I. INTRODUCTION

A. This course presents advanced programming techniques including file access methods, data structures, modular programming, program testing and documentation.

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: ITSE 1329 Programming Logic and Design OR ITSE 1302 Computer Programming.

II. LEARNING OUTCOMES

Upon successful completion of this course, Advanced Computer Programming – C#, the student will be able to:

A. Develop well documented programs containing data structures. (C1, C5, C6, C8, C16, F1, F2, F3, F4, F7, F9, F11, F13, F17)

B. Incorporate input/output file handling techniques. (C1, C7, C8, C16, C18, F1, F3, F8)

III. INSTRUCTIONAL MATERIAL

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

May 2016
B. Lecture Classes also require a minimum of one storage device. (32 GB or smaller preferred). 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. 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 any missed work.
VI. SEMESTER GRADE COMPUTATIONS

<table>
<thead>
<tr>
<th>Course Requirements</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments</td>
<td>300</td>
</tr>
<tr>
<td>Assessments</td>
<td>300</td>
</tr>
<tr>
<td>Final Assessment</td>
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</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>1000</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Points</th>
<th>Grade</th>
<th>Quality Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>900-1000</td>
<td>A-Superior</td>
<td>4</td>
</tr>
<tr>
<td>800-899</td>
<td>B-Above Average</td>
<td>3</td>
</tr>
<tr>
<td>700-799</td>
<td>C-Average</td>
<td>2</td>
</tr>
<tr>
<td>600 - 699</td>
<td>D-Passing, but unsatisfactory</td>
<td>1</td>
</tr>
<tr>
<td>0 - 599</td>
<td>F-Failure</td>
<td>0</td>
</tr>
</tbody>
</table>

VII. NOTES AND ADDITIONAL INSTRUCTIONS FROM THE INSTRUCTOR

A. **Course Withdrawal:** It is the student's responsibility to officially drop a class 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 as follows.

<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 session 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 the student a grade of "F" or "FN" for nonattendance.

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 this syllabus 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 dropped by the instructor with a grade of "W". Students may be administratively withdrawn from any class when their absences reach a total equal to 12.5% of the class hours for the course; and in the opinion of the instructor, the student cannot satisfactorily complete the course. An example: Students attending a 48-hour class during an 8-week period normally meet 180 minutes each session for 16 sessions. Those students accumulating two (2) unexcused absences are subject to Administrative Withdrawal since the total unexcused absences equal 12.5% of class hours for the course. Those students attending a 48 hour class during a 16-week period normally meet 90 minutes each session for 32 sessions. Those students accumulating four (4) unexcused absences are subject to Administrative Withdrawal since the total unexcused absences equals 12.5% of class hours for 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 a student who is administratively withdrawn.

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 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.
E. **Cell Phones and Beepers:** 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 education 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.

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. Unit One: Introduce course 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. Discuss course requirements as defined in the syllabus and reviewed by the instructor
   b. Enter, save, and execute a program written in C#
   c. Discuss advanced programming techniques

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 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

B. Unit Two: Introduction to Visual C#

1. **Learning Outcomes:** Upon successful completion of this unit the student will be able to:
   a. Write C# code for comments and simple I/O streams.
   b. Write C# code that utilizes the basics of classes and objects.
   c. Creating C# program forms for Windows using controls.
   d. Create simple event-driven applications using C#.
   e. Utilize C# features extending C++ capabilities.

