

# **Silicon Valley University**

2010 Fortune Ave, San Jose, CA 95131

Tel: 408-435-8989 Fax: 408-955-0887 Email: info@svuca.edu www.svuca.edu

###### Course Syllabus

#### Course Title: Operating System Design

**Instructor: Chung-Wen (Albert) Tsao, Ph.D. (atsao@svuca.edu)**

**Date:** Spring, 2016

**Course Number:** CS500

**Credit Hours:** 3 Credit Hours

**Course Length:** 15 Weeks

**Schedule:** TBD

**Text Book:** Operating System Concepts 8th Edition, Silberschatz, Galvin, Gagne, John Wiley & Sons, Inc, 2008 ISBN: 978-0-470-12872-5

Operating Systems Internals and Design Principals, 6/E, William, Stallings, Prentice Hall, 2009 ISBN: 0-13-600632-9 or ISBN: 978-0-13-600632-9

**Course Description**: The course covers the internals of the different Operating Systems subsystems including: Process Mgmt, Threads and SMP, Concurrency Control, Memory Mgmt, Scheduling, I/O Mgmt and Disk Scheduling, File Mgmt, Protection, Security threats, Distributed Systems, Distributed File Systems, Distributed Systems Coordination, Real-Time and Multi-Media systems. Windows and UNIX/Linux Operating Systems design requirements will be analyzed. There will be Case Studies using the Linux Operating System on the Raspberry PI SOC.

**Prerequisite:**  *CS400*

**Co-Requisite:** *None*

**Course Objectives:** The course helps you to be familiar with the main OS modules and their functionality, and how each work in detail.

Learning objectives of this course are:

1. Understand requirements, design and implementation of modern operating system.
2. Understand high level abstraction of OS (processes, threads, virtual memory, caching, I/O operations).
3. Understand OS role in distributed computing and distributed file system environments.
4. Understand requirements of a Real-Time Operating system.

**Learning Outcomes:** After completing this course, students will have the capabilities or skills indicated in the followings:

1. Understand the difference between processes and threads.
2. Understand the issues and use of locks, semaphores and monitors for synchronizing multithreaded systems and implement them in multithreaded programs.
3. Understand the issues of scheduling of user-level processes/threads.
4. Understand the concepts of deadlock in operating systems and how they can be managed/avoided.
5. Understand the virtual memory management, segmentation protection and security issues in operating systems.
6. Understand the I/O subsystem and OS role in managing and controlling I/O operations and devices.
7. Understand advanced concepts of OS used in distributed computing and file system environments.
8. Understand concept of Real-Time Operating System and environment.

Course Outline

Week Topic Reading Assignment

1 Computer System and Operating System Review Chapter1-4

(System Structure, Services, System Interface)

2 Operating System Review (Process, Threads, Chapter5-7

Scheduling Policy, Concurrency, Synchronization)

3 Operating System Review (Process, Threads, Chapter5-7

Scheduling Policy, Concurrency, Synchronization) Cont.

4 Operating System Review (Memory Management, Chapter 8-9 Virtual Memory, File-System Implementation, Mass

Storage Structure)

5 Operating System Review (File-System Implementation, Chapter 10-12

File-System Interface, Mass Storage)

6 Operating System Review (File-System Implementation, Chapter 10-12

File-System Interface, Mass Storage) Cont.

7 I/O Subsystem Chapter13

8 Mid-term Examination (closed book)

9 Protection Chapter14

10 Security Chapter15

11 Distributed System Structures Chapter16

12 Distributed File Systems Chapter17

13 Distributed Coordination Chapter18

14 Real-Time/Multi-Media Systems Chapter19-20

15 Final Examination (closed book)

**Instruction Methods**: In Class Lectures

**Grading:** Midterm Examination 25%

Final Examination 30%

Projects 15%

Homeworks 10%

Quiz 10%

Attendance & Participantion 10%

Total 100%

**Grading Scale:** Approximate letter grade range  
  90  <=  A  <= 100  
  80  <=  B  <   90  
  70  <=  C  <   80  
  60  <=  D  <   70  
  F  <   60

### Grading System: Score Range Grade GPA

98 - 100 A+ 4.3

92 - 97.9 A 4.0

90 - 91.9 A- 3.7

88 - 89.9 B+ 3.3

82 - 87.9 B 3.0

80 - 81.9 B- 2.7

78 - 79.9 C+ 2.3

72 - 77.9 C 2.0

70 - 71.9 C- 1.7

68 - 69.9 D+ 1.3

62 - 67.9 D 1.0

60 -61.9 D- 0.7

Below 59.9 F 0.0

**Honor Code**: All students taking courses in the SVU agree; individually and collectively, that they will neither give nor receive un-permitted aid in examination or other course work that is to be used by the instructor as a basis of grading.

**Attendance:** Required.

**Make-up Work:** No, unless pre-arranged with the instructor.

**Resources:** All students are encouraged to use library-collected reference books and IEEE, ACM electronic Journals. You can also use ProQuest and ProQuest/ABI database for research and projects.

# **Revision Date:** 05/10/2016