total Hours:	120

The minimum total of credit hours required for this degree is 120.

INFO 160. Digital Literacy: Computer Concepts, Internet, Digital Devices. 1 Hour.

Semester course; 1 credit. Overview of basic computer concepts, the Internet, new technologies and digital security. Topics include but are not limited to computing devices – hardware and software – skills for using and evaluating Internet content and security with digital devices. This course provides the foundation in digital technologies to prepare students for other business courses and application software courses in the INFO16X series. Administered as a self-paced course with all online content. Graded as pass/fail at 80 percent pass level with on-campus assessment. Purchase of online training/assessment package required.

INFO 161. Digital Literacy: Word Processing Skills. 1 Hour.

Semester course; 1 lecture hour. 1 credit. Presents academic- and professional-level word processing skills. Topics include but are not limited to document preparation and modification, tables and graphic enhancements, collaboration, formatting for research papers, newsletters, forms, and linking to other applications. The course will help students prepare documents to support professional tasks and other VCU course work. Administered as a self-paced course. Graded as Pass/Fail at 80 percent pass level with on-campus assessment. Purchase of online training/assessment package required.

INFO 162. Digital Literacy: Spreadsheets Skills I. 1 Hour.

Semester course; 1 credit. Introduces students to academic and professional spreadsheet skills. Topics include but are not limited to the entering of text, numbers and formulas; formatting; moving; copying; recalculation; retrieving; charting; saving; and printing with introductory coverage of data manipulation. The course will help students prepare analyses, tables and charts to assist with professional tasks and other VCU course work. Administered as a self-paced course. Graded as pass/fail at 80 percent pass level with on-campus assessment. Purchase of online training/assessment package required.

INFO 163. Introduction to Web Page Design and Application Software. 1 Hour.

Semester course; 1 credit. Introduces students to Web page design and construction using application software. Topics include Web page creation and modification, hypertext links, tables, graphics, and website organization. Graded as pass/fail. Administered as a self-paced, computer-aided instructional course.

INFO 165. Digital Literacy: Spreadsheet Skills II. 1 Hour.

Semester course, 1 credit. Presents intermediate-level academic and professional spreadsheet skills. Topics include but are not limited to advanced formulas, statistical and financial functions, multiple worksheet/workbook management, macros and pivot tables. This course is designed for students wanting to advance their previous spreadsheet skills. Administered as a self-paced course with all online content. Graded as pass/fail at 80 percent pass level with on-campus assessment. Purchase of online training/assessment package required.

INFO 166. Digital Literacy: Database Skills. 1 Hour.

Semester course; 1 credit. Introduces students to academic and professional database skills. Topics include but are not limited to creating and editing tables and forms, sorting and filtering data, and generating reports. Administered as a self-paced, online course. Graded as pass/fail at 80 percent pass level with on-campus assessment. Purchase of online training/assessment package required.

INFO 167. Introduction to Internet Researching. 1 Hour.

Semester course; 1 lecture hour. 1 credit. Course emphasizes Internet search tools and research skills development while expanding students understanding of the World Wide Web and its resources. Students will learn to explore and evaluate the various types of search sites, including the VCU Library Internet resources and learn skills for developing researching strategies. Using a microcomputer-based Web browser such as Internet Explorer or Netscape, students will learn about advanced browser features that will aid them in their search efforts. This course provides the necessary foundation to help students better find and use Web resources for documents and papers that other VCU course work may require.

INFO 168. Digital Literacy: Presentation Skills. 1 Hour.

Semester course; 1 credit. Introduces students to academic and professional presentation skills. Topics include but are not limited to creating and editing presentations, creating and modifying images/graphics, and use of video/audio media tools. The course will help students prepare presentations for professional tasks and other VCU course work. Administered as a self-paced course. Graded as pass/fail at 80 percent pass level with on-campus assessment. Purchase of online training/assessment package required.

INFO 169. Multimedia Presentations. 1 Hour.

Short course; 1 lecture hour. 5 weeks. 1 credit. Familiarizes students with the fundamental use of multimedia to enhance presentations. Topics include adding animation, creating templates, linking to other resources as well as audio and video. The course will help students to prepare more effective and professional presentations.

INFO 202. Introduction to E-business Technologies. 3 Hours.

Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 160 or passing score on the Knowledge Equivalency Test (see: www.business.vcu.edu/infosys/ket.html). Introduces students to the technologies used in e-business. Students will be introduced to current or emerging Web languages, e-business software development environments, Web application servers and other packages used in creating and running Web applications.

INFO 250. Introduction to Programming. 3 Hours.

Semester course; 3 lecture hours. 3 credits. Prerequisites: INFO 160 and BUSN 171*. Introduces students to writing, testing and debugging Java programs using simple logic and algorithms. Basic Java applets and the graphic user interface are covered. Cannot be used as an elective in the information systems major. *Formerly MGMT 171, SCMA 171.

INFO 291. Topics in Information Systems. 1-3 Hours.

Variable hours. Variable credit. Maximum of 3 credits per topic. Prerequisite: permission of instructor. An in-depth study of selected business topics. Graded as pass/fail at the option of the department.

INFO 300. Information Technology Infrastructure. 3 Hours.

Semester course; 3 lecture hours. 3 credits. Pre- or co-requisite: INFO 202, CMSC 245 or CMSC 255. Principles of computer hardware and software architecture, network communications technologies and security. Introduction to data structures.

INFO 320. Business Intelligence and Data Mining. 3 Hours.

Semester course; 3 lecture hours. 3 credits. Prerequisite: MGMT 301, SCMA 301 or STAT 210. Enrollment is restricted to students who have completed at least 54 credit hours (junior standing). Modeling business-related problems using information systems tools and quantitative techniques. Focus is on extraction, translation and loading of relevant business and external data, quantitative analysis and presentation of findings. Typical problem situations involve suggested productivity improvements, revenue enhancement opportunities and marketing.

INFO 350. Programming. 3 Hours.

Semester course; 3 lecture hours. 3 credits. Prerequisites: INFO 202, INFO 250, CMSC 245 or CMSC 255; and MATH 211, both with a minimum grade of C. Object-oriented programming and algorithmic design are introduced using C# and the .NET Framework. Emphasizes building business applications using the .NET Framework Class Library and the components, events and message handling therein. Intermediate Web application development is also covered. Students cannot receive credit for both CMSC 256 and INFO 350.

INFO 360. Business Information Systems. 3 Hours.

Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 160. This course is restricted to students who have completed at least 54 credit hours (junior standing). Provides an understanding of the importance of computer-based information in the success of the firm. Emphasis is on the role of information systems within each of the functional areas of business. Major concepts include data management, decision support and management information systems.

INFO 361. Systems Analysis and Design. 3 Hours.

Semester course; 3 lecture hours. 3 credits. This course is restricted to students who have completed at least 54 credit hours (junior standing). Examines the concepts, tools and techniques used to develop and support computer-based information systems. Systems planning, analysis, design and implementation are covered. Behavioral and model building aspects of systems development are emphasized throughout.

INFO 364. Database Systems. 3 Hours.

Semester course; 3 lecture hours. 3 credits. Prerequisites: INFO 202, INFO 250, CMSC 245 or CMSC 255; and MATH 211, both with a minimum grade of C. Enrollment is restricted to students who have completed at least 54 credit hours (junior standing). Designed to prepare students for development of systems involving databases and database management.

INFO 370. Fundamentals of Data Communications. 3 Hours.

Semester course; 3 lecture hours. 3 credits. Prerequisites: INFO 202, INFO 250, CMSC 245 or CMSC 255; and MATH 211, both with a minimum grade of C. Enrollment is restricted to students who have completed at least 54 credit hours (junior standing). Computer networks and data communications. Provides an understanding of the underlying concepts of computer networking. Emphasis is placed on terminology, techniques and issues in networking systems.

INFO 450. Advanced Programming. 3 Hours.

Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 350 with a minimum grade of C. Enrollment is restricted to students who have completed at least 54 credit hours (junior standing). The course covers advanced programming concepts. Topics include pointers, advanced GUI components and the building of multithreaded applications containing reusable components based upon design patterns and advanced data structures. Students cannot receive credit for both CMSC 245/246 and INFO 450.

INFO 451. Advanced Technology for E-business. 3 Hours.

