ISA 763
Security Protocol Analysis

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George Mason University
http://mason.gmu.edu/~pcosta

Course Description

Fall 2014

Teaches how to design, understand, verify, and test communication protocols so they meet their security objectives of recognizing the basic components of a communication protocol. These include specifying security properties accurately, modeling actors and mal-actors against whom a protocol ought to be secure and discussing verification and testing methods, including their limitations. This is a graduate level class where we read many papers and apply their methods to model and verify the properties of protocol that are being used today.

Class Details

Prerequisites: ISA 656 or permission of instructor
Co-requisites: None

Classes
* *Wednesdays, from 7:20 p.m. to 10:00 p.m.*
* *Room L008 of the Art and Design building.*

Participating Faculty
* *Dr. Paulo Costa, Associate Professor, SEOR Dept. – Course Instructor*
* *Dr. Duminda Wijesekera, Professor, CS Dept.*
* *Mrs. Damindra Bandara, ISA PhD Candidate – Group Project Mentor*
* *Mr. Thabet Kacem, ISA PhD Candidate – Group Project Mentor*
* *Mr. Tony Melaragno, ISA PhD Candidate – Group Project Mentor*

Office hours
* *Room 2227 of the Nguyen Engineering Building.*
* *Wednesdays, from 2:00 p.m. to 3:30 p.m., or by appointment.*
* *Dr. Costa contact data: (703) 993-9989 / pcosta@gmu.edu*

Administrative
* *Registration and drop without tuition penalty deadline: September 2nd.*
* *Drop with 33% tuition penalty: September 16th.*
* *Final Drop deadline (66% tuition penalty): September 26th.*

Course Logistics

1. All course communication will be done via the Blackboard system. Students are expected to have access and be able to use the system before classes start. Blackboard is accessible via the MyMason portal at https://mymasonportal.gmu.edu/. Instructions for using the Blackboard system are provided in the "resources" link at the bottom of the portal page.
2. Volgenau School Computing Resources has answers to many questions about school systems on their web site: http://labs.vse.gmu.edu and will try to help you if have problems connecting to school computing systems. However, they will not provide assistance with general computing questions or course assignments. Please contact me if you have any questions about how to use software to complete your assignments.
3. Accommodations for disability: If you have a documented learning disability or other condition that may affect your academic performance you should: a) make sure this documentation is on file with Office for Disability Services (SUB I, Rm. 4205; 993-2474; http://ods.gmu.edu) to determine the accommodations you need; and b) let me know about your accommodation needs as soon as possible. If you have contacted the Center for Disability Services and are waiting to hear from a counselor, please keep me updated during the whole process.
4. Inclement weather: Class sessions may be cancelled due to inclement weather or other University emergencies. Check the Announcements area of the course website for updates.

Expected Behavior

1. Attendance in class is essential. Information will be presented that will not necessarily be in the book, and is almost certain to be required for successfully completing the project.
2. Please make sure you have your cell phone, tablet, pager, etc., in silent mode. *Should you find yourself in extreme need of answering an incoming call, just leave the room to do so*.
3. All course deliverables will be submitted electronically and scheduled in advance. Should any scheduled event impact a student's participation in class activities and assignments, it is the student's responsibility to coordinate with me in advance.
4. Religious observances are one common example of events that might impact students' activities. Students are responsible for planning ahead. Please, refer to the GMU's calendar of religious holidays at http://ulife.gmu.edu/religious_calendar.php.
5. Academic Policy: All academic policies as given in the Honor System and code will be strictly followed. These are available at http://catalog.gmu.edu/content.php?catoid=19&navoid=4113.
6. General Policies: All general policies defined in the University Catalog are in place for this course. You can access those at http://catalog.gmu.edu/content.php?catoid=19&navoid=4114.
7. George Mason University is an Honor Code university. Please see the Office of Academic Integrity website (http://academicintegrity.gmu.edu/honorcode/) for a full description of the honor code and the honor committee process.

