I. INTRODUCTION

A. The organization of computer systems is introduced using assembly language. Topics include basic concepts of computer architecture and organization, memory hierarchy, data types, computer arithmetic, control structures, interrupt handling, instruction sets, performance metrics, and the mechanics of testing and debugging computer systems. Embedded systems and device interfacing are introduced. This course is included in the Field of Study Curriculum for Computer Science.

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. This course, in conjunction with the other courses listed on the degree plan, serves as preparation for careers in computer programming.

D. This course may be delivered as a traditional lecture/lab, non-self-paced online, or blended course.

E. Prerequisites: COSC 1315 or ITSE 1329.

II. LEARNING OUTCOMES

Upon successful completion of this course, Computer Organization, the student will be able to:

A. Explain contemporary computer system organization. (C1, C7, C8, C16, C18, F1, F3, F8)
B. Describe data representation in digital computers. (C5, C6, C8, F2, F11)
C. Explain the concepts of memory hierarchy, interrupt processing, and input/output mechanisms. (C1, C7, C8, C16, C18, F1, F3, F8)
D. Measure the performance of a computer system. (C5, C6, C8, F2, F11)
E. Design and develop assembly language applications. (C1, C8, C16, C18, F1, F3, F8)
F. Explain the interfaces between software and hardware components. (C1, C7, C8, C16, C18, F1, F3, F8)
G. Explain the design of instruction set architectures. (C1, C7, C8, C16, C18, F1, F3, F8)
H. Develop a single-cycle processor. (C1, C7, C8, C16, C18, F1, F3, F8)
I. Explain the concept of virtual memory and how it is realized in hardware and software. (C1, C8, C16, C18, F1, F3, F8)
J. Explain the concepts of operating system virtualization. (C5, C6, C8, F2, F11)

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, etc.)
   • Final Assessment (final exam and/or semester project, participation)
B. Scheduled and unscheduled quizzes 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. No make-up exams/assessments will be given. 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 see the instructor about make-up work in lieu of the missed exam/assessment.
E. Students with unexcused absences will be given a zero for any missed work.

VI. SEMESTER GRADE COMPUTATIONS

<table>
<thead>
<tr>
<th>Course Requirements</th>
<th>Points</th>
<th>Points</th>
<th>Grade</th>
<th>Quality Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments</td>
<td>300</td>
<td>900-1000</td>
<td>A - Superior</td>
<td>4</td>
</tr>
<tr>
<td>Assessments</td>
<td>300</td>
<td>800-899</td>
<td>B - Above Average</td>
<td>3</td>
</tr>
<tr>
<td>Final Assessment</td>
<td>400</td>
<td>700-799</td>
<td>C - Average</td>
<td>2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1000</td>
<td>600-699</td>
<td>D – Passing but Unsatisfactory</td>
<td>1</td>
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<tr>
<td></td>
<td></td>
<td>0-599</td>
<td>F - Failure</td>
<td>0</td>
</tr>
</tbody>
</table>

VII. NOTES AND ADDITIONAL INSTRUCTIONS FROM THE INSTRUCTOR

A. Information on the following Academic Policies, as described in the CTC Course Catalog will be followed:
   1. Withdrawals
   2. Grading
   3. Class Attendance and Course Progress
   4. Scholastic Honesty

B. Cell Phones and Pagers: Students will silence cell phones and mobile devices while in the classroom or lab.

C. 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 for further information. Reasonable accommodations will be given in accordance with the federal and state laws through the DSS office.

D. 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.

E. 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.
VIII. COURSE OUTLINE

A. **Unit One:** Introduce course content, requirements and objectives. Introduce students to the laboratory and use of the microcomputer.

