IA340 – Introduction to Information Assurance

School of Cybersecurity, Data Science, & Computing, Norwich University

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1   COURSE DESCRIPTION

This course introduces the foundations of information assurance, with focus on concepts and terminology used in describing, analyzing, and implementing information security. Topics include the history and mission of information assurance, history of computer crime, modern and historical cryptology, information warfare, penetrating computer systems and networks, malware, social engineering, spam, phishing, physical and facilities security, network security, identification and authentication, securing stored data, data backups and archives, patch management, protecting digital rights, writing secure code, software quality assurance, and antivirus technology. 3 hours. Prerequisite: C or higher in CS 140 or permission of instructor.

2   EDUCATIONAL OBJECTIVES

By the end of this course, students will be able to discuss the following issues at a management level:

- Recognize, define and use the technical terminology of information assurance (IA).
- Name, define and give illustrations of the fundamental concepts of IA and their breaches.
- Recognize and describe key historical cases of computer-related crime.
- Recognize, name, define and discuss computer crime techniques; present countermeasures for each type.
- Summarize security aspects of computer hardware and data communications.
- Explain the principles of secret-key cryptography with examples from history.

- Describe models and key elements of information warfare.
- Recognize, name, define, and discuss techniques of system and network penetration.
- Summarize characteristics of the different of malware.
- Recognize, name, define, and discuss techniques of denial-of-service (DoS) attacks, and countermeasures.
- Illustrate how social engineering can trick human beings into becoming victims.
- Distinguish among spam, phishing and Trojans.

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- Summarize the main Web-based vulnerabilities and countermeasures.
- Recognize, name, define, and discuss physical and facilities security vulnerabilities and defenses.
- Identify and explain key elements of operating-systems and local-area network security.
- Explain how gateway-security and intrusion-detection/prevention devices work.
- Recognize, name, define, and discuss identification and authentication techniques.
- Summarize security issues relating to e-commerce and Web servers.
- Explain key issues in web monitoring and content filtering.

- Show how virtual private networks contribute to secure remote access.
- Discuss specific security issues pertaining to voice over IP systems.
- Evaluate requirements and techniques for backing up, archiving, storing, managing, and destroying electronic records.
- Recognize, name, define, and discuss fundamentals of modern cryptography including the public-key infrastructure.
- Summarize key elements of secure programming, software testing and quality assurance.
- Explain antivirus technology.

3   MECHANICS OF THE COURSE

3.1   Text

- Bosworth, S., M. E. Kabay & E. Whyne (2014), eds. *Computer Security Handbook,* 6th Edition. Wiley (New York). ISBN 978-1118127063. Two volumes; 2040 pp. Index.
  Volume **1** is used for **IA340**; Volume **2** is used for **IA342**.
  AMAZON < **http://www.amazon.com/Computer-Security-Handbook-Seymour-Bosworth/dp/1118127064/** >
  or
  < **http://tinyurl.com/ldg9c8r** >
- Additional readings and lectures are provided through links in NUoodle.

3.2   Course Schedule & Location

This course is entirely online using asynchronous communications. All materials are available through documents and links accessible through NUoodle, the Norwich University implementation of the Moodle online-learning platform. The NUoodle class is called "IA340 Sections A, B & CDL FALL 2020." There are no specific required synchronous meetings, so the course fits any schedule. Synchronous discussions and office hours will be available using GoToMeeting sessions; the links for those sessions are posted in the NUoodle classroom.

- NUoodle < **https://nuoodle.norwich.edu/login/index.php** >

3.3   Minimum Technology Requirements

3.3.1   Internet Access

Students must be able to access NUoodle, the online teaching platform, and links to the Web. Students can use any Internet service provider that provides unrestricted access to these resources. If accessing a high-speed Internet service using a tower or laptop computer is impossible but there is a smart phone with Internet access, students may be able to use a hotspot from the phone to allow access from the computer.

