

**DEREE COLLEGE SYLLABUS FOR:****ITC 2293 OPERATING SYSTEMS CONCEPTS – LEVEL 4**

Same as CS 2293

(Updated Spring 2012)

**UK Credits: 15**

**PREREQUISITES:** CS 1070 Introduction to Information Systems  
CS 2188 Introduction to Programming

**CATALOGUE DESCRIPTION:** Structures for operating systems. Theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files. CPU scheduling algorithms and segmented vs paged types of memory. Polled, interrupt-driven and DMA-based access to I/O. Operating system design and functionality. Performance, avoidance of deadlock, security issues and basic processing of transactions.

**RATIONALE:** The module provides a clear understanding of the fundamental concepts underlying an operating system and relates these to its function, evolution and design. It describes the different structural components of an operating system and shows how they interact to provide a range of user services and resource management. By the end of this module, students will have an understanding of factors that need to be considered in selecting, deploying, configuring, optimising and securing an operating system and associated middleware.

**LEARNING OUTCOMES:** As a result of taking this course, the student should be able to:

1. Demonstrate an understanding of the major components of an operating system, scheduling, memory management; disk organisation and file system structure and device and I/O management functions.
2. Explain and illustrate the main principles and techniques used to implement processes and threads as well as the different algorithms for process scheduling.
3. Demonstrate and apply an understanding of the main mechanisms used for inter-process communication, and the problems of deadlock and livelock.
4. Understand the main problems related to concurrency and the different synchronization mechanisms available.
5. Compare aspects of operating systems and their facilities and

distinguish different styles of operating system design.

6. Evaluate security risks in operating systems and understand the role operating systems can and should play in establishing security.

#### **METHOD OF TEACHING AND LEARNING:**

In congruence with the learning and teaching strategy of the College, the following tools/activities are used:

1. Classroom lectures, discussions, laboratory practical sessions.
2. Office hours: Students are encouraged to make full use of the office hours of their instructor, where they can ask questions and go over lecture material.
3. Use of the Blackboard Learning platform, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.

#### **ASSESSMENT:**

##### **Summative:**

Coursework: case problems	<b>40</b>
Final Examination (2-hour comprehensive): combination of short answers to essay questions and case problems	<b>60</b>

##### **Formative:**

In-class, 1-hour, "diagnostic" test: short answers to essay questions	<b>0</b>
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The formative assessments aim to shape teaching along the semester and prepare students for the summative assessments.

The coursework tests Learning Outcomes 1-3.

The final examination tests Learning Outcomes 1-5.

(Guidelines and assessment rubrics are distributed on the first day of classes along with the course outline.)

#### **INDICATIVE READING:**

##### **REQUIRED READING:**

- "Operating Systems, A Spiral Approach", Ramez Elmasri, A. Gill Garrick, David Levine, Mc Graw Hill, 2010, ISBN: 9780072449815
- Instructor's notes

##### **RECOMMENDED READING:**

- McHoes A. et al., "Understanding Operating Systems", 6<sup>th</sup> ed., Course Technology (© 2010).
- Tanenbaum A. S., "Modern Operating Systems", 3<sup>rd</sup> ed., Prentice Hall (© 2007).
- Stuart B., "Principles of Operating Systems: Design and Applications", 1<sup>st</sup> ed., Course Technology (© 2008).

- Elmasri R., “Operating Systems: A Spiral Approach”, 1<sup>st</sup> ed., McGraw-Hill (© 2009).
- Stallings W., “Operating Systems: Internals and Design Principles”, 6<sup>th</sup> ed., Prentice Hall (© 2008).
- Doeppner T. W., “Operating Systems In Depth: Design and Programming”, 1<sup>st</sup> ed., Wiley (© 2010).

**COMMUNICATION  
REQUIREMENTS:**

Daily access to the course’s site on the College’s Blackboard CMS.  
Effective presentation skills using proper written and oral English.  
Communicate and coordinate during team activities.

**SOFTWARE  
REQUIREMENTS:**

A POSIX-UNIX or Linux Server and Windows 7.  
Java 1.5 JVM, GNU C.

**WWW RESOURCES:**

OS white papers (  
<http://www.computerworld.com/s/whitepapers/topic/89/Operating+Systems/1>,  
<http://whitepapers.businessweek.com/rlist/term/type/white+paper/Operating-Systems.html>,  
[http://www.developforwindows.com/public/pdfs/IDC\\_WhitePaper\\_Windows\\_7\\_A-Compelling\\_Opportunity\\_for\\_Developers.pdf](http://www.developforwindows.com/public/pdfs/IDC_WhitePaper_Windows_7_A-Compelling_Opportunity_for_Developers.pdf),  
<http://www.igniteyoursmallbusiness.com/contests/acqua/Rules/Microsoft%20Win%207-White%20Paper.pdf>,  
<http://www.bitpipe.com/tlist/Linux.html>  
<http://www.itbusinessedge.com/search/?topic=661&filter=WhitePaper>)  
Linux (<http://www.linux.org/info/>)  
Windows 7 (<http://www.microsoft.com/windows/windows-7/default.aspx>)  
Mac OS X (<http://www.apple.com/macosx/what-is-macosx/>)

**INDICATIVE  
CONTENT:**

1. Operating Systems basics
2. Operating Systems Structures
3. Process Management
4. Thread Management
5. CPU Scheduling
6. Process Synchronisation
7. Memory Management
8. Virtual Memory
9. File System Interface
10. File System Implementation
11. Mass-storage Organisation
12. Device Management
13. Protection

## 14. Security