1. **Learning Outcomes:** Upon successful completion of this unit the student will be able to:
   a. Describe course requirements as defined in the syllabus and reviewed by the instructor
   b. Explain the role of algorithms
   c. Demonstrate a knowledge of computing history
   d. Describe the overarching themes of computer science

2. **Learning Activities:**
   a. Instructor will cover the syllabus. (C5, F1)
   b. The instructor will review the lab procedures for the microcomputer lab. (C5, C6, C8, C9, C19, F1, F5, F11)
   c. The instructor will provide an overview of the introductory chapter of the textbook (C5, C6, C8, C9, C19, F1, F5, F11)
   d. The student will complete a quiz over the material covered in unit one. (C5, C6, C8, F1, F3, F4, F5, F11, F13)

3. **Unit Outline:** Follow the learning activities

B. **Unit Two:** Data Storage and Data Manipulation

1. **Learning Outcomes:** Upon successful completion of this unit the student will be able to:
   a. Describe bits and their storage
   b. Explain the function of main memory inside a computer
   c. Describe mass storage and its uses
   d. Represent information in bit patterns
   e. Describe computer architecture
   f. Create simple programs using machine language
   g. Describe how computer programs execute

2. **Learning Activities:**
   a. The instructor will describe and demonstrate all topics found in chapters 1 and 2 of the textbook. (C5, C6, C8, C9, C19, F1, F5, F11)
   b. The student will write a machine language program using the materials presented (C1, C5, C6, C16, C17, C18, C19, F1, F2, F3, F5, F9, F11, F13, F17)
   c. The student will complete a quiz over the material covered in this unit. (C5, C6, C8, F1, F3, F4, F5, F11, F13)

3. **Unit Outline:** Follow the learning activities
C. **Unit Three: Operating Systems**

1. **Learning Outcomes:** Upon successful completion of this unit the student will be able to:
   a. Demonstrate a knowledge of the history of operating systems
   b. Describe operating system architecture
   c. Explain how a computing machine coordinates activities
   d. Explain security features of operating systems

2. **Learning Activities:**
   a. The instructor will describe and demonstrate all topics found in chapter 3 of the textbook. (C5, C6, C8, C9, C19, F1, F5, F11)
   b. The student will answer essay questions to demonstrate knowledge of the materials presented (C1, C5, C6, C16, C17, C18, C19, F1, F2, F3, F5, F9, F11, F13, F17)
   c. The student will complete a quiz over the material covered in this unit. (C5, C6, C8, F1, F3, F4, F5, F11, F13)

3. **Unit Outline:** Follow the learning activities

D. **Unit Four: Algorithms and Programming Languages**

1. **Learning Outcomes:** Upon successful completion of this unit the student will be able to:
   a. Explain the concept of an Algorithm
   b. Demonstrate how to represent an algorithm
   c. Explain the concept of Algorithm Discovery
   d. Demonstrate the usage of iterative and recursive structures
   e. Employ efficiency and correctness in algorithmic design
   f. Demonstrate an historical knowledge of programming languages
   g. Describe tradition programming concepts
   h. Demonstrate the usage of procedural units
   i. Implement a programming language
   j. Describe object-oriented programming

2. **Learning Activities:**
   a. The instructor will describe and demonstrate all topics found in chapters 5 and 6 of the textbook. (C5, C6, C8, C9, C19, F1, F5, F11)
   b. The student will answer essay questions to demonstrate knowledge of the materials presented (C1, C5, C6, C16, C17, C18, C19, F1, F2, F3, F5, F9, F11, F13, F17)
   c. The student will complete a quiz over the material covered in this unit. (C5, C6, C8, F1, F3, F4, F5, F11, F13)
   d. The student will write a program using the materials presented. (C1, C5, C6, C16, C17, C18, C19, F1, F2, F3, F5, F9, F11, F13, F17)
3. **Unit Outline:** Follow the learning activities

E. **Unit Five: Software Engineering**

1. **Learning Outcomes:** Upon successful completion of this unit the student will be able to:
   a. Describe the software engineering discipline
   b. Explain the software development life cycle
   c. Demonstrate software engineering methodologies
   d. Demonstrate program modularity
   e. Demonstrate the use of tools in the software engineering trade
   f. Explain quality assurance procedures and their importance
   g. Demonstrate proper documentation of a computer program
   h. Describe the human-machine interface
   i. Demonstrate understanding of software ownership and liability