3.3.2   Hardware

Any Internet-capable computer is acceptable. Ideally, the system should have a screen large enough to make reading documents easy. An additional screen is useful when one needs to refer to multiple windows. Any modern operating system will do (e.g., Windows 10, OSX, Linux…). The system must include ability to play & record sound and to display video files. A Web camera is helpful but not essential.

3.3.3   Software

Students will need

- Browser (e.g., Chrome, Opera, Cake…)
- Word-processor capable of reading and generating DOCX, DOC, RTF or ODT files
- Presentation software equivalent to PowerPoint
- Adobe Reader or full Acrobat
- Norwich email account
- Any standard video player
- Sound-recording software (PowerPoint includes recording features)
- GoToMeeting (accessible through Web links as well as using an app)
- Optional: Skype & Facebook Messenger

3.4   Course Resources are Online

Course references and assignments are all made available through the Norwich University NUoodle online teaching platform. It is the student's responsibility to maintain regular contact with the class through the NUoodle platform on the assigned intranet. Additional readings and recorded lectures are also provided via the online course pages.

3.5   Deadlines for Topic-Review Exercises & Exams

All exercises, quizzes & exams are open-book and managed via the NUoodle online platform.

Deadlines for Topic-Review exercises are 23:55 US Eastern Time Zone (UTC-4 for Daylight Saving time & UTC-5 for Standard Time) two Sundays after the introduction of a week's topics.

Mid-term and final memo exams have specific deadlines that are listed in NUoodle and in the metadata for each exam. No late submissions are accepted without special arrangements in advance including written permission from one of the instructors.

4   Requirements for Online Participation

- Students are required to use the online resources through the NUoodle pages every week. Acceptable activities include viewing articles or videos from the reference lists, contributing to discussions, posting responses to assignments, and uploading exam responses. An automatic logfile will be kept showing details of each student's activities.
- More than two weeks of complete inactivity in the course as documented in the log files will result in expulsion from the course with an F grade UNLESS the student has requested and received written accommodations from the instructors to cope with unusual circumstances.
- Readings, videos, and sound recordings (required and optional) are listed in the weekly assignments on NUoodle.
- Teaching materials are available through the classroom in NUoodle and on the course Web pages, which are < **http://www.mekabay.com/courses/academic/norwich/ia340/index.htm** >.
- Students should read, listen to or view specified assigned readings, audio recordings or videos according to the instructions posted in NUoodle.
- Students must upload responses to discussion questions according to the prescribed schedule shown in the Syllabus and on NUoodle.

5 Methods of Assessment

All assignments, quizzes and exams are submitted using NUoodle. Deadlines for each assignment are posted in NUoodle and on the class Syllabus; normally students must complete the quizzes by 23:55 US Eastern Time Zone (UTC-4 for Daylight Saving time & UTC-5 for Standard Time) of the second Sunday after the start of the week's material – basically, with a two-week span available for each quiz. NUoodle is accessible on or off campus:

< **https://nuoodle.norwich.edu/login/index.php** >

Responding punctually to professional responsibilities is part of the maturation of students. To encourage promptness, late submissions for any of the essay exams and assignments will result in reduction of grades by 10% per day from the total score allotted. However, because of the constraints on NUoodle quizzes, the time limits on quizzes have to be definite; therefore, quizzes close at their deadlines and cannot normally be taken or retaken after closure. Because too many students have failed to respect the deadlines and ended up cramming for quizzes at the end of the course – thus learning less effectively – these deadlines are rigid except in cases of demonstrable reasons *not including* hypomyelination of the prefrontal cortex[1] (i.e., failure to plan does not excuse the failures).

It is, however, possible to be authorized for a delayed submission by discussing exigent circumstances with the instructors and receiving written authorization.

5.1 Review Quizzes: 10% of final grade

Using NUoodle, there will be weekly quizzes (each individual quiz will cover an assigned chapter reading). These open-book, automatically graded quizzes will test for concepts and technical vocabulary and must be completed in 30 minutes or less. These quizzes are always open and close at the end of Sunday night (23:55) in the week *after* the topic was discussed. Quizzes and multiple-choice exams have an average of two minutes per question; thus a 30-question quiz has a time limit of 60 minutes.

