I. INTRODUCTION

A. This course will provide the Computer Science student with an introduction to personal computer operating systems including installation, configuration, file management, memory and storage management, control of peripheral devices, and use of utilities.

B. This course serves as a required or elective course on various degree plans. Curriculum plans for degrees and certificates are listed in the current Central Texas College catalog.

C. The delivery method of this course may be traditional lecture/lab, blended lecture/lab, or online.

D. Prerequisite: Six (6) semester hours in Computer Science courses.

II. LEARNING OUTCOMES

Upon successful completion of this course, Introduction to PC Operating Systems, the student will be able to:

A. Effectively install, configure, and maintain an operating system for operations of a computer system. (C5, C7, C8, C9, C15, C16, C18, F1, F9, F10, F13)

B. Effectively perform basic file management operations using the utilities provided by a specific operating system. (C5, C7, C8, C9, C15, C16, C18, F1, F9, F10, F13)

C. Organize and allocate primary and secondary storage. (C5, C7, C8, C9, C15, C16, C18, F1, F2, F6,)

D. Access and control peripheral devices. (C5, C7, C8, C9, C15, C16, C18, F1, F2, F6, F9, F10, F13)

E. Run utilities (C7, C18)

F. Evaluate operating systems in terms of security, memory management, and resource management, including the organization and allocation of primary
and secondary storage and the use of utilities. (C5, C7, C8, C9, C15, C16, C18, F1, F9, F10, F13)

F. As a team discuss the aspects of resource management in selected case studies. (C1, C3, C4, C5, C6, C7, C8, C9, C11, C13, C14, C15, C18, C19, F1, F2, F6, F7, F8, F9, F12)

III. INSTRUCTIONAL MATERIALS

A. The instructional materials identified for this course are viewable through www.ctcd.edu/books

B. Lecture Classes also require at least one USB storage device. Online students may use cloud based storage.

IV. COURSE REQUIREMENTS

A. Attend both lecture and lab or in the case of online delivery, be actively engaged in Blackboard and maintain constant progress.

B. Be prepared to participate in discussion, team projects/assignments and take unannounced assessments relating to the lecture materials.

C. Complete all exams/assessments.

D. Submit all assignments on time.

V. ASSESSMENTS

A. Student content mastery will be evaluated in the following areas:
   • Assessments (midterm exam, quizzes, projects, discussion etc.)
   • Final Assessment (final exam and/or semester project, participation)

B. Scheduled and unscheduled assessments will be given at the discretion of the instructor.

C. Exams/assessments may be composed of both subjective and objective questions plus computer output.

D. A student must take all exams/assessments. Both online and on campus students who know in advance that they will be absent due to school sponsored trips, military duty or orders, or any other valid reason, must arrange to take an early exam/assessment. Unexpected absences due to illness or other
extenuating circumstances will require the student to contact the instructor about make-up work in lieu of the missed exam/assessment.

E. Students with unexcused absences will be given a zero for each missed assignment.

VI. SEMESTER GRADE COMPUTATIONS

<table>
<thead>
<tr>
<th>Course Requirements</th>
<th>Points</th>
<th>Points</th>
<th>Grade</th>
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VII. NOTES AND ADDITIONAL INSTRUCTIONS FROM THE INSTRUCTOR

A. Course Withdrawal: It is the student’s responsibility to officially withdraw from a course if circumstances prevent attendance. Any student who desires to, or must, officially withdraw from a course after the first scheduled class meeting must file a Central Texas College Application for Withdrawal (CTC Form 59). The student must sign the withdrawal form.

CTC Form 59 will be accepted at any time prior to Friday of the 12th week of classes during the 16-week fall and spring semesters. The deadline for sessions of other lengths is:

- 10-week session: Friday of the 8th week
- 8-week session: Friday of the 6th week
- 5-week session: Friday of the 4th week

The equivalent date (75% of the semester) will be used for sessions of other lengths. The specific last day to withdraw is published each semester in the Schedule Bulletin.

