EEL 4736 Principles of Computer System Design

1. Catalog Description (3 credit hours) – A broad introduction to the main principles and abstractions for engineering hardware and software systems, and in-depth studies of their use on computer systems across a variety of designs, be it an operating system, a client/server application, a database server, or a fault-tolerant disk cluster.

2. Pre-requisites – EEL 4712C and EEL 3834
   The project’s programming component primarily uses a scripting language (Python) and requires basic understanding of data structures, algorithms, and Unix.

3. Course Objectives – students learn in this class core abstractions and techniques that generally apply to the design of hardware and software in complex computer systems ranging from personal devices to large-scale distributed, networked computers.

4. Contribution of course to meeting the professional component (ABET only – undergraduate courses) - 3 credits of Engineering Design

5. Relationship of course to program outcomes (ABET only undergraduate courses) – a, b, e

6. Instructor – Renato Figueiredo
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   b. Telephone: 352-392-6430
   c. E-mail address: renato@acis.ufl.edu
   d. Web site: http://byron.acis.ufl.edu
   e. Office hours: TBA

7. Teaching Assistant
   a. Office location: TBA
   b. Telephone: TBA
   c. E-mail address: TBA
   d. Office hours: TBA

8. Meeting Times – M W F 9th period

9. Class/laboratory schedule - 3 classes per week consisting of 50 minutes each

10. Meeting Location – LAR 239

11. Material and Supply Fees - N/A

12. Textbooks and Software Required
   a. Title: Principles of Computer System Design
   b. Author: Jerome E. Saltzer and M. Frans Kaashoek
   c. Publication date and edition: Morgan Kaufmann 2009.
13. Recommended Reading – Readings will also be based on a collection of relevant technical papers.

14. Course Outline -

Week 1: Overview of computer systems: sources of complexity and design principles
- Modularity, Abstraction, Layering, Hierarchy

Week 2: Elements of computer system organization
- Memory, interpreters, communication links

Weeks 3-4: Layering and naming in computer systems
- Case studies: UNIX file system, Uniform Resource Locator (URL)

Weeks 5-7: Enforcing modularity
- Clients and servers; virtualization

Weeks 8-9: Designing for performance
- Metrics; latency and throughput; queuing
- Exploiting workload properties, concurrency; addressing bottlenecks

Weeks 10-11: The network as a system and as a system component
- Network layers; end-to-end
- System design issues

Weeks 12-13: Fault tolerance
- Concepts and metrics
- Systematically applying redundancy; software and data

Weeks 14-15: Atomicity, Consistency

15. Attendance and Expectations - Attendance is strongly encouraged, and students are expected to come to class having read the material in the textbook chapter being covered in lecture. In-class quizzes will be given and contribute to the final grade.

Cell phones and other electronic devices are to be silenced. No text messaging during class or exams.

Requirements for class attendance and make-up exams, assignments, and other work are consistent with university policies that can be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

16. Grading
- Homework: 20%
- Project: 20%
- 2 Midterms 18% each
- Final Exam 21%
- Quizzes 3%
17. Grading Scale - Final letter grades are based on a curve of the final class numeric grades

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In order to graduate, graduate students must have an overall GPA and an upper-division GPA of 3.0 or better (B or better).” Note: a B- average is equivalent to a GPA of 2.67, and therefore, it does not satisfy this graduation requirement. For more information on grades and grading policies, please visit: [http://gradschool.ufl.edu/catalog/current-catalog/catalog-general-regulations.html#grades](http://gradschool.ufl.edu/catalog/current-catalog/catalog-general-regulations.html#grades)

18. Make-up Exam Policy – A make-up exam will only be considered in extraordinary cases, and must be taken before the scheduled exam. The student must submit a written petition to the instructor for a make-up exam two weeks prior to the scheduled exam, and the instructor must approve the petition.

If you have a University-approved excuse and arrange for it in advance, or in case of documented emergency, a make-up exam will be allowed. University attendance policies can be found at: [https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx](https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx)

19. Honesty Policy – All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others.

20. Accommodation for Students with Disabilities – Students Requesting classroom accommodation must first register with the Dean of Students Office. That office will provide the student with documentation that he/she must provide to the course instructor when requesting accommodation.

21. UF Counseling Services – Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:
- UF Counseling & Wellness Center, 3190 Radio Rd, 392-1575, psychological and psychiatric services.
- Career Resource Center, Reitz Union, 392-1601, career and job search services.

22. Software Use – All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary
action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.