ECES 435 (Winter 2020)
Advances in DSP: Multimedia Forensics and Security

Course details

Lecture times	Mondays & Wednesday 3:30-4:50pm
Lecture room	Curtis Hall 456
Lab time	Fridays 11:00- 12:50
Lab room (ECES 435)	Randell Hall 329
Instructor	Matthew Stamm (Dept. of ECE)
Instructor email	mstamm@coe.drexel.edu
Instructor office	Bossone 413G
Instructor office hours	By Appointment
Teaching Assistant	Oday Bshara
TA email	ob67@drexel.edu
TA office hours	By Appointment
TA office hours location	T.B.D.

Course objectives / learning outcomes

1. An understanding of digital images and how they are represented, processed, and stored.
2. An understanding of how information can be hidden in a digital signal, particularly a digital image.
3. Familiarity with how hidden information can be used for security purposes such as watermarking or image authentication.
4. An understanding of how image processing such as compression or contrast enhancement can be forensically detected.
5. An understanding of the source of a digital image can be determined without relying on easily falsifiable traces such as metadata.

Textbook

- There will be no required textbook for this course.
- Required and supplemental reading will be periodically posted to the course's Blackboard Learn website.

Course logistics

- Enrollment
  - It is **strongly recommended** that you have already taken or are currently taking ECE 361 – Probability & Statistics. Students should be familiar with probability theory, random variables, and statistics.
  - Students should have an appropriate familiarity with DSP and Matlab.
- Website
  - We will use Drexel's **Blackboard Learn** course management website for this class extensively.
  - I will mail you important information regarding the class through this system. Please make sure you setup the system to forward BB Learn emails to an account you check regularly.
  - Assignments, supplemental materials, etc. will be posted on the main course page.

  - The gradebook will hold your course assignment and midterm exam scores.
  - If you want to email me or the TAs, please do so at the email addresses listed above. This is preferred to emailing us from within BB Learn.

- Lectures
  - **Laptops** may not be used during lecture without prior approval by the instructor.
  - **Cell phones** should be set to silent and may not be used during lecture. You should not be talking, accessing the internet, or texting on your phone during class. If you need to use your phone in any way, please leave the classroom.
  - Please ask questions. If you are confused, then there is a very good chance someone else in the class is confused as well.
  - If reading is assigned, please read the material in advance of the corresponding lecture. This will greatly improve your understanding of the material.

- Attendance
  - Attendance in lectures is not required but is **strongly encouraged**. Part of your grade will be calculated from class participation. If you do not regularly attend lecture, you should expect your participation grade to be low.

- Course Assignments
  - Course assignments will be due periodically throughout the quarter. Detailed descriptions of each assignment along with their due dates will be posted on the BB Learn website.
  - A written report should be submitted for each assignment. A hard copy of this report should be turned in at the beginning of the class when the assignment is due.
  - Late assignments will not be accepted.
  - All assignments should be completed individually and your assignment report submission must be your own original work. You are allowed and encouraged to discuss assignments with other students, but the work and solutions you submit must be your own. **Copying assignment solutions or reports from another student is cheating.**
  - Code for each assignment should be written in Matlab. No other programming languages should be used to complete assignments (such as Python, C, etc) without permission of the instructor.
  - Unless explicitly noted, all code (or any other code) should be written by you. Proper attribution should be given to all code or software originating elsewhere and code from online sources should not be used without prior permission from the instructor.
  - If you are unsure if it acceptable to use software or code that you have found, please ask at least one full day before the assignment is due.
  - **Using another student's code or passing off existing code or software as your own is cheating and is strongly prohibited**.

- Midterm Exam
  - There will be one midterm exam held during this course.
  - The midterm will occur roughly half way through the quarter. More detail about this exam will given later in the quarter.

- Final Project
  - The course will culminate in a final design project. You will be allowed to choose the topic of this final project. This topic must be approved in advance by me.
  - At the end of the quarter, your team must give a presentation and a demo of your final project.
  - Your team will also prepare a final report documenting both technical details of your final project along with user documentation.
  - More detail will be given regarding the final project some time around the midpoint of the quarter.
- Office hours
  - Office hours are available by appointment.
  - If you have a question regarding an assignment, I expect you to have attempted solving the problem before coming to office hours. I am happy to help you with any problem that you are stuck on, so long as you have first put forth an effort to solve the problem on your own.
  - Due to my other commitments I may not in general be able to schedule meetings with you outside of designated office hours. If you need to see me outside of office hours, please email me in advance. I will do best to accommodate reasonable requests to meet, but I may not always be able to meet with you due to time constraints.

Grading

Your final numerical grade will be computed as follows:

Course assignments	80%
Final project	20%

Minor adjustments to these weights may be made before the midpoint of the quarter. Any adjustments will be announced in class.

Your final numerical score will be used to assign you a letter grade for the course as follows:

93	100	A
90	92	A-
87	89	B+
83	86	B
80	82	B-
77	79	C+
73	76	C
70	72	C-
65	69	D+
60	64	D
0	59	F

At my discretion I may curve course grades up (but not down). If this occurs, I will assign letter grades by examining the distribution of the final numerical scores. An A will likely correspond to the highest "cluster" of scores, followed by a B for the next "cluster", and so on.

I cannot tell you what your final letter grade in the class will be at the at the week 6 withdraw deadline, however, I will try to share the distribution of scores up to that point to give you some idea of your standing in class.

Course Outline

Below is a tentative outline of the topics we will cover in this course. The actual order in which these topics are covered and the amount of time spent on them may be changed as the course proceeds.

Topic
Introduction to image processing
Coding & compression
Information hiding, steganography & steganalysis (this may be skipped or shortened)
Introduction to decision theory & machine learning
Multimedia forensics - Manipulation detection
Multimedia forensics - Device identification

University Academic Policies:
Missed Classes:
Absence from class will be based on the Universitys absence policy. Please review the link below.
http://drexel.edu/provost/policies/absence/

Academic Integrity, Plagiarism and Cheating Policy:
Please review the University policy regarding academic integrity:
http://drexel.edu/provost/policies/academic-integrity/
http://drexel.edu/studentlife/community_standards/studentHandbook/

Office of Equality and Diversity - Disability Resources:
Students requesting accommodations due to a disability at Drexel University need to request a current Accommodations Verification Letter (AVL) in the ClockWork database before accommodations can be made. These requests are received by Disability Resources (DR), who then issues the AVL to the appropriate contacts. For additional information, visit the DR website at drexel.edu/oed/disabilityResources/overview/, or contact DR for more information by phone at 215.895.1401, or by email at disability@drexel.edu.

Course Drop Policy:
http://drexel.edu/provost/policies/course-add-drop/

Course Withdrawal Policy:
http://drexel.edu/provost/policies/course-withdrawal/

Course Change Policy:
The instructor reserves the right to modify the course, as necessary, during the term: including policies, evaluations, due dates, course content, schedule, assignments or requirements. All changes will be communicated in lecture and/or via the course DrexelLearn page.

Weather, Emergencies and University Closing:
University closing or delayed opening information will be posted on www.drexel.edu. In the event of the need to close or delay the daily opening of a campus, the University will provide notice via Web, telephone, and the DrexelALERT system. Closing or delayed opening information will be announced at 215-895-MELT (6358).

The University determines whether to close or delay opening due to inclement weather, not the instructor. Therefore, please do not contact the instructor for this information.