For non-GoArmyEd active military students, the effective date of withdrawal is the filing date with the Education Center. For all other students, the effective date of withdrawal is the date that the withdrawal application is received by the Central Texas College representative.

Students who used financial aid, military tuition assistance, VA benefits, or other non-personal funds may be required to repay tuition and fees to the funding agency. For specific repayment requirements, contact the Office of Student Financial Aid or Veterans Services Office before withdrawing. Military
tuition assistance students should visit their military Education Center or Navy College Office.

A student who officially withdraws will be awarded the grade of “W” provided the student’s attendance and academic performance are satisfactory at the time of official withdrawal. Students must file a withdrawal application with the College before they may be considered for withdrawal.

A student may not withdraw from a class for which the instructor has previously issued a grade of “F,” “FI,” “FN,” “IP,” or “XN.”

B. Instructor Initiated Withdrawals: Faculty are authorized to withdraw students who are not making satisfactory course progress to include failure to meet College attendance requirements as outlined in the section of the Catalog entitled “Satisfactory Progress Standards.” The instructor will assign the appropriate grade on CTC Form 59 for submission to the registrar.

Students enrolled in distance learning courses are expected to maintain constant progress throughout the course. Failure to do so may result in the student being administratively withdrawn by the instructor.

Students who have not attended class by the 12th class day of a 16-week course or the 6th class day of an 8-week term may be administratively withdrawn by the instructor with a grade of "W." Students may also be administratively withdrawn from any class when their absences exceed a total of four class meetings for a 16-week course or three class meetings for less than 16-week courses and; in the opinion of the instructor, the student cannot satisfactorily complete the course. In a distance learning course the last date of attendance is the last activity by the student in the course.

C. Administrative Withdrawal: A student may be administratively withdrawn by a designated member of the administrative staff of the College when the student has been placed on Academic Suspension or Disciplinary Suspension; the student has an outstanding financial obligation owed to the college; or the student registered for a course without the required prerequisite or departmental permission.

The College is under no obligation to refund tuition and fees, or other costs associated with an administrative or instructor initiated withdrawal.

D. Incomplete Grade: The College catalog states, “An incomplete grade may be given in those cases where the student has completed the majority of the coursework but, because of personal illness, death in the immediate family, or military orders, the student is unable to complete the requirements for a course...” Prior approval from the instructor is required before the grade of “IP” for Incomplete is recorded.
E. **Cell Phones and Pagers:** Students will silence cell phones and mobile devices while in the classroom or lab.

F. **Americans with Disabilities Act (ADA):** Disability Support Services provide services to students who have appropriate documentation of a disability. Students requiring accommodations for class are responsible for contacting the Office of Disability Support Services (DSS) located on the central campus. This service is available to all students, regardless of location. Review the website at [www.ctcd.edu/disability-support](http://www.ctcd.edu/disability-support) for further information. Reasonable accommodations will be given in accordance with the federal and state laws through the DSS office.

G. **Instructor Discretion:** The instructor reserves the right of final decision in course requirements and may make changes to the course outline and/or assignments as needed.

H. **Civility:** Individuals are expected to be aware of what a constructive educational experience is and be respectful of those participating in a learning environment. Failure to do so can result in disciplinary action up to and including expulsion.

I. **Degree Progression:** Students who receive a grade of “D” are advised not to enroll in the next course for which this course was a prerequisite.

J. **Failing Grade:** The grade of “F” or “FN” will be given for academic failure, non-attendance or scholastic dishonesty.

K. **Scholastic Honesty:** All students are expected to maintain the highest standards of scholastic honesty in the preparation of all course work and during examinations. The college policy on scholastic honesty, including definitions on plagiarism, collusion, and cheating can be found at the following URL: [http://online.ctcd.edu/plagiarism.cfm](http://online.ctcd.edu/plagiarism.cfm)
VIII. COURSE OUTLINE

A. Lesson Zero: Introduce course requirements and objectives. Introduce the student to lab and use of equipment.

1. Learning Outcomes: Upon successful completion of this lesson the student will be able to:
   a. Apply course requirements as defined in the syllabus and reviewed by the instructor.
   b. Employ hardware and software.

