Syllabus for
ITMS 539 Steganography, Spring 2014

This syllabus will apply to the following courses and sections for the spring 2014 semester.
IT-S539, ITMS539

Faculty Information
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Course Catalog Description
Digital steganography is the science of hiding covert information in otherwise innocent carrier files so that the
observer is unaware that hidden information exists. This course studies both digital steganography and digital
steganalysis (the science of discovering the existence of and extracting the covert information). In addition to
understanding the science and the pathologies of specific carriers and hiding algorithms, students will have hands-on
experience with tools to both hide and extract information. Carrier files such as image, audio and video files will be
investigated. Prerequisite: None. Credit: 2-2-3

Course Outcome and Objectives
Each successful student will demonstrate an understanding of cyber steganography and steganalysis and be able to
demonstrate a detailed understanding of hiding schemes and considerations for many standard carrier files such as
JPEG, MP3, MP4, GIF and others. Students will also demonstrate the ability to analyze files to determine the
possibility of being steganography carriers and, in some cases, be able to determine the tools used in hiding; and
then extract covert information. In addition, because of the team project, the student will become an expert in the
specific facet of "stego" related to their team project. They should also have very practical experience in
steganographic forensics.

Successful completion will give students a solid foundation in this growing area of cyber security and forensics,
enhancing their abilities and opportunities.

Session Days, Time and Location
Wednesdays from 5:30 - 9:05pm in the ForSec Lab (room 250) at the Rice campus.

Course Deliverables
Course deliverables will include assignments, exams, and a team implementation project, which will be
demonstrated and presented at ForenSecure14 on 17-18 April 2014. The project will require team members to
submit interim results at specified times during the semester.

Assignments will be made on a week-by-week basis. All assignments will be submitted via Blackboard. Also,
unless otherwise specified, assignments will be due on or before 11:55 pm on the 2nd Sunday following the date that
they were assigned. This should accommodate most extenuating circumstances that students may encounter.

Exams will include short quizzes, midterm and final.
Class Sessions
Most of the class sessions will include the following:
- a lecture of about 1.5 hours,
- a lab of about 1 hour and
- a project time of about 1 hour.
But these allotted times will vary from session to session.

Textbook, Readings and Videos
The textbook is mandatory.

M. Raggo, C. Hosmer, *Data Hiding: Exposing Concealed Data in Multimedia, Operating Systems, Mobile Devices and Network Protocols*

Readings for the class will be assigned from the text and selected papers. Viewing of on-line videos may also be assigned. These readings and videos or links to them will be provided via Blackboard.

Grading
- Midterm: 15%
- Final: 20%
- Assignments (*AssignX*): 20%
- Project Interim Submissions (*ProjAssign01-06*): 15%
- ForenSecure Pres & DemoVideo (improved *ProjAssign06*): 15%
- Project Final Submissions (*ProjAssign07*): 15%

Class and Lab Resources
Take home lab assignments will make use of RADISH (Remotely Accessible Distributed Internet for Students to Hack). RADISH allows students to do many hands-on labs remotely. (RADISH was developed by forensic and security students at IIT.)

Arrangements have been made with several cyber forensic vendors for the use of expensive forensic analysis tools and software in the ForSec Lab. While these tools and software are limited to ForSec Lab use, RADISH allows many of them to be used remotely.

Academic Honesty and Plagiarism
All work that you or your team submit in this course must be your own. You must fully attribute all material directly quoted in papers, books and Internet articles. You must document all sources used in the preparation of your submissions. Including directly quoted material in a submission without attribution is always considered plagiarism and will always be treated as such. If you submit plagiarized material, you will receive a grade of zero on the submission. In addition an Academic Honesty Violation Report will be filed and may result in your expulsion from this course with a failing grade per the IIT and ITM academic honesty policies. There is no excuse for not understanding this policy.

Please read the ACADEMIC HONESTY and INFORMATION TECHNOLOGY AND MANAGEMENT POLICY ON ACADEMIC HONESTY VIOLATION sections of the following manuals for further information.

If you need further understanding, please let us know and we will discuss it with you so that you fully understand.

Team Project
This course will have a significant team research/implementation project. Each team will normally consist of 2 or 3 students. The student teams, with consent of the instructors, will either continue projects started in the autumn of the previous year in ITMS448/548 or start new projects. The deliverables for each project are discussed in this document. We will, with reluctance, consider teams of 1 student or 4 students.

Project deliverables will consist of technical documents (*TecDoc*), slide presentations (*Pres*), user manuals (*UsrMan*), project demonstrations videos (*VideoDemo*). The schedule for these deliverables is detailed in the course schedule.

Details about the formats and content of the project deliverables will be provided in documents posted to Blackboard prior to the second class session.
Assignments
There will be two types of assignments:

1. Homework assignments. These can be either labs to be done remotely using RADISH or research assignments. These will be designated AssignX, where X=01, 02, 03... These will generally correspond to the lecture topics, which in turn will correspond to the texts, modified by rapidly evolving technology. The rapidly evolving nature of operating systems, data networks and cyber forensics requires continual upgrading of labs and assignments. AssignX submissions must conform to the AssignX slides in the 01a Course Introduction slide set.

