

Approved May 2004

## **Information Security Concentration in the CIS undergraduate curriculum**

### **Overview & Vision:**

The Computer Information Systems department is developing a new concentration in Information Security to enhance awareness in this important area. Our vision is to respond to the challenges posed by the rapid technological advancements in the area of networking and consequent emergence of new and sophisticated threats and attacks on the critical information infrastructure of the nation.

The National Security Agency (NSA), the Committee on National Security Systems (CNSS), the Department of Homeland Security (DHS), and various other federal departments and agencies have combined their resources to tackle this problem. As part of this effort, the NSA and CNSS have developed a set of standards for Information Security education. University of Louisville successfully mapped our courses to the federal standards. U of L is certified to offer courses that meet the federal NSTISSI 4011 and 4012 standards for Information Assurance.

The principal goal of this concentration program is to provide a timely, high quality, comprehensive training in Information Security for students. The trained students will then be able to take up security related positions in the private sector as well as in government at the federal, state and local levels.

### **Goals & Objectives:**

In order to accomplish our goals we will work closely with other departments at U of L, the iTRC, and other organizations in Louisville.

#### The program will:

1. Provide our students with a cutting-edge curriculum that keeps abreast of changes in the field, instructional resources, and delivery methodologies that support emerging technologies in Information Assurance (IA) and Information Security (IS).
2. Promote faculty development in IA/IS
3. Recruit and support students interested in IA/IS and prepare them for entering the workforce with the necessary skills and knowledge
4. Develop a process for continuous evaluation and improvement of the curriculum
5. Develop and deliver courses in IA/IS which lead to a concentration in the CIS undergraduate curriculum
6. Work collaboratively with area community colleges to deliver credit courses in IA/IS both within the Louisville metro area as well as across the state via videoconferencing
7. Create an Advisory Board of specialists in IA/IS from area organizations such as iTRC, ISSA, InfraGard, MTTC, etc.

8. Develop an operational budget and secure instructional resources needed to accomplish the goals and objectives
9. Develop a website dedicated to InfoSec that gives all relevant information about the programs at U of L as well as other technical resources
10. Identify and communicate scholarship opportunities in IA/IS for students pursuing a CIS undergraduate program with a concentration in IA/IS.
11. Incorporate IA/IS concepts in other related courses in the curriculum within CIS as well as other programs within CBPA
12. Keep the IA accreditation from NSA/CNSS current

### **Details about the concentration:**

The Information Security concentration is available to all current undergraduate CIS majors who have a junior standing. This concentration requires a higher level of mathematical preparation than the current CIS major requirement. Students interested in the concentration must take MATH 205 (Calculus I) instead of MATH 111 (College Algebra). The core of the program consists of the following four courses (all these courses have prerequisites):

- CIS 480 (Introduction to Network Security)
- CIS 481 (Introduction to Information Security)
- CIS 482 (Introduction to Cryptography)
- CIS 483 (Introduction to Database Security)

Students interested in the Information Security concentration will not be expected to take any more credits than the 129 credits currently required to graduate with a CIS major.

All students who are currently enrolled in the CIS program may follow the following plan to meet the concentration requirements. We will make every effort to find an information security related co-op position for all students in the concentration program.

#### **Plan:**

CIS 480	Substitute this course for one CIS elective
CIS 481	Substitute this course for one A&S elective
CIS 482	Substitute this course for 3 Co-op credits
CIS 483	Substitute this course for two CIS Skills courses (390-level courses with 1½ credits each)

## Course Descriptions

### **CIS 480      Introduction to Network Security      3 Cr.**

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.

Prerequisite: CIS 360 (Business Data Communications)

### **CIS 481      Introduction to Information Security      3 Cr.**

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.

Prerequisite: CIS 320 (Analysis and Design of Computer Information Systems)

### **CIS 482      Introduction to Cryptography      3 Cr.**

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, social implications of new technologies.

Prerequisites: CIS 360 (Business Data Communications)  
MATH 205 (Calculus I) or EAC 101 (Engineering Analysis I)

### **CIS 483      Introduction to Database Security      3 Cr.**

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.

Prerequisite: CIS 310 (Database Design)

**Suggested course sequence:**

Junior year Fall semester – CIS 310, 320

Junior year Spring semester – CIS 360, 420

Junior year Summer semester – CIS 480

Senior year Fall semester – CIS 410, 481

Senior year Spring semester – CIS 482, CIS 483