



Department of Information Sciences and Technology
Volgenau School of
Engineering
**IT 369 Data and Application
Security**

Common Syllabus revised 01.08.2018

This syllabus contains information common to all sections of IT 369 for the Fall 2017 semester. Information specific to each section will be made available to registered students via [the Blackboard course management system](#).

University Policies

The [University Catalog](#) is the central resource for university policies affecting student, faculty, and staff conduct in university affairs. Unless explicitly noted, any conflict between the policies in the University Catalog and the content of this document is unintentional. Please notify the author to resolve any such conflicts.

Scheduled Sections

001 – Tuesdays 1630-1910

IT 369 – Data and Application Security

Credits: 3

Introduces concept of data and application security. Discuss challenges of database, and application and industrial control system security.

Prerequisite(s): IT 207, IT 223

Notes: none

Hours of Lecture or Seminar per week: 3

Course Description

From <http://catalog.gmu.edu/>

Prerequisites

IT 207 (or concurrent enrollment), IT 223

Rationale

Security has become a global concern, especially since the events of September 11, 2001. Understanding application and data security is not only a critical part of a cyber security curriculum, it is also a topic that can prepare students for challenging and exciting careers in the the IT security field. Application and data security are an important sub-discipline under the umbrella of cyber security. Application and data security provides students a look at how malware infects computers, how SQL injections and DNS injections work, as well newer topics such as healthcare information systems data security and industrial control systems security.

Objectives

On successful completion of this course, students will be able to:

- Describe common security models of database management, and industrial control systems, and other network and network application based security paradigms.
- Apply security principles to design and development of database, industrial control and web-based programs.
- Understand how to analyze malware and its paths into file systems and structures.
- Understand and recognize patterns to assess and exploit vulnerabilities on systems
- Understand and be able to assess ICS/SCADA system security issues.

Labs :

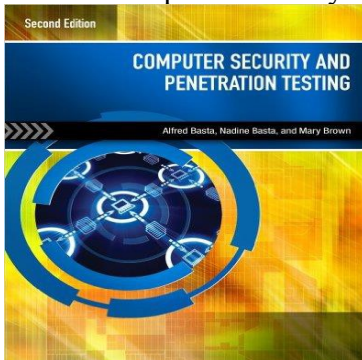
There will be labs using the virtual machine environment. Instructions for accessing this environment will be part of the Assignment A. The labs will be designed to test some of the theory used in class.

Textbooks

There will be many readings from scholarly journals for this course, assigned during the course running.

There is one (1) textbook for this course. There will be other readings from free, and online sources.

- Computer Security and Penetration Testing



ISBN-13: 978-0840020932

ISBN-10: 0840020937

Securing the API Stronghold (free) - <http://nordicapis.com/wp-content/uploads/securing-the-api-stronghold.pdf>

Recommended, but not required.

- Basta, Alfred and Zgola, Melissa (2012). Database Security, Course Technology, Cengage Learning, ISBN: 978-0-4354-5390-6 Recommended only
- Cryptography I course by Dan Boneh (Stanford) on coursea.org (for review – NOT required)

Faculty and Staff

Course Coordinator:

Dr. Tom Winston

Teaching Assistant:

Inna Vasilyeve (ivasilye@gmu.edu)

Grading

Grades will be awarded in accordance with the Mason Grading System for undergraduate students. See the [University Catalog](#), [Academic Policies](#), [AP.3.1 Undergraduate Grading](#) for more information.

The grading scale for this course is:

97 – 100%	A+	Passing
93 – 96%	A	Passing
90 – 92%	A-	Passing
87 – 89%	B+	Passing
83 – 86%	B	Passing
80 – 82%	B-	Passing
76 – 79%	C+	Passing
70 – 75%	C	Passing
60 – 69%	D	Passing
0 – 59%	F	Failing

- * Grades of "C-" and "D" are considered passing grades for undergraduate courses. However, a minimum grade of "C" is required in the AIT major for any course that is a prerequisite for one or more other courses. This course is a prerequisite for several courses in AIT Concentrations – see <http://catalog.gmu.edu/> for course descriptions including prerequisite requirements.

Raw scores may be adjusted by the Instructor to calculate final grades.

Final grades will be based on the following components:

Final Paper	30%
Class Participation - homework	10%
Mid-term exam	30%
Final exam	30%

Final Paper

Students will write a final paper on a research topic related to the topics covered in this course. Students will use APA referencing style, and the paper will not exceed 15 pages, including references. No table of contents is required, however proper citation format is required, and plagiarism will result in an F for the course. No exceptions.