5.2 Mid-term Multiple-Choice Exam: 10% of final grade

The mid-term exam will be open-book multiple-choice (M/C) exams taken via NUoodle and covering the material discussed from the start of the course to the end of Week 4. Opening and closing dates are specified in the Syllabus and on NUoodle.

5.3 Mid-term Memo-Question Exam: 10% of final grade

The mid-term *open-book take-home memo exam* will include

- Serious questions raised by imaginary people with high management positions (CEO, CFO, COO and so on) about security issues;
- Areas will refer to topics discussed in the period before the mid-term exam;
- Students will respond with a minimum of 250-words (no maximum) per response;
- Responses are to be at the highest level of professionalism; rudeness or incorrect information will automatically result in zero for that answer;
- Grading criteria for the essay exam are listed in the document "Grading Standards for Essay Exams" provided via NUoodle and the course pages of the instructors class Website.

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[1] See Kim, S. & D. Lee (2011). "Prefrontal Cortex and Impulsive Decision Making." *Biol Psychiatry* 69(12): 1140–1146.

5.4 Final Multiple-Choice Exam: 20% of final grade

The final multiple-choice exam will be similar to the weekly quizzes but covering all the material in the course. The exam will be offered via NUoodle. Opening and closing dates are specified in the Syllabus and on NUoodle.

5.5 Final Memo-Question Exam: 20% of final grade

The final *open-book take-home memo exam* will include questions referring to the second part of the course and otherwise conform to the description of the mid-term essay exam..

5.6 Weekly discussions: 5% of final grade

Students will respond to questions posted in the online discussions for each week in NUoodle. **For at least one posted topic per week, every student is expected to contribute at least one *thoughtful comment*** about the issues raised using reason and including evidence to support their point of view; postings consisting of "I agree" and "Yeah, right" will not be penalized, but they won't earn points, either.

Every valid additional comment beyond the minimum earns points. The instructors will also grant extra points for contributions that present new ideas, which point to interesting information on the Web or in the Kreitzberg Library databases, or which comment articulately on issues or arguments already presented.

The discussion *grading* will close two weeks after they open at the start of each week; i.e., the discussions for any given week will be graded from the start of that period and end on the second Sunday after the start.

5.7 Term Project: 20% of final grade

Students will write a **3,500 ± 500 word** research paper on a suitable topic to be selected with approval of the instructors. Students should choose a topic they personally find *interesting* –why spend time on something boring? The minimum length is 3,000 words; the upper limit is a suggestion, but longer work is not penalized. Papers with word counts lower than the minimum will be graded as a percentage of the minimum; for example a perfect submission (100% grade before penalty) with only 2,000 words would receive a grade of 67% (2,000/3,000).

Students must post their topic proposals in the public discussion group on NUoodle for consideration by the instructors by the deadline specified in the syllabus. Topics must be approved to avoid the problem of discovering that students have picked a topic so broad as to be worthy of writing a textbook or so technical that it would appeal to a total of four human beings on the planet. Approval also prevents duplicate topics among students, making for more interesting presentations at the end of the course.

Students should not hesitate to work with the instructors to review draft versions before submitting the final version. Students must submit the topic and final version of their project via NUoodle no later than the deadlines listed on the syllabus and on NUoodle. Students may discuss their drafts in person with the instructors before submitting the final version. The instructors may offer suggestions on corrections and may offer additional suggestions.

The deadline for full-grade submissions of the project report is specified in the syllabus. *Early* submission for the project report will result in bonus points of 1% point per day early for the total score allotted to the assignment; for example, a paper submitted 10 days before the deadline will be granted an extra 10% points on the project; the total may exceed 100%. In contrast, late submissions are penalized by 5% per day late. For example, a project report graded at 100% but submitted eight days late will lose 40% points from the maximum and thus be marked with a maximum grade of 60%.