Semester course; 3 lecture hours. 3 credits. Prerequisites: grades of C or better in INFO 350 and 364, and junior standing. Focuses on the technical aspects of developing e-business systems using Web services and Web server controls to build visually interactive and highly responsive Web applications. Students will learn how various XML APIs (processing, messaging and distributed registries) are used under the umbrella of Web services to support the sharing of data and processes for e-business applications. The course will integrate the students' prior knowledge of client-side GUI development with server-side controls, components and behaviors in a multitiered environment that includes database connectivity.

INFO 461. Information Systems Planning and Project Management. 3 Hours.

Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 361. Concentrated study of planning methods and techniques required for defining, planning, integrating and implementing information technology projects consistent with the organizational strategic plan and mission.

INFO 463. Business Process Engineering. 3 Hours.

Semester course; 3 lecture hours. 3 credits. Prerequisite: INFO 361. This course is restricted to students who have completed at least 54 credit hours (junior standing). A survey of legacy system re-engineering technologies in which the student becomes familiar with a variety of tools used in practice and has the opportunity to develop applications using these tools under supervision. Selection of technologies is determined each semester.

INFO 465. Projects in Information Systems. 3 Hours.

Semester course; 3 lecture hours. 3 credits. Prerequisites: INFO 350, 364, 370 and 461. The student's behavioral and technical skills developed in listed prerequisite courses are challenged by participating in a team systems development project. Appropriate computer-assisted software engineering tools are used throughout the project, from requirement specification to implementation and testing.

INFO 468. Information Engineering. 3 Hours.

Semester course; 3 lecture hours. 3 credits. Prerequisites: INFO 361 and INFO 364. This course is restricted to students who have completed at least 54 credit hours (junior standing). A study of information engineering as a model-based, data-centric approach to integrating organizational strategic planning with enterprise information systems development. Involves readings, group discussion and case studies.

INFO 472. Infrastructure Services. 3 Hours.

Semester course; 3 lecture hours. 3 credits. Prerequisites: INFO 370 and junior standing. Concepts and principles related to administering and securing information and communication technologies. Topics include management of infrastructure, hosts, applications and network security.

INFO 474. Advanced Networking and Security. 3 Hours.

Semester course; 3 lecture hours. 3 credits. Prerequisites: INFO 370 and junior standing. Detailed coverage of the TCP/IP protocol suite and its application to internetworking. Emphasis is placed on security, vulnerabilities and controls.

INFO 481. Information Technology Auditing. 3 Hours.

Semester course; 3 lecture hours. 3 credits. Enrollment is restricted to information systems majors who have completed 54 credit hours (junior standing), or students may enroll with permission of the department. The course teaches the role and objectives of information technology audits and the processes that are necessary to properly conduct an IT audit. Case studies introduce students to the process of interpreting audit evidence.

INFO 482. Introduction to Enterprise Resource Planning Systems. 3 Hours.

Semester course; 3 lecture hours. 3 credits. Enrollment is restricted to majors in the School of Business who have completed 54 credit hours (junior standing). This course allows students to develop an appreciation of the impact of enterprise resource planning systems on businesses and to understand the issues involved in the design, implementation and maintenance of these systems. Students also develop practical skills in the use of a commercial enterprise resource planning system.

INFO 491. Topics in Information Systems. 1-3 Hours.

Semester course; 1-3 lecture hours. 1-3 credits. Maximum of 3 credits per course; maximum total of 6 credits for all topics courses. Enrollment restricted to students with junior standing. An in-depth study of a selected business topic, to be announced in advance.

INFO 492. Independent Study in Information Systems. 1-3 Hours.

Semester course; 1-3 credits. Maximum total of 3 credits. Prerequisites: junior or senior standing as a major in a business curriculum and approval of adviser and department chair prior to course registration. Intensive study under supervision of a faculty member in an area not covered in-depth or contained in the regular curriculum.

INFO 493. Internship in Information Systems. 3 Hours.

Semester course; 3 field experience hours. 3 credits. Enrollment restricted to students with senior standing and permission of department chair prior to or during advance registration of the semester of credit. Students taking this course must have earned 12 hours of course credit in IS courses at the 300-level or above. Involves students in a meaningful work experience, typically 20 hours per week, in a setting appropriate to the information systems major.