2. **Learning Activities:**
   a. The instructor will demonstrate C# code for comments and simple I/O streams. (C5, C6, C8, F1, F5, F11, F13)
   b. The instructor will discuss the basics of classes and objects. (C5, C6, C8, F1, F5, F11, F13)
   c. The instructor will demonstrate how to create C# program forms for Windows using controls. (C5, C6, C8, F1, F5, F11, F13)
   d. The instructor will demonstrate how to create simple event-driven applications using C#. (C5, C6, C8, F1, F5, F11, F13)
   e. The instructor will demonstrate C# features extending C++ capabilities. (C5, C6, C8, F1, F5, F11, F13)
   f. The students will write a program using the materials presented. (C1, C3, C8, C17, F2, F3, F9)
3. **Unit Outline:** Follow the learning activities

### C. Unit Three: Processing Data

1. **Learning Outcomes:** Upon successful completion of this unit the student will be able to:
   a. Write C# programs using C# variable types.
   b. Write C# programs using form fields.
   c. Write C# programs that read input from screen controls.
   d. Write simple C# exception handling code.
   e. Use self-documenting techniques for constant and variable names.
   f. Apply intricacies of creating graphical user interfaces.

2. **Learning Activities:**
   a. The instructor will demonstrate the use of C# variable types. (C5, C6, C8, F1, F5, F11, F13)
   b. The instructor will demonstrate C# techniques using fields in forms as input. (C5, C6, C8, F1, F5, F11, F13)
   c. The instructor will demonstrate how to read input from screen controls. (C5, C6, C8, F1, F5, F11, F13)
   d. The instructor will demonstrate exception handling coding techniques. (C5, C6, C8, F1, F5, F11, F13)
   e. The instructor will demonstrate the use of self-documenting techniques for constant and variable names. (C5, C6, C8, F1, F5, F11, F13)
   f. The instructor will discuss and demonstrate the intricacies of creating graphical user interfaces
   g. The students will write a program using the materials presented. (C1, C3, C8, C17, F2, F3, F9)
   h. Debugging of a computer program (C8, C16, C17, F9)

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

### D. Unit Four: Making Decisions

1. **Learning Outcomes:** Upon successful completion of this unit the student will be able to:
   a. Write programs with advanced techniques using relational operators and Boolean expressions.
   b. Write programs with advanced flow control.
c. Write programs utilizing C# decision structures, logical operators and switch statements.
d. Write programs utilizing C# specific parsing, exception handling and input validation coding techniques.
e. Write programs utilizing C# radio buttons, check box, and list box graphical user interface controls.

2. **Learning Activities:**
   a. The instructor will demonstrate advanced techniques using relational operators and Boolean expressions. (C5, C6, C8, F1, F5, F11, F13)
b. The instructor will demonstrate advanced flow control techniques. (C5, C6, C8, F1, F5, F11, F13)
c. The instructor will demonstrate C# decision structures, logical operators and switch statements. (C5, C6, C8, F1, F5, F11, F13)
d. The instructor will demonstrate C# specific parsing, exception handling and input validation coding techniques. (C5, C6, C8, F1, F5, F11, F13)
e. The instructor will demonstrate C# radio buttons, check box, and list box graphical user interface controls. (C5, C6, C8, F1, F5, F11, F13)
f. The students will design a program using the materials and algorithms presented. (C1, C3, C8, C17, F2, F3, F9)
g. Debugging of a computer program (C8, C16, C17, F9)

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

E. **Unit Five: Loops, Files and Random Numbers**

1. **Learning Outcomes:** Upon successful completion of this unit the student will be able to:
   a. Construct loops and repetitive structures using C# concepts.
b. Write C# programs using counters and accumulators.
c. Write C# programs using sequential file input/output.
d. Create C# programs utilizing pseudorandom numbers.

2. **Learning Activities:**
   a. The instructor will demonstrate the construction of loops and repetitive structures using C# concepts. (C5, C6, C8, F1, F5, F11, F13)
b. The instructor will demonstrate counters and accumulators. (C5, C6, C8, F1, F5, F11, F13)
c. The instructor will demonstrate C# sequential file input/output techniques. (C5, C6, C8, F1, F5, F11, F13)
d. The instructor will demonstrate C# pseudorandom numbers. (C5, C6, C8, F1, F5, F11, F13)
e. The students will write a program using the materials presented. (C1, C3, C8, C17, F2, F3, F9)
f. Debugging of a computer program (C8, C16, C17, F9)

3. Unit Outline:
   a. Follow the learning activities.
   b. Review for and administer Midterm Exam

F. Unit Six: Modularizing Code with Methods

1. Learning Outcomes: Upon successful completion of this unit the student will be able to:
   a. Write C# programs using methods to modularize program logic and algorithms.
   b. Write C# programs that pass arguments to methods by value and reference for advanced data control.
   c. Write C# programs that return output to calling methods for advanced data control.