Mid-term exam

The mid-term exam will be conducted during the 6th scheduled class session and will be based on topics addressed in Lectures 1-5. The mid-term exam will be “closed book” – no reference materials other than those provided with the exam paper will be permitted. Mid-term exams will be returned to students once all mid-term exams for all sections have been graded.

Homework

There will be a variety of in-class, and homework exercises for this grade.

Final exam

The final exam will be held during the scheduled final exam session (see <http://registrar.gmu.edu/calendars/2014fall/exams/>) and will be based on topics addressed throughout the entire course. The final exam will be “closed book” – no reference materials other than those provided with the exam paper will be permitted. Final exams will be retained by the [Department of Information Sciences and Technology](#) and will not be returned to students.

Final Grades will be posted on PatriotWeb. This is your official record for this course.

Schedule

Lecture	Content	Reading*
1	Introductions, overview of course, information security, Database Security I – Intro, MySQL review Database– Security II – SQL Injections Database Security III Defense against SQL Inj Reconnassance. Scanning Tools. Sniffers	Lectures 1-3 DB Lectures 4-6,7 DB Lectures 8-10 DB
2	Application Security for Hackers and developers C and Security; C++ and Security	From Slides
3	Fuzzing	From Slides
4	API text 1 - 7 Introduction to OAuth and OAuth2	API Security Text
5	API 8, 9, 10 / OAuth2	
6	Mid-term exam TCP/IP vulnerabilities; Spoofing; Session Hijacking	CS&PT 5,7,8
7	Hacking Network Devices; DOS; Buffer Overflows	CS&PT 9,11, 12
8	Buffer Overflows; Programming Exploits	CS&PT 12, 13
9	Checkpoint – review, interview review; sample tech eval.	Various will be posted
10	Industrial Control Systems Security I Chaps. 2,3	ICS/SCADA
11	Industrial Control Systems Security II Chaps. 6,7	ICS/SCADA
12	Industrial Control Systems Security III Chaps. 8,11, 12	ICS/SCADA
13	The Internet of Things and Application Security	TBD
14	Review for Final	TBD
-	Final exam	

* See **References** above

The reading assignment shown for each lecture is to be completed *prior to* that lecture.

This schedule is subject to revision before and throughout the course.

Please see the [Spring 2018 Semester Calendar](#) for important dates, including the last days to add and drop courses.

Religious Holidays

[A list of religious holidays](#) is published by [University Life](#). Any student whose religious observance conflicts with a scheduled course activity must contact the Instructor *at least 2 weeks in advance* of the conflict date in order to make alternative arrangements.

Attendance Policy

Students are expected to attend every class, to complete any required preparatory work (including assigned reading – see **Schedule** above) and to participate actively in lectures, discussions and exercises. As members of the academic community, all students are expected to contribute regardless of their proficiency with the subject matter.

Students are expected to make prior arrangements with Instructor if they know in advance that they will miss any class and to consult with the Instructor as soon as possible if they miss any class without prior notice. Any student who expects to miss more than one class session is **strongly advised** to drop the course and take it in a later semester when he/she can attend every class.

[Mason policy](#) requires students to take exams at the scheduled time and place, unless prior approval is granted by the Dean of the school. Failure to attend a scheduled exam will result in a score of zero (0) for that exam. Please note that exams may be re-scheduled by the Registrar to compensate for disruptions in the semester schedule and students are expected to be available throughout the exam period including the scheduled Make-up Day.

Classroom conduct

Students are expected to conduct themselves in a manner that is conducive to learning, as directed by the Instructor. Any student who negatively impacts the opportunity for other students to learn may be asked to leave the classroom.

Electronic devices are potential distractions in the classroom environment. Cell phones, pagers and other handheld devices must be turned off or set to "silent" mode and not used while class is in session. Laptop computers and similar devices may be used only if such use is directly related to the classroom activity in progress – for some activities the Instructor may require that such devices not be used in order to maximize student engagement.

Communications

Registered students will be given access to a Blackboard section for this course. Blackboard will be used as the primary mechanism (outside of lectures) to disseminate course information, including announcements, lecture slides, homework and other assignments, and scores for homework and exams. Some announcements may be sent via Blackboard to students' Mason email accounts

Communication with the Instructor on issues relating to the individual student only should be conducted using Mason email, via telephone, or in person - **not** in the public "Discussions" forums on Blackboard. To protect student privacy any communication related in any way to a student's status must be conducted using secure Mason systems – if you use email to communicate with the Instructor you **MUST** send messages from your Mason email account. Students must activate and monitor their Mason email accounts to receive important information from the University, including messages related to this class.