Detailed instructions and suggestions about the term project are available in the "Term-Paper Guidelines" available online. The instructors encourage students to publish their work and provide advice and support to achieve that end. The instructors will *not* add their names to students' publications unless the *students* insist on inclusion due to unusual levels of contributions by the instructors to the final published work.

5.8 Term-Project Presentation: 5% of final grade

Students will present interesting aspects of their research and stimulate discussion in class. Students usually prefer an informal video presentation to the class chatting about what was particularly interesting or surprising in what they learned in their research – no formal presentation notes are required. However, if students do want to prepare such notes, they are welcome to do so, and may ask the instructors for review to see if there are any improvements they can suggest before the presentation itself. The order of presentations is determined by the instructors to link topics together in an interesting way.

The graph below shows the grades assigned to the different measures in the course.
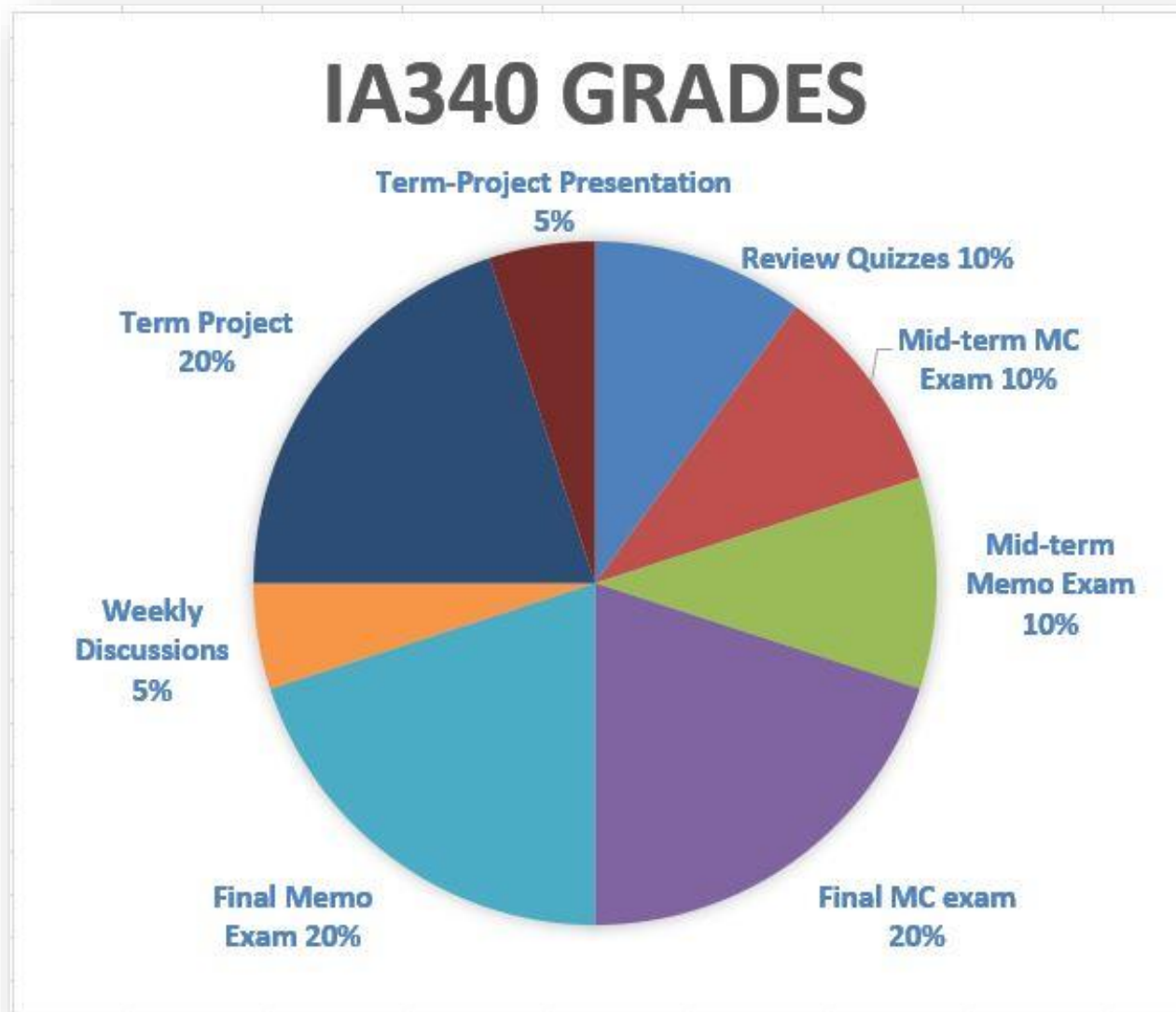
5.9 Replacement Quizzes & Make-up Exams

