

CÁC KỸ THUẬT GIẤU TIN (STEGANOGRAPHIC TECHNIQUES)

Đề cương chi tiết (Course Syllabus)

1. General Information

Course name: Các kỹ thuật giấu tin (Steganographic Techniques)

Course code: SEC1420_CLC

Course type: Selective

Number of credits: 2

2. Objectives

Knowledge:

The course provides students with basic knowledge of information hiding techniques in multimedia environments and some practical applications of information hiding methods.

Skills:

After completing the course students will:

- Analyze and select information hiding methods to solve practical information security problems.

- Deploy suitable information hiding techniques to solve practical information security problems.

Attitude:

Students are required to attend classes and complete assignments/projects.

3. Abstracts

The course provides knowledge related to basic issues in the field of information hiding including: concepts, roles, importance; Characteristics of secret information hiding and digital watermarking methods; Methods of hiding information in image, audio, video environments, some applications of information hiding techniques in the world.

4. Teaching and learning methods

Lectures: 16h

Exercises: 2h

Projects : 8h

Labs: 4h

Individual reading: 0h

5. Prerequisites: SEC1403_CLC

6. Learning outcomes

After completing this course, students is able to:

[CLO1]: Explain methods of hiding information and separating information in a number of environments such as images, audio, and video.

[CLO2]: Select and deploy encryption, information hiding and information separation algorithms to solve basic problems in information security

7. Assignment criteria

Learning outcomes	Assignment criteria
[CLO1]: Explain methods of hiding information and separating information in a number of environments such as images, audio, and video.	Chapter 1, Chapter 2, Chapter 3, Chapter 4
[CLO2]: Select and deploy encryption, information hiding and information separation algorithms to solve basic problems in information security	Chapter 2 Chapter 3 Chapter 4

8. Outlines

Chapter 1: Overview of information hiding techniques

1.1. Definitions and basic concepts

- 1.1.1. Basic terms and concepts
- 1.1.2. Requirements for information hiding techniques
- 1.1.3. Development history
- 1.1.4. Role and importance

1.2. Classification of information hiding techniques

1.3. Applications of information hiding techniques

Chapter 2: Hiding information in images

2.1. Problems of hiding information in images

- 2.1.1. Concepts and requirements of image hiding techniques
- 2.1.2. Image formats
- 2.1.3. Classification of information hiding techniques in images

2.2. Method for hiding information in the image space domain

- 2.2.1. Substitution method
- 2.2.2. Pseudo-random permutation method

2.3. Method for hiding information in the image frequency domain

- 2.3.1. DCT frequency domain transformation method
- 2.3.2. DWT transformation method

Chapter 3: Hiding information in audio

3.1. Overview of information hiding in audio

- 3.1.1. Characteristics of the technique of hiding information in audio
- 3.1.2. Audio file formats
- 3.1.3. Classification of methods for hiding information in audio

3.2. LSB method

3.3.Phase encoding method

3.4.Other methods

Chapter 4: Hiding information in videos

4.1.Overview of hiding information in videos

4.1.1. Characteristics of hiding information in videos

4.1.2. Video file formats

4.1.3. Classification of information hiding techniques in videos

4.2.Hiding information in videos based on the coefficient domain

4.2.1. DC coefficient modification technique

4.2.2. Technique for modifying DC and AC coefficients with bias equalization

4.3.Hiding information in video based on compression domain

4.3.1. Hiding information in energy differences,

4.3.2. Hiding information in high quality video domain

4.4.Other methods

9. Required Textbooks

- [1] Digital Watermarking and Steganography: Fundamentals and Techniques, Second Edition. CRC Press, 2017, 292p

10. Suggested Textbooks

- [2] Đỗ Xuân Chợ. Giáo Trình Các kỹ thuật giấu tin. Học Viện Công Nghệ Bưu Chính Viễn Thông, 2023.
- [3] Ingemar Cox, Jeffrey Bloom, Matthew Miller, Ton Kalker, Jessica Fridrich, Digital Watermarking and Steganography, 2nd Edition, 2008, 624p
- [4] Langelaar, Gerrit Cornelis. Real-time Watermarking Techniques for Compressed Video Data. 2010. 158p

11. Schedule

Main contents	Duration	Specific contents
Chapter 1: Overview of information hiding techniques	2h lecture 2h project	1.1.Definitions and basic concepts 1.2.Classification of information hiding techniques 1.3.Applications of information hiding techniques
Chapter 2: Hiding information in images	4h lecture 1h exercise 2h project	2.1.Problems of hiding information in images 2.2.Method for hiding information in the image space domain 2.3.Method for hiding information in the image frequency domain

Chapter 3: Hiding information in audio	4h lecture 1h exercise 2h project 2h lab	3.1.Overview of information hiding in audio 3.2.LSB method 3.3.Phase encoding method 3.4.Other methods
Chapter 4: Hiding information in videos	6 lecture 2h project 2h lab	4.1.Overview of hiding information in videos 4.2.Hiding information in videos based on the coefficient domain 4.3.Hiding information in video based on compression domain 4.4.Other methods

12. Grading Policy

Attendance: 10%
Mid-term exam/exercises: 10%
Course projects: 30%
Final examination: 50%