2. Learning Activities:
   a. Read syllabus. (C5, F1)
   b. Read and analyze assignments. (C5, C6, F1, F9, F11, F12)
   c. On Campus: Use laboratory equipment. Online and on campus conduct Blackboard demonstration. (C5, C6, C8, C9, C19, F1, F5, F11)

3. Lesson Outline:
   a. Discuss syllabus
   b. Present computer system operations environment
   c. Cover hardware and software fundamentals
   d. Conduct Blackboard demonstration

B. Lesson One: Introducing Operating Systems & Simple Memory Management Systems

1. Learning Outcomes: Upon successful completion of this lesson the student will be able to:
   a. Articulate the innovations in operating system development.
   b. Describe the basic role of an operating system including its subsystems and their functions.
   c. List the types of machine hardware on which operating systems run.
   d. Differentiate among batch, interactive, real-time, hybrid, and embedded operating systems.
   e. Compare and contrast the basic functionality of the four memory allocations schemes: single user, fixed partitions, dynamic partitions, and relocatable dynamic partitions.
   f. Explain how a memory list tracks available memory
   g. Describe the importance of the bounds register in memory allocation schemes.
   h. Differentiate best-fit and first-fit allocation schemes
   i. Discuss the role of compaction in memory allocation efficiency.

2. Learning Activities:
a. Define an operating system. (C5, C6, C18, C19, F1, F11)
b. Discuss the operating system subsystem. (C9, C18, F1, F2, F12)
c. Discuss the history of machine hardware. (C18, F1, F11)
d. Describe the types of operating systems. (C1, C7, C9, C14, C15, C19, F1, F5, F9)
e. History of operating systems development. (C5, C6, C7, C8, F1, F2, F10)
f. Employ memory allocation schemes (C5, C6, C7, F1, F10)

3. Lesson Outline:
   a. Discuss operating systems
   b. Discuss operating system software
   c. Discuss hardware, software and I/O devices
   d. Discuss different types of operating systems
   e. Discuss the history of operating systems.
   f. Explore the differences in simple memory designs

C. Lesson Two: Memory Management and Processor Management

1. Learning Outcomes: Upon successful completion of this lesson the student will be able to:
   a. Distinguish the basic functionality of the memory allocation methods covered in this chapter: paged, demand paging, segmented, and segmented/demand paged memory allocation
   b. Describe the influence that these page allocation methods have had on virtual memory
   c. Create a page swapping matrix showing the difference between a first-in first-out page replacement policy, a least-recently-used page replacement policy, and a clock page replacement policy
   d. Design a page swapping matrix demonstrating the mechanics of paging and how a memory allocation scheme determines which pages should be swapped out of memory
   e. Explain the concept of the working set and how it is used in memory allocation schemes
   f. Describe cache memory and its role in improving system response time
   g. Distinguish between job scheduling and process scheduling
   h. List the advantages and disadvantages of several process scheduling algorithms
   i. Describe the goals of process scheduling policies using a single-core CPU
   j. Compare and contrast the similarities and differences between processes and threads
   k. Explain the role of internal interrupts and of the interrupt handler

2. Learning Activities:
   a. Simple memory schemes
b. Algorithm in the single-user system
c. Algorithm for the fixed (static partition)
d. Dynamic partitioning memory management
e. Best fit versus first fit allocation
f. De-allocation or released memory
g. The compaction of memory in re-locatable Dynamic Partitions
h. Processor, program, process,
i. Two schedulers - job and process
j. Process states
k. Control blocks and queuing
l. Scheduling policies

3. Lesson Outline:
   a. Discuss the memory allocation methods. (C5, C6, C7, F1, F11)
   b. Compare single and multicore technologies. (C5, C7, F1, F11)
   c. FIFO, SJN, SRT, Round Robin allocation schemes. (C19, C20, F1, F11)
   d. Discuss process of interrupts. (C5, C6, C7, C19, F1)