2. **Learning Activities:**
   a. The instructor will describe and demonstrate all topics found in chapter 7 of the textbook. (C5, C6, C8, C9, C19, F1, F5, F11)
   b. The student will answer essay questions to demonstrate knowledge of the materials presented (C1, C5, C6, C16, C17, C18, C19, F1, F2, F3, F5, F9, F11, F13, F17)
   c. The student will complete a quiz over the material covered in this unit. (C5, C6, C8, F1, F3, F4, F5, F11, F13)
   d. The student will write a program using the materials presented. (C1, C5, C6, C16, C17, C18, C19, F1, F2, F3, F5, F9, F11, F13, F17)

3. **Unit Outline:** Follow the learning activities.

F. **Unit Six: Data Abstractions and Database Systems**

1. **Learning Outcomes:** Upon successful completion of this unit the student will be able to:
   a. Demonstrate the use of simple data structures
   b. Implement data structures within a program
   c. Customize data types within a program
   d. Create classes and objects within a program
   e. Explain the fundamentals of a database
   f. Describe the relational database model
   g. Demonstrate data mining techniques
   h. Explain the social impact of database technology

2. **Learning Activities:**
   a. The instructor will describe and demonstrate all topics found in chapters 8 and 9 of the textbook. (C5, C6, C8, C9, C19, F1, F5, F11)
b. The student will answer essay questions to demonstrate knowledge of the materials presented (C1, C5, C6, C16, C17, C18, C19, F1, F2, F3, F5, F9, F11, F13, F17)

c. The student will complete a quiz over the material covered in this unit. (C5, C6, C8, F1, F3, F4, F5, F11, F13)

d. The student will write a program using the materials presented. (C1, C5, C6, C16, C17, C18, C19, F1, F2, F3, F5, F9, F11, F13, F17)

e. The student will create a database using the materials presented. (C1, C5, C6, C16, C17, C18, C19, F1, F2, F3, F5, F9, F11, F13, F17)

3. Unit Outline: Follow the learning activities.

G. Unit Seven: Computer Graphics and Artificial Intelligence

1. Learning Outcomes: Upon successful completion of this unit the student will be able to:
   a. Demonstrate a knowledge of computer graphics representation
   b. Explain 3D graphics representation
   c. Model computer objects
   d. Render computer objects
   e. Demonstrate the usage of computer animation
   f. Describe intelligence and machines
   g. Explain how computers perform perception and reasoning activities
   h. Describe artificial neural networks
   i. Demonstrate knowledge of robotics engineering
   j. Explain the consequences of artificial intelligence

2. Learning Activities:
   a. The instructor will describe and demonstrate all topics found in chapters 10 and 11 of the textbook. (C5, C6, C8, C9, C19, F1, F5, F11)
   b. The student will answer essay questions to demonstrate knowledge of the materials presented (C1, C5, C6, C16, C17, C18, C19, F1, F2, F3, F5, F9, F11, F13, F17)
   c. The student will complete a quiz over the material covered in this unit. (C5, C6, C8, F1, F3, F4, F5, F11, F13)
   d. The student will write a program using the materials presented. (C1, C5, C6, C16, C17, C18, C19, F1, F2, F3, F5, F9, F11, F13, F17)

3. Unit Outline: Follow the learning activities

H. Unit Eight: Theory of Computation

1. Learning Outcomes: Upon successful completion of this unit the student will be able to:
a. Explain the theory of functions and their computations
b. Describe Turing machines
c. Describe universal programming languages
d. Demonstrate understanding of a non-computable function
e. Explain the complexity of problems

2. **Learning Activities:**
   a. The instructor will describe and demonstrate all topics found in chapter 12 of the textbook. (C5, C6, C8, C9, C19, F1, F5, F11)
   b. The student will answer essay questions to demonstrate knowledge of the materials presented (C1, C5, C6, C16, C17, C18, C19, F1, F2, F3, F5, F9, F11, F13, F17)
   c. The student will complete a quiz over the material covered in this unit. (C5, C6, C8, F1, F3, F4, F5, F11, F13)

3. **Unit Outline:** Follow the learning activities