- All quizzes and multiple-choice exams include optional replacement versions with the same deadlines as the original versions. Students are not required to take the replacement quizzes and exams, but they must complete the regular quiz or exam before starting the replacement item.
- Replacement quizzes and exams have 150% of the number of questions but impose a limit of an average of one minute per question. For example, if the regular quiz has 30 questions with a time limit of 60 minute, the corresponding replacement quiz will have 45 questions with a time limit of 45 minutes.
- Replacement quizzes and exams fully replace a lower grade by a higher grade. Thus a 60% grade on the original quiz or exam followed by a 100% grade on the corresponding replacement results in a quiz grade of 100% for that quiz or exam.
- Make-up exams cannot lower existing grades. There is no penalty for getting a lower grade on the replacement.

5.10 Extra Work for Extra Points:

- Students may submit extra work for extra points on their final grade.
- For example, the instructors will accept suitable short essays such as summaries of interesting incidents, articles or books relevant to the course materials.
- The rate granted for extra written work is one-half percentage point added to the *final grade* for 500 words of professional-grade writing. Thus a 1,000 word essay could improve the final grade by up to one point; a student who achieved 93% in her work throughout the course (an A- grade) could thus achieve a 94% grade (an A) by submission of a good 1,000 word extra essay.
- Video presentations are credited with 1 percentage point added to the final grade for a 10-minute, substantive presentation of an appropriate topic.
- The same standards for grading apply to extra essays as for the term project (section 5.7).
- The maximum increase in the final grade for the course from extra points is 5% points.
- Extra-credit materials may be posted on the NUoodle site for other students to read or see.

6 Cheating and Plagiarism

- Students are graded on an individual basis and must therefore complete their own work.
- Students are reminded of the University's Policy against cheating and plagiarism (Chapter 2, Section V of the *Student Rules*):
  < **http://www.norwich.edu/about/policy/StudentRulesRegs.pdf** >.
- Plagiarism consists of using someone else's text or ideas without using quotation marks to indicate exact duplication of the original and/or failing to indicate the source of reference materials and quotations.
- If in doubt as to what constitutes plagiarism, ask the instructors for a review of your work before submitting an assignment.
- All instances of cheating and of plagiarism must be reported to the *Academic Integrity Committee* by the instructors or by students who have observed the dishonesty.
- Penalties include expulsion from the University.
- **Ignorance of the University's Rules is not a valid defense against accusations of academic dishonesty.**

7   Additional Notes

- There will be no *grading on a curve*. There are no predetermined numbers of final letter grades. Students do not compete with each other for grades; if everyone gets A, great. If everyone fails, tough.
- Review questions (without answers) and PowerPoints highlighting major points of each assigned chapter are available to students at all times at < **http://www.mekabay.com/courses/academic/csh6_lecture_notes/index.htm** >. These example questions and notes are intended to help students in review and exam preparation.

- Students are encouraged to study together but may not collaborate during quizzes or exams. Students are individually responsible for all assigned essays and online discussion material, unless otherwise noted.