D. Lesson Three: Process Management and Concurrent Processes

1. Learning Outcomes: Upon successful completion of this lesson the student will be able to:
   a. Compare and contrast the differences among deadlock, race, and starvation
   b. List several causes of system deadlock and livelock
   c. Explain the difference between preventing and avoiding deadlocks
   d. Describe how to detect and recover from deadlocks and from starvation
   e. Explain the concept of a race and how to prevent it
   f. List the critical difference between processes and processors and how they're connected
   g. Identify the differences among common configurations of multiprocessing systems
   h. Demonstrate the basic concepts of multicore processor technology
   i. Describe the significance of a critical region in process synchronization
   j. List the essential ideas behind process synchronization software
   k. Identify the need for process cooperation when several processors work together
   l. Demonstrate how processors cooperate when executing a job, process, or thread
   m. Explain the significance of concurrent programming languages and their application

2. Learning Activities:
   a. Understanding process synchronization (C1, C3, C5, C6, C7, C8, C10, C15, C18, C19, F1, F9)
b. Deadlock management  (C1, C3, C5, C6, C7, C8, C10, C18, F1, F9)
c. Concurrent programming.  (C5, C6, C7, C8, F1, F2, F10)

3. Lesson Outline:
   a. Discuss deadlock, livelock, and starvation
   b. Discuss parallel processing
   c. Compare multiprocessing configurations
   d. Cover process synchronization software
   e. Discuss process cooperations
   f. Cover concurrent programming including Amdahl’s Law and the order of operations

E. Lesson Four: Device and File Management

1. Learning Outcomes: Upon successful completion of this lesson the student will be able to:
   a. List features of dedicated, shared, and virtual devices
   b. Describe the concepts of blocking and buffering, and how they improve I/O performance
   c. Identify the roles of seek time, search time, and transfer time in calculating access time
   d. List differences in access times in several types of devices
   e. Compare and contrast the strengths and weaknesses of common seek strategies and how they compare
   f. List the levels of RAID and what sets each apart
   g. Describe the fundamentals of file management
   h. Explain file naming conventions, including the role of extensions
   i. Differentiate between fixed-length and variable-length record format
   j. Compare the advantages and disadvantages of several file storage techniques
   k. Compare and contrast sequential and direct file access
   l. List access control techniques and how they compare
   m. Identify the role of data compression in file storage

2. Learning Activities:
   a. Management of I/O Requests  (C2, C3, C5, C6, C8, C17, C18, F1, F8, F9, F11, F12)
   b. Storage types including magnetic disk, optical discs, and solid state.  (C1, C5, C7, C9, C17, C19, C20, F1, F8, F9)
   c. RAID levels zero, one.  (C5, C6, C7, C8, F1, F2, F10)
   d. Fundamentals of file management including naming conventions, access methods and control techniques.  (C5, C19, C20, F1, F11)

3. Lesson Outline:
   a. Types of devices
b. RAID levels  
c. File organization techniques  

F. **Lesson Five**: Network Organization and Functions  
1. **Learning Outcomes**: Upon successful completion of this lesson the student will be able to:  
   a. Identify several different network topologies - including the star, ring, bus, tree, and hybrid - and how they connect numerous hosts to the network  
   b. Diagram several types of networks: LAN, MAN, WAN, and wireless LAN  
   c. Distinguish between circuit switching and packet switching, and provide examples of everyday use that favor each  
   d. List conflict resolution procedures that allow a network to share common transmission hardware and software effectively  
   e. Compare the two transport protocol models (OSI and TCP/IP)  
   f. Describe the complexities introduced to operating systems by network capabilities  
   g. Compare and contrast a network operating system (NOS) compared to a distributed operating system (DO/S)  
   h. Explain how a DO/S performs memory, process, device, and file management  
   i. Explain how a NOS performs memory, process, device, and file management  
   j. List important features that differentiate a DO/S and a NOS  

