Information and Computer Sciences

Department Goals
The discipline of computer science is concerned with the examination of computation and its related applications. The field is relatively young. Being as young as it is, the discipline is experiencing the strain of rapid growth so typical of a new frontier of knowledge. The department of information and computer science is committed to a balanced exploration of all major methodological and content areas.

The department seeks to accomplish the following three major goals in offering a program in information and computer science:
1. the development of “computer literacy” in all students enrolled at the college;
2. the support of department courses needed by other majors to enhance those programs;
3. the offering of major and minor programs in information and computer science.

The department is committed to an academically responsible presentation of the discipline of information and computer science. Many students express interest in this particular type of program. However, this discipline is not for every student. Students are welcome to the program but should be aware of the professional demands such a discipline makes on an individual.

Requirements for Major in Information and Computer Sciences
The core and distribution requirements for a major in information and computer science are those listed for baccalaureate degrees on page 22, except that ICS 130. Computer Programming Methodology (4 units) is substituted for ICS 121. Microcomputer Applications (3 units). ICS 120. Christian View of Technology (1 unit) is required as noted below.

Core requirements ...............................................................58
Electives ..............................................................................23

Major Course Requirements
ICS 120. Christian View of Technology ...............................1
ICS 130. Computer Programming Methodology ..................4
ICS 150. Advanced Programming Methodology .................4
ICS 245. Systems Analysis ...................................................4
ICS 250. Introduction to Computer Organization ................4
ICS 300. Database Concepts ................................................4
ICS 325. Operating Systems ................................................4
ICS 350. Programming Languages ....................................4
ICS 375. Software Engineering ...........................................4
ICS 400. Data Structures and Algorithms ..........................4
ICS 492. Senior Integration Seminar and Paper ‘S’ ............4
STA 251. Statistical Methods .............................................4
Total................................................................................ 45

Requirements for Minor in Computer Science and Information Systems
ICS 130. Computer Programming Methodology ..................4
ICS 150. Advanced Programming Methodology .................4
ICS 240. Info. Systems for Management ...............................4
ICS 245. Systems Analysis ...................................................4
ICS 375. Software Engineering ...........................................4
Total................................................................................ 20

Information and Computer Sciences Courses

120. Christian View of Technology
Fulfills the core requirement for transfer students who have taken a computer literacy course elsewhere. The course develops a model for the consideration of technology from a Christian perspective. One unit.

121. Microcomputer Applications: Technology, Literacy and Competency
This course provides a general overview of technology, computing, and proficiency in the use of microcomputer applications. The course develops a model for the consideration of technology from a Christian perspective. This model includes the examination of technology in general as well as a consideration of ethical issues in computing. A survey of the content of the computing disciplines is also provided along with the development of skills in Microsoft Word, Excel, and PowerPoint. Students may transfer an approved course of similar content but will be required to take ICS 120. There is no proficiency examination for the course. Three units.

122. Quantitative Microcomputing
This course provides an overview of spreadsheet microcomputing, with extensive lab work in Microsoft Excel. Other quantitative tools will be described but not
extensively explored in this course. Exercises will be constructed to parallel applications in the various disciplines, such as business, psychology, and engineering. Prerequisite: ICS 121. Two units.

130. Computer Programming Methodology
Designed for majors and minors in information and computer science and students who decide to fulfill their ICS core requirement in programming. This course introduces the student to a general methodology for computer programming. Course content includes problem solving techniques, algorithm development, structured and object-oriented programming methodology, pseudo-code, data types, selection, iteration, and arrays. Elementary file structures are also examined. Algorithm development in the course will be implemented in the Java programming language. This course is rigorous. Students enrolling should be fully committed to the development of computer programming skills. Students should register for ICS 120 concurrently. Four units.

150. Advanced Programming Methodology
This course examines programming methods of greater sophistication. Topics include data abstraction, data structures including linked lists, stacks, queues, and trees. The course provides an understanding of the different implementations of these data structures. The student is also introduced to searching and sorting algorithms and their analysis. This course provides the necessary foundation for further study in computer science. Prerequisite: ICS 130. Four units.

