

COURSE SYLLABUS

CSC14101 – Data Hiding and Secret Sharing

1. GENERAL INFORMATION

Course name:	Data Hiding and Secret Sharing
Course name (in Vietnamese):	Ẩn Dữ Liệu và Chia Sẻ Thông Tin
Course ID:	CSC14101
Knowledge block:	Specialized knowledge
Number of credits:	4
Credit hours for theory:	45
Credit hours for practice:	30
Credit hours for self-study:	90
Prerequisite:	None
Instructors:	

2. COURSE DESCRIPTION

This course provides basic concepts and techniques related to the process of securing multimedia information. Students are provided the ability to analyze and evaluate the characteristics of a system of hiding data and sharing confidential information. Based on the characteristics and structure of each type of information and the unique requirements of each system, students can build appropriate data sharing and protection models themselves. In addition, the course also helps students have the right attitude, opinion and awareness about the importance of data and the sense of protecting important data. Moreover, after this course students have the ability to create their own security system and share private data.

3. COURSE GOALS

At the end of the course, students are able to

ID	Description	Program LOs
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G1	Know and explain English terms, writing and presentation skills related to the field of Data Hiding and Secret Sharing.	2.3.1, 2.3.2, 2.4.3
G2	Knowledge of math, physics, programming	1.1.1, 1.1.2, 1.2.1
G3	Able to explain basic concepts, terms and issues related to data hiding, including: watermarking (digital watermarking), steganography (secret communication), applications of the field, and model to sharing confidential information.	1.3.1, 1.3.6
G4	Apply appropriate data hiding techniques to the given requirements of real problems.	1.2.1, 5.1.3, 5.1.1, 5.3.2
G5	Based on the structure of each type of information and the unique requirements of each system, students can build their own appropriate data sharing and security model.	5.1, 5.3.2, 5.3.3
G6	Sense of respecting the copyright of intellectual products.	3.1.4, 3.1.2, 3.3.1
G7	Analyze and/or aggregate documents, write scientific reports	4.1.2, 4.1.4, 4.2.2

4. COURSE OUTCOMES

CO	Description	I/T/U
G1.1	Explain the meaning of specialized English terms needed for reading and understanding of course-related materials.	U
G1.2	Write and present the project according to the instructions.	U
G2.1	Summarize the content of several English references, articles, and websites about the algorithms taught in the course.	U
G2.2	Apply general mathematical knowledge (arithmetic, algebra, geometry) to implement programming projects.	U
G2.3	Apply basic physics to understand the characteristics of sound waves	U
G3.1	Implement a program that runs the learned algorithms correctly.	U
G3.2	Describe the general principles, properties, and implementation steps of data hiding and information sharing models	T
G3.3	Present applications of this field	T
G4.1	Apply data hiding on 3 types of digital signals: text, image, audio.	T
G4.2	Analyze the advantages and disadvantages of existing data hiding methods. From there, make improvements to the Data Hiding model for a given requirement.	T

G5.1	Based on the structure of each type of information and the unique requirements of each system, students can build their own appropriate data sharing and security model.	T
G5.2	Sense of respecting the copyright of intellectual products.	T
G5.3	Analyze, aggregate documents, write scientific reports	T

5. TEACHING PLAN

Week	Topic	Course outcomes	Teaching/Learning Activities	Assessments
1	Data Hiding Overview	G1.1, G3, G6	Lecturing and Group register	
2,3	The Problem of Hiding Data on Text	G2.1, G4, G3.1	Lecturing and Group discussion	QZ1: Quiz 1 HW1
4,5	The problem of Hiding Data on images	G2.1, G4, G3.1	Lecturing and Group discussion	QZ2: Quiz 2 HW2
6,7	The Problem of Hiding Data on Audio	G2.1, G2.2, G4, G3.1	Lecturing and Group discussion	HW3
8,9	Sharing confidential information	G2.1, G2.2, G3.1	Lecturing and Group discussion	HW4
10,11	Other Data Hiding Techniques	G7, G4.2, G3.2, G1.2, G1.3	Student presentation	Project#1

6. LABORATORY WORK PLAN (Start from Week 2)

Week	Topic	Course outcomes	Teaching/Learning Activities	Assessments
2	Introduction to the subject and the working environment	G2.1, G4, G3.1, G2.3	Lecture, Demo programming on Python	

3,4	Applications about Hiding Data on Text	G2.1, G4, G3.1, G2.3	Implement Whitespace Data Hiding method	HW1
5,6	Applications about Hiding Data on Photos	G2, G4, G3.1, G2.3	Implement LSB, Histogram and Pixel-value differencing Data hiding method	HW2
7,8	Applications about Hiding Data on Audio	G2.1, G2.2, G3.1, G2.3	Implement Echo Data Hiding method	HW3
9,10	Information Sharing application	G2.1, G4, G3.1, G2.3	Implement Binary Image Sharing method	HW4

7. ASSESSMENTS

ID	Topic	Description	Course outcomes	Ratio (%)
A1	Quiz			10
A11	QZ1	Hiding data on text using whitespace & synonyms method	G4.1	5
A12	QZ2	Hiding data on images using the Histogram and LSB method	G4.1	5
A2	Homework			30
A21	HW1	Implement the method of Whitespace Data Hiding. Build a list of questions and elements.	G2.1, G4, G3.1, G2.3	5
A22	HW2	Implement the LSB, Histogram, and Pixel-value differencing method of Data Hiding. Design a feature class for a given specification	G2.1, G4, G3.1, G2.3	15
A23	HW3	Implement Echo Data Hiding method. Build an interactive user interface screen	G2, G4, G3.1	5
A24	HW4	Implement Information Sharing method on binary images. Build a list of test cases and test data	G2, G3.1	5
A3	Project			30

A31	Project#1	Research a problem about data hiding and present it to the class. The topic is a research paper related to Data Hiding	G7, G4.2, G3.2, G1.2, G1.3	30
A4	Examinations			30
A41	Final exam	<i>100 minutes, closed-book, in-class written exam</i> They are on any topics in any lecture covered and any reading material assigned up to the time the exam is administered	G1.1, G2.1, G2.2, G3, G4, G5	30

8. RESOURCES

Textbooks

- **Information Hiding Techniques for Steganography and Digital Watermarking**, Stefan Katzenbeisser and Fabien A.P. Petitcolas, Artech House, 2000.
- **Giáo trình Ẩn dữ liệu và chia sẻ thông tin**, 2011.

Others

- **Multimedia Data Hiding**, Min Wu and Bede Liu, Springer-Verlag New York, Inc, 2002.
- **Techniques and Applications of Digital Watermarking and Content Protection**, Michael Arnold, Martin Schmucker, Stephen D. Wolthusen, Artech House, Boston, London, 2003
- **Multimedia Security: Steganography and Digital Watermarking Techniques for Protection of Intellectual Property**, Chun-Shien Lu, Idea Group Publishing, 2004.
- **Multimedia Security Technology Digital Rights Management**, Wenjun Zeng, Heather Yu, and Ching-Yung Lin, Elsevier, 2006.

Tools, libraries, software

- IDE for Python 3 programming
- Matlab

9. GENERAL REGULATIONS & POLICIES

- All students are responsible for reading and following strictly the regulations and policies of the school and university.
- Students who are absent for more than 3 theory sessions are not allowed to take the exams.
- For any kind of cheating and plagiarism, students will be graded 0 for the course. The incident is then submitted to the school and university for further review.
- Students are encouraged to form study groups to discuss on the topics. However, individual work must be done and submitted on your own.
- **Students who are absent for final exam and students who have less than 10% project scores are considered as unqualified for course completion.**