2. **Learning Activities**:  
   a. Types of networks. (C5, C7, C18, C19, F1)  
   b. Conflict resolution. (C5, C7, C18, C19, F1)  
   c. NOS and D O/S comparison. (C15, C18, C19, C20)  

3. **Lesson Outline**:  
   a. Discuss types of networks  
   b. Discuss the methods of conflict resolution  
   c. Compare NOS and Distributed Operating Systems  

G. **Lesson Six**: Security & Ethics and System Management  
1. **Learning Outcomes**: Upon successful completion of this lesson the student will be able to:  
   a. Describe the role of the operating system with regard to system security  
   b. List the effects of system security practices on overall system performance

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c. Explain the levels of system security that can be implemented and the threats posed by evolving technologies

d. Differentiate among computer viruses, worms, and blended threats

e. Contribute to the role of education and ethical practices in system security

f. Consider the trade-offs to be considered when attempting to improve overall system performance

g. Employ the roles of system measurement tools such as positive and negative feedback loops

h. Implement the two system monitoring techniques

i. Use the fundamentals of patch management

j. Understand the importance of sound accounting practices by system administrators

2. Learning Activities:

   a. Role of operating system in system security (C5, C6, C8, C19, F8)

   b. Differentiation of malware types (C5, C6, C8, C19, F8)

   c. Strategies for system optimization. (C5, C6, C8, C18, F8)

   d. Fundamentals of patch management. (C5, C6, C8, C18, C19, F8)

   e. Ethics in computing. (C5, C8, C17, C19, F1)

3. Lesson Outline:

   a. Discuss system security

   b. Cover types of malware

   c. Discuss path management in network optimization

   d. Ethics in computing

H. Lesson Seven: UNIX and Windows Operating Systems

1. Learning Outcomes: Upon successful completion of this lesson the student will be able to describe:

   a. List the goals of UNIX designers

   b. Explain the significance of using files to manipulate devices

   c. Compare the strengths and weaknesses of competing versions

   d. Explain the advantages of command-driven user interfaces

   e. List the design goals for Windows operating systems designers

   f. Explain the role of the Memory Manager and Virtual Memory Manager in Windows

   g. Describe Windows' use of the Device, Processor, and Network Managers

   h. Discuss the system security challenges for Windows

   i. Explain the evolution of the Windows user interfaces

2. Learning Activities:

   a. Evolution of UNIX and Windows operating systems. (C15, C16, C18,
b. Role of the user interfaces.  (C15, C16, C18, C19, F1, F9)
c. Security issues in both operating systems.  (C5, C15, C16, C18, C19, F1, F9)
d. Role of the submanagers in each operating system design.  (C5, C15, C18, C19, F1, F9)

3. Lesson Outline:
   a. Discuss evolution of Unix and Windows
   b. Compare security issues in both operating systems
   c. Discuss the role and evolution of user interfaces
   d. Submanagers in each operating system

I. Lesson Eight: Linux and Android Operating Systems

1. Learning Outcomes: Upon successful completion of this lesson the student will be able to describe:
   a. List the design goals for the Linux operating system as well as Android operating system devices
   b. Explain the flexibility gained by using files to manipulate devices
   c. Detail the roles of the Memory, Device, File, Processor, and Network Managers for both types of operating systems
   d. Explain the impact of open source Linux software
   e. Compare the strengths and weaknesses of Linux and various Android systems
   f. Explain the cooperation of the Android operating system with Linux for memory, device, processor, and network management
   g. List system security challenges for mobile devices

2. Learning Activities:
   a. Evolution of each operating system.  (C8, C15, C19, F1)
   b. Role of mobile devices.  (C8, C15, C19, F1)
   c. Role of each submanager.  (C8, C15, C19, F1, F17)
   d. User interface including touch interface.  (C5, C6, C7, C8, F1, F2, F10)
   e. Concept of open source.  (C5, C7, C19, F1, F9)

3. Lesson Outline:
   a. Discuss the evolution of each operating system
   b. Cover the roles of operating systems in mobile computing
   c. Concept of open source