

*Computer Science CS 4/6/79995 ST: Design of Secure Operating Systems*

Section 021/020/020

Call Numbers 12966/10607/10621

## **SYLLABUS**

Summer 2013

**Time and Place:** Mondays, Tuesdays and Thursdays, 4:00 to 5:40 in room 228 MSB

**Instructor:** Michael Rothstein, 268 MSB, phone 330-672-9065. Email address: rothstei at cs.kent.edu (The address mrothste at kent.edu will not work too well because I do not check it as often; for a quicker response, the first address is recommended.)

**Web address:** <http://www.cs.kent.edu/~rothstei>

**Office Hours:** Mondays, Tuesdays and Thursdays 2:00-3:30 and after class. Also, you can always send email with questions and/or to set up an appointment. Usual turnaround will be a few hours during the day. Email use is to be preferred over voicemail, which will not be checked as often.

**Textbook:** Jaeger, Trent, *Operating System Security*, Morgan & Claypool Publishers, 2008, ISBN 9781598292121 (paperbook), 9781598292138 (ebook)

**Additional bibliography:** • Silberschatz, Galvin, Gagne, *Operating System Concepts* 8th Ed Update, John Wiley and Sons, 2009, 2012, ISBN 978-1-118-11273-1.

- Rueda, Sandra, Vijayakumar, Hayawardh and Jaeger, Trent, *Analysis of virtual machine system policies* in Proceedings of the 14th ACM symposium of Access control models and technologies (SACMAT 09), 2009, Stresa, Italy, pp 227-236
- Amer, Suhair Hafez and Hamilton, Jr., John A. *Understanding security architecture*, in Proceedings of the 2008 Spring simulation multiconference (SpringSim '08), 2008, Ottawa, Canada, pp 335-342
- Chaudhuri, Avik *Language-based security on Android* in Proceedings of the ACM SIGPLAN Fourth Workshop on Programming Languages and Analysis for Security (PLAS '09), 2009, Dublin, Ireland, pp 1-7
- William Enck, Machigar Ongtang and Patrick McDaniel *Understanding Android Security*, IEEE Security and Privacy, Vol 7, 2009, pp 50-57
- Anonymous (Untitled)  
<http://www.ratliff.net/blog/2007/10/03/security-design-principles/> (A critique on selinux)
- Bishop, Matt, *Computer Security: Art and Science*, Addison-Wesley, 2003, ISBN 0201-440997, Chapter 13.

**Course Goals:** The goal of this course is a study of the challenges involved in the design and implementation of a secure operating system.

**Prerequisite:** For CS 6/79995: Graduate Standing  
For CS 49995: CS II with a grade of C or better; Operating Systems is desirable, but not required.

**Attendance policy:** By initiative of the Provost of the University, I have been charged with keeping full attendance records, at least for the first five weeks of the term. Though I will not compute these records into your final averages, when I assign letter grades, I will give you a slightly better grade if you have a better attendance record. Notwithstanding the above, if you are absent, there may be material created, either spontaneously or in response to questions, and covered in the classroom; often there will not be any written notes of this material, so it might be a good idea to team up with somebody who keeps good notes to make sure you have all the material covered. Some of this material may show up in an exam.

Read the text. Only general reading assignments will be given, so it is up to you to discover what is and is not important.

The syllabus may be changed during the semester if necessary: changes will be announced in class; they will also show up on the instructor's website.

**Grading:** For Graduate Students: Your grade will be based on one midterm, one final, and a class presentation at the end of the term on a relevant topic of the student's choosing, with instructor approval. The weights are:  
Midterm (July 11) 30%  
Final (August 1) 30% For Undergraduate Students: Your grade will  
Presentation 40%

be based on one midterm, one final, and a three page term paper due on July 26 on a relevant topic of the student's choosing, with instructor approval. The weights are:

Midterm (July 11) 30%  
Final (August 1) 30%  
Term paper 40%

**Test make-up policy:** I will need signed documentation to verify *each* individual absence in order to provide make-ups; only university accepted reasons will be honored.

**Grading scale:** I will assign number grades during the session and only convert them to letter grades when I turn them in at the end of the session. No decision can be made regarding a conversion table until the very last minute due to such imponderables as test difficulty, class attendance and participation, etc. which will influence the grade. However, I guarantee the following, worst case, table:

97-100	will convert into an A
94-96	will convert into at least an A-
91-93	will convert into at least a B+
88-90	will convert into at least a B
85-87	will convert into at least a B-
82-84	will convert into at least a C+
79-81	will convert into at least a C
76-78	will convert into at least a C-
73-75	will convert into at least a D+
66-72	will convert into at least a D

- Topics to be covered:**
- Introduction to the topic of Security in Operating Systems (1 lecture)
  - Principles of Information Security (1 lecture)
  - Access Control Fundamentals (2 lecture)
  - Generalized Security Architectures (3 lectures)
  - Case study: Multics, security architecture, analysis and vulnerabilities. (3 lectures)
  - Case study: Analysis of security in Unix and problems with the design of its security architecture (2 lectures)
  - Case study: Analysis of security in Windows and problems with its security(1 lecture)
  - Verifiable Security Goals (3 lectures)
  - Case studies: Security Kernels: SCOMP design and analysis, GEM-SOS design.(3 lectures)
  - Difficulties with securing Commercial Operating Systems (Retrofitting Security) (3 lectures)
  - Case study: Solaris Trusted Extensions (3 lectures)
  - Case study: Linux Security Modules architecture (2 lectures)
  - Case study: SELinux design and analysis (3 lectures)
  - Problems and issues in Secure Capability Systems (3 lectures)
  - Security issues in Virtual Machine Systems; evaluation (3 lectures)
  - Security issues in sandboxing designs: design and analysis of Android (3 lectures)
  - Space for student talks (6 lectures)