Course Outline:

Unit 0:	Course Overview and Introduction
Unit 1:	Security Protocol Verification Syntax: Basic Concepts
Unit 2:	Security Protocol Verification Syntax: Specifying Security Objectives
Unit 3:	Protocols for Anonymity
Unit 4:	Trusted Computing

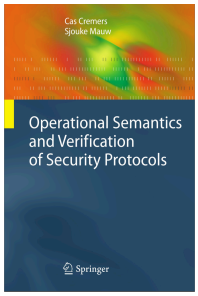
Grading

The grading structure of this course is as follows:

- Projects (80% of grade – 4 total, 20% each Project)
- Project presentations (20% of grade)

Textbook and References

The following book is recommended:



Operational Semantics and Verification of Security Protocols
Cas Cremers and Sjouke Mauw
Springer, 1st Edition (October 31, 2012). 172 pp.
ISBN-10: 354078635X.
ISBN-13: 978-3540786351.
GMU Library Link:
http://magik.gmu.edu/cgi-bin/Pwebrecon.cgi?BBID=2956956

Other main references for this course are:

- Lowe, Gavin. A Hierarchy of Authentication Specifications. *Proceedings of 10th IEEE Computer Security Foundations Workshop*, 1997.
  Available at: http://www.cs.ox.ac.uk/gavin.lowe/Security/Papers/authentication.ps
- Meier, Simon. Advancing Automated Security Protocol Verification. PhD Thesis. ETH Zürich. 2013. Available at:
  http://www.infsec.ethz.ch/research/meiersi_thesis_final_draft_20130130.pdf

Please, note that all of the above references are also available either from the course Blackboard website or from the GMU Library.

Software

The course includes usage of the following software, which is freely available from their associated websites listed below.

Scyther tool

Scyther is a tool for the automatic verification of security protocols. It is available from:

http://www.cs.ox.ac.uk/people/cas.cremers/scyther/

Tamarin solver

Tamarin is a security protocol verification tool that supports both falsification and unbounded verification of security protocols. It is available from:

http://www.infsec.ethz.ch/research/software/tamarin

GO Language

Go is an expressive, concurrent, garbage-collected programming **language**. It is available from:

https://code.google.com/p/go/

Group Projects

Overview. The course grade is based on 4 group projects. Groups will be defined during the first class and all assignments must be submitted via Blackboard by their respective due date. Each group will have a faculty assigned as mentor, and should refer to them for details on the project.

Oral presentations. Each group will present at least one of the group project solutions in class. The presentation(s) account for 20% of the course grade.

Peer Evaluation Sheet. Your grade on this project will be partly a group grade and partly an individual grade. You are expected to rate each person of your team – not including you - on a 100-point scale. The rating scale is as follows:

- **90-100** Participated enthusiastically, exhibited strong leadership, attended regularly and was essential to meetings, performed tasks responsibly and on time, work was extremely high quality, took excellent initiative and was highly self-motivated;
- **80-90** Good participation, attended and contributed to meetings, exhibited leadership, performed tasks responsibly and on time, work of dependable high quality, took good initiative and was self-motivated;
- **70-80** Adequate participation, usually attended and contributed to meetings, exhibited some leadership, performed tasks responsibly and usually on time, work of dependable good quality, took some initiative and was self-motivated;

- **50-70** Participation could have been better, performed tasks when asked but may have been late and/or needed reminders, quality could have been better, needed guidance and usually did not take enough initiative;
- **up to 50** Participation was minimal or non-existent; any work that was turned in was of inadequate quality.

The individual grade of each student will be based on the average of your peer evaluations and on my own observations. Evaluation sheets will be distributed as an assignment closer to the end of the course.

Tentative Schedule

The following schedule is provided for planning purposes only. The course's blackboard website includes a schedule of the activities, and students are responsible for keeping themselves updated with the changes

8/27	Week 1	Course Overview and Introduction, group assignments
9/3	Week 2	Unit 1, Yahloom protocol, Scyther tool
9/10	Week 3	Unit 1, mentor meetings
9/17	Week 4	Unit 1, group presentation
9/24	Week 5	Unit 2, JFK protocol, Tamarin
10/1	Week 6	Unit 2, mentor meetings
10/8	Week 7	Unit 2, group presentation
10/15	Week 8	Unit 3, Dinning cryptographers protocol, GO language
10/22	Week 9	Unit 3, mentor meetings
10/29	Week 10	Unit 3, group presentation
11/5	Week 11	Unit 4, a zero knowledge protocol
11/12	Week 12	Unit 4, mentor meetings
11/19	Week 13	Unit 4
11/26	- x -	Thanksgiving recess – no classes
12/3	Week 14	Unit 4, Group presentations

BEST WISHES FOR A GREAT SEMESTER!!!

Wednesday, August 27, 2014.