Lecture slides are complements to the lecture process, not substitutes for it - access to lecture slides will be provided in Blackboard as a courtesy to students provided acceptable attendance is maintained.

All course materials (lecture slides, assignment specifications, *etc*) are published on Blackboard in Adobe® Portable Document Format (PDF). This allows users of most computing platforms to view and print these files. Microsoft® Word (or a compatible word processing application) is required for preparing assignments – it is available on computers in the Mason open labs.

Privacy

Instructors respect and protect the privacy of information related to individual students.

As described above, issues relating to an individual student will be discussed via email, telephone or in person. Instructors will not discuss issues relating to an individual student with other students (or anyone without a need to know) without prior permission of the student.

Homework, quizzes, mid-term exams and other assessable work will be returned to individual students directly by the Instructor (or by a faculty or staff member or a Teaching Assistant designated by the Instructor, or via another secure method). Under no circumstances will a student's graded work be returned to another student.

Instructors, staff, and Teaching Assistants will take care to protect the privacy of each student's scores and grades.

Disability Accommodations

[The Office of Disability Services \(ODS\)](#) works with disabled students to arrange for appropriate accommodations to ensure equal access to university services. Any student with a disability of any kind is strongly encouraged to register with ODS as soon as possible and take advantage of the services offered.

Accommodations for disabled students **must** be made in advance – ODS cannot assist students retroactively, and at least one week's notice is required for special accommodations related to exams. Any student who needs accommodation should contact the Instructor during the first week of the semester so the sufficient time is allowed to make arrangements.

Campus Notifications

Students are encouraged to subscribe to the [Mason Alert system](#) to receive notifications of campus emergencies, closings, and other situations that could affect class activities.

Each classroom has a poster explaining actions to be taken in different types of crisis. Further information on emergency procedures is available at <http://cert.gmu.edu/>. In the event of an emergency, students are encouraged to dial 911.

Other Resources

Mason provides many useful resources for students. The following resources may be particularly useful:

- The Writing Center
- The Academic Advising Center
- The University Libraries
- Counseling and Psychological Services
- University Career Services

See <http://www.gmu.edu/resources/students/> for a complete listing of Mason resources for students.

Academic Integrity

All members of the Mason community are expected to uphold the principles of scholarly ethics.

The AIT major has been designed to achieve several specific outcomes. One of those outcomes is: *“An understanding of professional, ethical, legal, security, and social issues and responsibilities.”*

Graduating students are bound by the ethical requirements of the professional communities they join. The ethics requirements for some of the communities relevant to AIT graduates are available via the following links:

- [ACM Code of Ethics and Professional Conduct](#)
- [IEEE Code of Ethics](#)
- [EC-Council Code of Ethics](#)

On admission to Mason, students agree to comply with the requirements of the Mason [Honor Code](#). The Honor Code will be **strictly enforced** in this course. Honor Code cases are heard by a panel of students – students who meet the requirements are encouraged to nominate themselves to serve on the Honor Committee.

Any use of the words or ideas of another person(s), without explicit attribution that clearly identifies the material used and its source in an appropriate manner, is **plagiarism** and will not be tolerated. The Instructor reserves the right to use manual and/or automated means (including such services as [SafeAssign](#)) to detect plagiarism in any work submitted by students for this course, and to direct Teaching Assistants and/or other faculty and/or staff members to do likewise in support of this course.

For this course, the following requirements are specified:

- All assessable work is to be prepared by the individual student, unless the Instructor explicitly directs otherwise.
- All work must be newly created by the individual student for this course for this semester. Any usage of work developed for another course, or for this course in a prior semester, is strictly prohibited without prior approval from the Instructor.

Instances of cheating whether perceived or real will result in actions to be determined by the instructor in accordance with University policies. This can include –

- 1. An Honor Code Violation**
- 2. A failure for the assignment in question**
- 3. A failure for the course.**

George Mason requires instructors to report all instances of perceived cheating to the Office of Academic Integrity.

Students are encouraged to ask for clarification of any issues related to academic integrity and to seek guidance from the Instructor, other faculty members, academic advisors, or the [Office for Academic Integrity](#).