**OUTCOMES BASED LEARNILNG MATRIX**

**Course: CTIM221 Operating Systems Concepts (3 credits, 45 hours)**
**Department: Computer Technology and Information Management**

**Description**:

**This course is designed for second-year Computer Information Systems students. It examines operating systems from an application programmer's viewpoint. It shows why operating systems are needed and how they are used to increase operating efficiency while minimizing the need for technical programming. Standard functions of commonly used operating systems are examined.**

Prerequisite: None

While completing the table below, remember that the individual outcomes you list in the first column should answer this question: **What must the learner know and be able to do at the end of the course?** Items in the third column should answer the question: **How do we know?** The second column is where teachers can be most creative; it's for pedagogy. Each rectangle in column one should contain just one outcome; the corresponding rectangles in columns two and three, however, may contain more than one item. Using the code at the end of the matrix, indicate the core competencies being strengthened by the outcomes activities and the assessment tools.

| *COURSE OUTCOMES | OUTCOMES ACTIVITIES | ASSESSMENT TOOLS |
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| At the end of this course students will have a basic understanding of operating systems.<br><br>1. Overview of Operating Systems | 1. Examine/explore - Introduction (CCT, IL, OC, QL, IL WC).<br>2. Examine/explore - Operating System Software (CCT, IL, OC, QL, IL WC).<br>3. Examine/explore - Machine | 1. Labs, Quizzes, homework assignments (CCT, IL, OC, QL, IL WC). |

**Approved by CTIM Department—September 2015**

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| | Hardware (CCT, IL, OC, QL, IL WC).<br>4. Examine/explore - Types of Operating Systems (CCT, IL, OC, QL, IL WC).<br>5. Examine/explore - History of Operating Systems Development (CCT, IL, OC, QL, IL WC). | |
| 2. Memory Management, Early Systems | 6. Examine/explore - Single User Contiguous Scheme (CCT, IL, OC, QL, IL WC).<br>7. Examine/explore - Fixed Partitions (CCT, IL, OC, QL, IL WC).<br>8. Examine/explore - Dynamic Partitions (CCT, IL, OC, QL, IL WC).<br>9. Examine/explore - Best-Fit v. First Fit Allocation (CCT, IL, OC, QL, IL WC).<br>10. Examine/explore - Deallocation (CCT, IL, OC, QL, IL WC).<br>11. Examine/explore - Relocatable Dynamic Partitions (CCT, IL, OC, QL, IL WC). | Labs, Quizzes, homework assignments (CCT, IL, OC, QL, IL WC). |
| 3. Memory Management, Modern | 12. Examine/explore - Paged | Labs, Quizzes, homework |

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| Systems | Memory Allocation (CCT, IL, OC, QL, IL WC).<br>13. Examine/explore - Demand Paging (CCT, IL, OC, QL, IL WC).<br>14. Examine/explore - Page Replacement Policies and Concepts (CCT, IL, OC, QL, IL WC).<br>15. Examine/explore - Segmented Memory Allocation (CCT, IL, OC, QL, IL WC).<br>16. Examine/explore - Segmented/Demand Paged Memory Allocation (CCT, IL, OC, QL, IL WC).<br>17. Examine/explore - Virtual Memory (CCT, IL, OC, QL, IL WC). | assignments (CCT, IL, OC, QL, IL WC). |
| 4. Processor Management | 18. Examine/explore - Job Scheduling v. Process Scheduling (CCT, IL, OC, QL, IL WC).<br>19. Examine/explore - Process Scheduler (CCT, IL, OC, QL, IL WC).<br>20. Examine/explore - Process Scheduling Policies (CCT, IL, | Labs, Quizzes, homework assignments (CCT, IL, OC, QL, IL WC). |

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| | OC, QL, IL WC).<br>21. Examine/explore - Process Scheduling Algorithms (CCT, IL, OC, QL, IL WC).<br>22. Examine/explore - Cache Memory (CCT, IL, OC, QL, IL WC).<br>23. Examine/explore - Interrupts (CCT, IL, OC, QL, IL WC). | |
| 5. Process Management | 24. Examine/explore - Deadlock (CCT, IL, OC, QL, IL WC).<br>25. Examine/explore - Starvation (CCT, IL, OC, QL, IL WC). | Labs, Quizzes, homework assignments (CCT, IL, OC, QL, IL WC). |
| 6. Concurrent Processes | 26. Examine/explore - Parallel Processing (CCT, IL, OC, QL, IL WC).<br>27. Examine/explore - Typical Multiprocessing Configurations (CCT, IL, OC, QL, IL WC).<br>28. Examine/explore - Process Synchronization Software (CCT, IL, OC, QL, IL WC).<br>29. Examine/explore - Process | Labs, Quizzes, homework assignments (CCT, IL, OC, QL, IL WC). |

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| | Cooperation (CCT, IL, OC, QL, IL WC).<br>30. Examine/explore - Concurrent Programming (CCT, IL, OC, QL, IL WC). | |
| 7. Device Management | 31. Examine/explore - System Devices (CCT, IL, OC, QL, IL WC).<br>32. Examine/explore - Sequential Access Storage Media (CCT, IL, OC, QL, IL WC).<br>33. Examine/explore - Direct Access Storage Devices (CCT, IL, OC, QL, IL WC).<br>34. Examine/explore - Components of the I/O Subsystem (CCT, IL, OC, QL, IL WC).<br>35. Examine/explore - Communication Among Devices (CCT, IL, OC, QL, IL WC).<br>36. Examine/explore - Management of I/O Requests<br>37. Examine/explore - RAID (CCT, IL, OC, QL, IL WC). | Labs, Quizzes, homework assignments (CCT, IL, OC, QL, IL WC). |

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| 8. File Management | 38. Examine/explore - The File Manager (CCT, IL, OC, QL, IL WC).<br>39. Examine/explore - Interacting with the File Manager (CCT, IL, OC, QL, IL WC).<br>40. Examine/explore - File Organization (CCT, IL, OC, QL, IL WC).<br>41. Examine/explore - Physical Storage Allocation (CCT, IL, OC, QL, IL WC).<br>42. Examine/explore - Data Compression (CCT, IL, OC, QL, IL WC).<br>43. Examine/explore - Access Methods (CCT, IL, OC, QL, IL WC).<br>44. Examine/explore - Levels in a File Management System (CCT, IL, OC, QL, IL WC).<br>45. Examine/explore - Access Control Verification (CCT, IL, OC, QL, IL WC). | Labs, Quizzes, homework assignments (CCT, IL, OC, QL, IL WC). |
| To strengthen Core Competencies** in order to increase success in this and other courses and in the workplace. | Referenced above | Referenced above. |

*Try to express an outcome as an infinitive phrase that concludes this sentence: **At the end of the course, the students should be able to . . ..** Finding the line between too general and too specific can be difficult. In an English Composition course, for instance, it is probably too general to say, "The student should be able to write effective essays." It is probably too specific to say, "The student should be able to write an introductory paragraph of at least 50 words, containing an attention-getting device, an announcement of the narrowed topic, and an explicit thesis sentence." Just right might read, "The student will write introductions that gather attention and focus the essay."

**Indicate the Core Competencies that apply to the outcomes activities and assessment tools: critical and creative thinking (CCT); oral communications (OC); quantitative literacy (QL); information literacy (IL); written communication (WC); civic engagement (CE); integrative learning (IG); global learning (GL).