**Special accommodations for Students with Disabilities:** University policy 3342-3-01.3 requires that students with disabilities be provided reasonable accommodations to ensure their equal access to course content. If you have a documented disability and require accommodations, please contact the instructor at the beginning of the semester to make arrangements for necessary classroom adjustments. Please note, you must first verify your

eligibility for these through Student Accessibility Services (contact 330-672-3391 or visit: <http://www.kent.edu/sas> for more information on registration procedures).

**Registration Requirement:** The official registration deadline for this course is 06/16/2010. University policy requires all students to be officially registered in each class they are attending. Students who are not officially registered for a course by published deadlines should not be attending classes and will not receive credit or a grade for the course. Each student must confirm enrollment by checking his/her class schedule (using Student Tools in FlashFast) prior to the deadline indicated. Registration errors must be corrected prior to the deadline.

The last withdrawal date for this course is 07/14/2010.

**On cheating, plagiarism and other unethical behavior:** You are encouraged to discuss class problems with other students but required to work independently of anybody else except the instructors and/or tutor, unless otherwise indicated. Copying other people's work, allowing your work to be copied (even inadvertently!) and plagiarizing work will not be tolerated and will be dealt with according to University regulations, as described in the University Policies and Procedures, a condensed version of which is attached.

Notes:

1. By default, the penalty for cheating in this course is an "F" in the course.
2. University regulations require me to notify Student Conduct in case of violations.
3. Cooperation is just as bad as the deed itself: so, deciding which of two is the original is a non-issue: both are equally guilty.

## **ADMINISTRATIVE POLICY AND PROCEDURES REGARDING STUDENT CHEATING AND PLAGIARISM**

*Condensed Version*

For complete policy and procedure go to [www.kent.edu/policyregister](http://www.kent.edu/policyregister) 3342-3-01.8.(available at <http://www.kent.edu/policyreg/chap3/3-01-8.cfm>)

Cheating and plagiarism constitute fraudulent misrepresentation for which no credit can be given and for which appropriate sanctions are warranted and will be applied.

The university affirms that acts of cheating and plagiarism by students constitute a subversion of the goals of the institution, have no place in the university and are serious offenses to academic goals and objectives, as well as to the rights of fellow students.

“Cheat” means to intentionally misrepresent the source, nature, or other conditions of academic work so as to accrue undeserved credit, or to cooperate with someone else in such misrepresentation. Cheating includes, but is not limited to:

1. Obtaining or retaining partial or whole copies of examinations, tests or quizzes before these are distributed for student use;
2. Using notes, textbooks or other information in examinations, tests and quizzes, except as expressly permitted;
3. Obtaining confidential information about examinations, tests or quizzes other than that released by the instructor;
4. Securing, giving or exchanging information during examinations;
5. Presenting data or other material gathered by another person or group as one’s own;
6. Falsifying experimental data or information;
7. Having another person take one’s place for any academic performance without the specific knowledge and permission of the instructor;
8. Cooperating with another to do one or more of the above;
9. Using a substantial portion of a piece of work previously submitted for another course or program to meet the requirements of the present course or program without notifying the instructor to whom the work is presented; and
10. Presenting falsified information in order to postpone or avoid examinations, tests, quizzes, or other academic work.

“Plagiarize” means to take and present as one’s own a material portion of the ideas or words of another or to present as one’s own an idea or work derived from an existing source without full and proper credit to the source of the ideas, words, or works. As defined, plagiarize includes, but is not limited to:

- a. The copying of words, sentences and paragraphs directly from the work of another without proper credit;
- b. The copying of illustrations, figures, photographs, drawings, models, or other visual and nonverbal materials, including recordings of another without proper credit; and
- c. The presentation of work prepared by another in final or draft form as one’s own without citing the source, such as the use of purchased research papers.

### **Academic Sanctions**

The following academic sanctions are provided by this rule for offenses of cheating or plagiarism. Kent campus instructors shall notify the department chairperson and the student conduct office each time a sanction is imposed. Regional campus instructors shall notify the regional campus dean and the student conduct officer each time a sanction is imposed. Regional campus student conduct officer shall notify the Kent student conduct office each time a sanction is imposed by a regional campus Instructor. The following academic sanctions are provided by this rule for offenses of cheating or plagiarism. In those cases the instructor may:

1. Refuse to accept the work for credit; or
2. Assign a grade of "F" or zero for the project, test, paper, examination or other work in which the cheating or plagiarism took place; or
3. Assign a grade of "F" for the course in which the cheating or plagiarism took place; and/or;
4. Recommend to the department chair or regional campus dean that further action specified in the rule be taken. The department chairperson or regional campus dean shall determine whether or not to forward to the academic dean or to the vice president for the extended university a recommendation for further sanction under this rule.

For complete policy and procedure go to [www.kent.edu/policyregister](http://www.kent.edu/policyregister) 3342-3-01.8, available at <http://www.kent.edu/policyreg/chap3/3-01-8.cfm>.