2. Project-related assignments. These will be designated ProjAssignY, where Y=01, 02, 03... These are related to the student teams project and will be specific to them. They will usually consist of one or more of these files: TecDoc, UsrMan, Pres and VideoDemo. The dates and content of these are described in the right most column of the Course Schedule.

ForenSecure14 (17 and 18 April 2014)
Teams will give their presentations in the morning sessions in the Rice auditorium (room 166). I don't have the allocated time for each presentation yet, but based upon past conferences, each team will have about 20 minutes including Q&A. It would be desirable to include your video in this 20 minute time, but that would mean you would have perhaps 12 minutes for your slide presentation exclusive of the video and Q&A; perhaps 7-9 slides with content. I'll see if we can allocate more time, but it probably won't happen.

A reason for rehearsing is to streamline your presentation so that you can fit it into the allotted time.

You will also prepare posters and set up a live demonstration in either room 249 or on tables in the hall outside of the ForSec Lab. The idea is for conference attendees to talk to you one-to-one about your work. If you haven't done this already, this is an excellent time to network.

The lunch break will be 1.5 hours. During the last 45 minutes of the lunch break, you will be at your demo table to meet with conference attendees.
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<thead>
<tr>
<th>Week</th>
<th>Lecture / Lab</th>
<th>Project</th>
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<tbody>
<tr>
<td>02</td>
<td>Steganography tools. MATLAB, StegoAnalyst and others Requirements for TecDoc, UsrMan, Pres and Video</td>
<td>Team slide presentations Pres1. Present in class &amp; submit TWICE to Blackboard by 9pm; once in Discussion Board Forum for your project &amp; again as ProjAssign01</td>
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<tr>
<td>04</td>
<td>Image Steganography/Steganalysis 1: bmp, gif, fractal</td>
<td>Individual meetings by instructors with project teams</td>
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<tr>
<td>05</td>
<td>Image Steganography/Steganalysis 2: jpg; advanced topics</td>
<td>Team slide presentations Pres2. Present in class &amp; submit TWICE to Blackboard by 9pm; once in Discussion Board Forum for your project &amp; again as ProjAssign02</td>
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<tr>
<td>06</td>
<td>Audio Steganography/Steganalysis 1: wav</td>
<td>TecDoc1, UsrMan1, Pres3 due on Blackboard. Submit TWICE to Blackboard by 9pm; once in Discussion Board Forum for your project &amp; again as ProjAssign03</td>
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<tr>
<td>07</td>
<td>Audio Steganography/Steganalysis 2: mp3</td>
<td>Feedback on Blackboard submissions</td>
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<tr>
<td>08</td>
<td>Prep for midterm</td>
<td>Individual meetings by instructors with project teams</td>
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<td>09</td>
<td>Midterm</td>
<td>Teams work on projects. Instructors available for consultation.</td>
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<tr>
<td>10</td>
<td>Video Steganography/Steganalysis 1: avi. Midterm review</td>
<td>Team slide presentations Pres4, DemoVideo1. Submit TWICE to Blackboard by 9pm; once in Discussion Board Forum for your project &amp; again as ProjAssign04</td>
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<tr>
<td>11</td>
<td>Video Steganography/Steganalysis 2: mp4</td>
<td>TecDoc2, UsrMan3, Pres5, DemoVideo2 due on Blackboard. Submit TWICE to Blackboard by 9pm; once in Discussion Board Forum for your project &amp; again as ProjAssign05</td>
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<tr>
<td>12</td>
<td>Network Steganography/Steganalysis 1</td>
<td>Rehearsal for ForenSecure: Pres6, DemoVideo3.</td>
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<td>13</td>
<td>Rehearse for ForenSecure14 in room 166 during the day and into the evening. Your team must schedule a time with instructors. Use Pres7 and DemoVideo4</td>
<td>Pres7 &amp; DemoVideo4. Submit TWICE to Blackboard by 9pm; once in Discussion Board Forum for your project &amp; again as ProjAssign06</td>
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<tr>
<td>14</td>
<td>No class since you will be at ForenSecure14 the next day.</td>
<td>ForenSecure14: Thr 17 Apr and Fri 18 Apr.</td>
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<td>17</td>
<td>Required: Attend ForenSecure14 morning and early afternoon. You're welcome to attend the entire conference free</td>
<td>Use improved versions of Pres7 &amp; DemoVideo4</td>
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<tr>
<td>14</td>
<td>Network Steganography/Steganalysis 2</td>
<td>Final of TecDoc3, UsrMan4, Pres8, DemoVideo5. Submit TWICE to Blackboard by 9pm; once in Discussion Board Forum for your project &amp; again as ProjAssign07</td>
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<tr>
<td>15</td>
<td>Mobile Steganography/Steganalysis: Android, iOS</td>
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<tr>
<td>07</td>
<td>Final Exam</td>
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