8   Instructor Biographies & Contact Information

8.1   Prof Kabay

8.1.1   Biography

Mich Kabay began programming computers in IB1401 assembly language in 1965. After receiving his PhD from Dartmouth College in 1976, he taught statistics and programming in universities in Canada and overseas. In 1979, he joined a compiler team for a new 4GL and RDBMS in the US; in 1980, Hewlett-Packard Canada hired him as an operating systems and database performance specialist. He ran the technical support hotline for HP (1981-1983) and then joined a major service bureau as Director of Technical Services (1984-1986). He ran his own consulting firm from 1986 to 1998, specializing in operations management, facilities security, and corporate security policy development and implementation. He served as Director of Education for the National Computer Security Association from 1990 to 1999, and then worked with AtomicTangerine where he supported the International Institute for Information Integrity (I-4). He joined Norwich University in 2001, designed the initial version of the BSCSIA, served as Program Director of the Master's Program in Information Assurance from 2002 to 2009, and was the Chief Technical Officer of the School of Graduate Studies in from 2005 to 2009.

Since 1986, he has published over 1,500 articles in operations management and security, written a college textbook on enterprise security (McGraw-Hill, 1996), and served as Technical Editor of the 4th (2002) 5th (2009) and 6th (2014) editions of the *Computer Security Handbook* (Wiley). He is retiring from Norwich on 2021-06-30 and is planning to write six novels based on the Parkerian Hexad and give several concerts of song cycles by Gustav Mahler.

8.1.2   Contact

- Students may use Facebook Messenger (Mich Kabay) and Skype (mekabay) *at any time* to ping Prof Kabay. He will answer if he's available. His GoToMeeting link is < **https://www.gotomeet.me/MichelKabay** >.
- Students are welcome to call Prof Kabay at (802) 479-7937 at *any time* (that number cannot disturb him because he turns the sound off on his phone when finished for the day); leave a voice-mail message with a return number if necessary.
- For email, use only the Norwich account (**mkabay@norwich.edu**) to conform to FERPA privacy regulations.

8.2 Prof Zeedick

8.2.1 Biography

Dr. Zeedick is a certified cybersecurity professional combining over three decades of academic, federal government, and industry experiences into a student-centered teaching and advising philosophy. She spent 25 years as a consultant in Washington D.C. advising the United States intelligence and defense communities on intelligence gathering techniques, critical infrastructure protection, risk management frameworks, and national cyber policy implementations. She has taught at several training events for the United States military both stateside and overseas. Dr. Zeedick not only teaches at Norwich University this fall but has taught full-time at Norwich from 2005-2011 in the Cyber Security and Information Assurance program. During that time, she was faculty sponsor and involved in the student ACM chapter, Cadet Honor Committee, and the Norwich Dressage Club. Dr. Zeedick received her masters and doctoral degrees in education with a concentration in computer science from The George Washington University. Her undergraduate work was completed at the University of Pittsburgh in Germanic Languages with concentrations in French and computer science. Shortly after graduation, she began her computer career (completely by accident after sending out 207 resumes and cover letters and receiving 206 no answers or rejections) as a software engineer at a Fortune 50 firm just as the home PC was coming into fashion fueled by DOS (Disk Operating System). She is currently a professorial lecturer in computer science at The George Washington University teaching undergraduate and graduate level information policy courses in the School of Engineering and Applied Science since 2011. Dr. Zeedick also serves as a senior academic advisor in computer science at Western Governors University since 2018. At that time, she became 100% dedicated to the education of future cyber warriors and computer scientists.

8.2.2 Contact

- Students may use GoToMeeting (**https://www.gotomeet.me/DanielleZeedick**), Facebook Messenger (Danielle Zeedick) to ping Prof Zeedick *at any time*. She will answer if she's available. Email (**dzeedick@norwich.edu**) is the best way to contact Prof Zeedick asynchronously.

- For email, please write to Prof Zeedick using only the Norwich account (**dzeedick@norwich.edu**) to conform to FERPA privacy regulations. Dr. Zeedick answers all emails in well under 24 hours for emails received during normal, reasonable business hours, Monday through Friday. Responses also sent at other times if she is available

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