I. INTRODUCTION

A. While virtualization started as a means of server consolidation, IT needs are evolving as organization’s data centers are becoming service providers. Organizations are challenged with providing the speed and time required to deploy a complete application stack. It is increasingly critical to realize the full benefits of virtualization, and organizations must look beyond simple consolidation and choose application-driven virtualization solutions that are integrated with the applications and infrastructure.

B. This course explores installation, configuration, and management of computer virtual workstations and servers. This course will acquaint the student with the basic vocabulary and help him to understand most virtualization and network protocols. The student will be able to implement and support virtualization of clients of servers in a networked computing environment. The student will also understand the basic design standards used in installing and configuring virtual computer systems.

II. LEARNING OUTCOMES

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

A. Adhere to proper safety techniques. (OSHA standards).(F1, F13, F17)
B. Understand the basics of networking terminology.(F1)
C. Recognize basic virtual computer system media and devices.(C15)
D. Identify the basics of data flow through virtual computer systems.(C15)
E. Identify network topologies.(C18)
F. Create a virtual computer system.(F10)
G. Adhere to the design requirements for virtual computer systems.(C19)
H. Demonstrate virtualization best practices.(C16, C19, F1)
I. Describe virtualization protocols.(F1, F6, F10, F11)
III. INSTRUCTIONAL MATERIALS

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

B. Required Equipment Supplied by Department:
   Computers and networking equipment

IV. COURSE REQUIREMENTS

This course has been designed with an on-line component. The student will be required to attend classes and labs. Tests are taken on-line. It is mandatory that the student read the text material before coming to class. Late assignments will result in 25% less than full credit or a “0” if the assignment submission exceeds five calendar days.

V. EXAMINATIONS

There will be one exam covering the units completed in class which is a comprehensive Final Exam.

VI. SEMESTER GRADE COMPUTATION

The course grade will be calculated according to the following weights:

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesson Review Questions</td>
<td>240</td>
</tr>
<tr>
<td>Hands-On Projects</td>
<td>240</td>
</tr>
<tr>
<td>Case Study/Project</td>
<td>320</td>
</tr>
<tr>
<td>Final Exam</td>
<td>200</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1000</td>
</tr>
</tbody>
</table>

Students who do not complete all projects successfully, with approval by the instructor, will receive an Incomplete for the course grade and will have three weeks into the next semester to finish the projects or their grade will become an F.

VII. ATTENDANCE
Students are required to attend all classes in which they have enrolled. Students are required to be in the classrooms on time and remain for the duration of the class. Any time a student has 10 hours absence, an administrative withdrawal will be submitted.

A. Four Classes of 2½ hours = 10 Hours
B. Late for Class = 1 Hour Absence: 10 Times = 10 Hours

VIII. 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 of Withdrawal (CTC Form 59). The withdrawal form must be signed by the student.

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

<table>
<thead>
<tr>
<th>Session Length</th>
<th>Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-week session</td>
<td>Friday of the 8th week</td>
</tr>
<tr>
<td>8-week session</td>
<td>Friday of the 6th week</td>
</tr>
<tr>
<td>5-week session</td>
<td>Friday of the 4th week</td>
</tr>
</tbody>
</table>

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 Student Bulletin.

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 the student a grade of “F” or “FN” for nonattendance.

B. Administrative Withdrawal: An administrative withdrawal may be initiated when the student fails to meet College attendance requirements. The instructor will assign the appropriate grade on CTC Form 59 for submission to the registrar.

C. Incomplete Grade: The College catalog states, an incomplete grade may be given in those cases where the student has completed the majority of the course work 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.
A student who merely fails to show for the final examination will receive a zero for the final and an “F” for the course.

D. **Cellular Phones and Beepers**: Cellular phones and beepers will be turned off while the student is in the classroom or laboratory.

E. **Americans with Disabilities Act (ADA)**: Disability Support Services provides 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.