210. Computer Programming Methodology
The same course as ICS 130 but prefix numbered at the 200 level to satisfy the requirements for secondary education teaching certification in mathematics as instructed by the Georgia Board of Education. Four units.

240. Information Systems for Management
This course examines the role of information systems technology in today’s business world. The course is designed for business majors and information and computer science majors interested in developing a basic understanding of the application of computer technology in the business environment. The course addresses the role of information in the business environment; the techniques of information problem identification and analysis; the tools and techniques of structured systems analysis; and overviews of software, hardware and telecommunications systems currently in use. Investigation, analysis, writing, and presentation skills will be developed. Four units.

245. Systems Analysis
An introduction to systems, concepts, and the basic tools of systems analysis. Topics include human decision-making, project planning and control, philosophical foundations, and selected applications of systems techniques. Data flow diagramming will be included as an analysis technique. Prerequisite: ICS 130, 150. Four units.

250. Introduction to Computer Organization
This course is an introduction to computer organization with an emphasis upon the computer in a hierarchical fashion, with virtual machines built on top of the features of lower level virtual machines. There will be an emphasis upon interactions among hardware, software, firmware, and operating systems. The basic organization of a computer—its central processing unit, memory, and input/output devices all tied together by a system bus—will be learned in theory, and that theory will be applied in practice to understanding the more important computer architectures of today. Students will also learn to program in C/C++, with those languages being used as a means of communicating many of the ideas in the course. Four units. ‘W’

300. Database Concepts
A study of the nature and application of database processing. The physical representation of databases, the primary structured models used in organizing a database, commercially available database management systems, and the factors involved in implementing and using a database are covered. Students will design and work with a database using one of the database management systems on the Covenant College computing network. Prerequisite: ICS 130, 150 and 245. Four units.

325. Operating Systems
An introduction to operating systems, their function, development, structure, and implementation. A general model of operating systems functions and development will be studied. Specific operating environments studied include Microsoft Windows and UNIX, as well as recently introduced operating systems. Prerequisite: ICS 130, 150, and 250. Four units.

350. Programming Languages
A survey of the significant features of existing and experimental programming languages with particular emphasis on grammars, syntax, semantics, notation, parsing, and storage arrangements. Selected examples of general purpose and special purpose languages are studied. Prerequisite: ICS 130, 150, 250. Four units.

375. Software Engineering
An overview of the tools, metric techniques, and team-oriented methodologies necessary to support the development of large systems and application software will be given. A group project consists of the study and implementation of a large software system of the type expected in industry. This type of project requires a high degree of interaction and communication among team members, as well as rigorous coding techniques.
Prerequisite: ICS 130, 150, 245, STA 251, junior or senior status, or permission of instructor. $50 fee. Four units.

400. Data Structures and Algorithms
This course provides an in-depth study of data structure methods. Using ICS 150 as a foundation, the course makes an in-depth study of the typical range of data structure methods, including methods of representing information both in memory and auxiliary storage, and extensive use of dynamic storage allocation. The course also examines tools and techniques for the analysis and measurement of algorithms. Prerequisite: ICS 130, 150. Four units.

450. Special Topics
A course offered on a subject of particular interest but unlisted as a regular course offering. The course is open to appropriate students by class standing, background, or interest, depending on the topics. All offerings are at the discretion of the department. The department uses this course to provide majors and other departments and groups with topics of current interest which are timely in the student’s development in computer science as well as other disciplines. Possible topics include artificial intelligence, the Internet, neural networks, parallel processing, expert systems, and computer graphics. Prerequisites and credits will vary.

492. Senior Integration Seminar and Paper
This course is divided into two parts. The first part is a two-hour seminar on computer science and a Christian worldview. In this part of the seminar the student examines major questions relative to Christianity and the computer science profession. The student writes a paper expressing his/her Christian view as it relates to computer science. The second part of the course is devoted to the study of one’s responsibility as a member of the computer science profession. The participants will examine techniques in résumé preparation, interviewing, career goal setting and professional identification. Under normal circumstances, seniors participate in at least one computer industry related registry. Four units. ‘S’