F. **Instructor Discretion**: The instructor reserves the right of final decision in course requirements.

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

IX. **COURSE OUTLINE**

A. **Unit One**: Introduction to Virtualization

1. **Unit Objectives**: Upon successful completion of this unit the student will be able to:

   a. Define virtualization.
   b. Explain the purpose of virtualization.
   c. List the types of virtualization.
   d. List system virtualization techniques.
   e. Name the benefits of virtualization in the data center.
   f. Explain grid computing.
   g. Define software as a service (SaaS).
   h. Explain cloud computing.
   i. List security vulnerabilities involved with virtualization.
   j. Name prominent virtualization vendors.
2. **Learning Activities:**
   
a. Read Chapter One of course text (C3, C5, F1)
b. Complete assigned review questions. (C8)
c. Complete assigned Hands-on Project(s). (F1)

B. **Unit Two: VMware ESXi on Linux**

1. **Unit Objectives:** Upon successful completion of this unit the student will be able to:
   
a. Use VMware software for business continuity and disaster recovery.
b. Understand VMware ESX Server architecture.
c. Install, configure, and use VMware ESX Server 3i.
d. Implement security measures for VMware ESX server 3i.

2. **Learning Activities**
   
a. Read Chapter Two of course text. (C3, C5)
b. Complete assigned review questions. (C8)
c. Complete assigned Hands-on Project(s). (F1)

C. **Unit Three: Microsoft Virtualization**

1. **Unit Objectives:** Upon successful completion of this unit the student will be able to:
   
a. Discuss Microsoft virtualization.
b. Give an overview of virtualization with Hyper-V.
c. Modify virtual machines
d. Install Hyper-V.
e. Create Hyper-V Server virtual networks.
f. Configure virtual networks.
g. Add a network adapter to a VM.

2. **Learning Activities**
   
a. Read Chapter Three of the course text. (F1, C3, C5)
b. Complete assigned review questions. (C8)
c. Complete assigned Hands-on Project(s). (F1)

D. **Unit Four: Citrix Xen Virtualization**
1. **Unit Objectives**: Upon successful completion of this unit the student will be able to:

   a. Use Citrix XenServer.
   b. Install the XenServer host.
   c. Install the XenCenter administrator console.

2. **Learning Activities**

   a. Read Chapter Four of the course text.
   b. Complete assigned review questions. (C8)
   c. Complete assigned Hands-on Project(s). (F1)

---

**E. Unit Five: Sun Virtualization**

1. **Unit Objectives**: Upon successful completion of this unit the student will be able to:

   a. Discuss Sun Virtualization products and services.
   b. Install and configure the xVM Ops Center.
   c. Administer an xVM Ops Center.
   d. Install VirtualBox on Windows hosts.
   e. Install VirtualBox on Mac hosts.
   f. Discuss Sun Virtual Desktop Infrastructure Software.

2. **Learning Activities**

   a. Read Chapter Five of the course text. (F1, F10)
   b. Complete assigned review questions. (C8)
   c. Complete assigned Hands-on Project(s). (F1)

---

**F. Unit Six: Red Hat Enterprise Linux Virtualization**

1. **Unit Objectives**: Upon successful completion of this unit the student will be able to:

   a. Implement Red Hat Virtualization.
   b. Understand the requirements for Red Hat Virtualization.
   c. Create a guest operating system.
   d. Install Red Hat Enterprise Linux 5 as a paravirtualized guest.
   e. Install Windows XP as a fully virtualized guest.
   f. Create a virtualized floppy disk controller.
g. Add storage devices to guests.

2. Learning Activities
   
a. Read Chapter Six of course text (C3, C5, F1)
   b. Complete assigned review questions. (C8)
   c. Complete assigned Hands-on Project(s). (F1)

G. Unit Seven: NoMachine

1. Unit Objectives: Upon successful completion of this unit the student will be able to:
   
a. Explain how NX components work.
   b. Describe the NX system architecture.
   c. Install NX Client.
   d. Configure the NX client.
   e. Set up NX client sessions.
   f. Install NX Node.
   g. Install NX Server.

2. Learning Activities
   
a. Read Chapter Seven of course text (C3, C5, F1)
   b. Complete assigned review questions. (C8)
   c. Complete assigned Hands-on Project(s). (F1)

H. Unit Eight: Virtualization Security

1. Unit Objectives: Upon successful completion of this unit the student will be able to:
   
a. Describe VirtualBox uses
   b. Install VirtualBox
   c. Create virtual machines
   d. Modify virtual machines
   e. Perform backup and restore procedures with virtual machines

2. Learning Activities
a. Read Chapter Eight of course text (C3, C5, F1)
b. Complete assigned review questions. (C8)
c. Complete assigned Hands-on Project(s). (F1)