2. Learning Activities:
   a. The instructor will demonstrate methods to modularize program logic and algorithms. (C5, C6, C8, F1, F5, F11, F13)
   b. The instructor will demonstrate passing arguments to methods by value and reference for advanced data control. (C5, C6, C8, F1, F5, F11, F13)
   c. The instructor will demonstrate returning output to calling methods for advanced data control. (C5, C6, C8, F1, F5, F11, F13)
   d. The students will write a program using the materials presented. (C1, C3, C8, C17, F2, F3, F9)
   e. Debugging of a computer program (C8, C16, C17, F9)

3. Unit Outline: Follow the learning activities.

G. Unit Seven: Arrays and Lists

1. Learning Outcomes: Upon successful completion of this unit the student will be able to:
   a. Demonstrate understanding of C# value and reference type objects.
   b. Write C# programs using single-dimensional and multi-dimensional arrays.
c. Write C# programs that pass arrays as arguments to methods.
d. Write C# programs that transfer data between arrays and files.
e. Write C# programs that utilize partially filled arrays.
f. Create C# List objects and store data in them.

2. Learning Activities:
   a. The instructor will demonstrate C# value and reference type objects. (C5, C6, C8, F1, F5, F11, F13)
   b. The instructor will demonstrate the use of single-dimensional and multi-dimensional arrays. (C5, C6, C8, F1, F5, F11, F13)
   c. The instructor will demonstrate how to pass arrays as arguments to methods. (C5, C6, C8, F1, F5, F11, F13)
   d. The instructor will demonstrate how to transfer data between arrays and files. (C5, C6, C8, F1, F5, F11, F13)
   e. The instructor will demonstrate how to create C# List objects and store data in them. (C5, C6, C8, F1, F5, F11, F13)
   f. The students will write a program using the materials presented. (C1, C3, C8, C17, F2, F3, F9)
   g. Debugging of a computer program (C8, C16, C17, F9)

3. Unit Outline: Follow the learning activities

H. Unit Eight: More about Processing Data

1. Learning Outcomes: Upon successful completion of this unit the student will be able to:
   a. Write C# programs incorporating advanced string and character processing techniques.
   b. Write C# programs incorporating encapsulated data structures.
   c. Write C# programs utilizing enumerated types.
   d. Write C# programs employing the Image-List form control.

2. Learning Activities:
   a. The instructor will demonstrate advanced C# string and character processing techniques. (C5, C6, C8, F1, F5, F11, F13)
   b. The instructor will demonstrate the use of encapsulated data structures. (C5, C6, C8, F1, F5, F11, F13)
   c. The instructor will demonstrate the use of enumerated types. (C5, C6, C8, F1, F5, F11, F13)
   d. The instructor will demonstrate the use of the C# Image-List form control. (C5, C6, C8, F1, F5, F11, F13)
   e. The students will write a program using the materials and algorithm presented. (C1, C3, C8, C17, F2, F3, F9)
   f. Debugging of a computer program (C8, C16, C17, F9)
3. **Unit Outline:** Follow the learning activities

I. **Unit Nine: Classes and Multiform Projects**

1. **Learning Outcomes:** Upon successful completion of this unit the student will be able to:
   a. Create C# classes and create user defined objects.
   b. Create C# classes using proper code with fields, methods and constructors techniques.
   c. Write C# programs that use arrays of objects.
   d. Write C# programs that store objects into List form controls.
   e. Determine where to use classes when coding a problem solution.
   f. Write C# programs that using multiple form classes, instantiating those classes and displaying them.

2. **Learning Activities:**
   a. The instructor will demonstrate how to create C# classes and create user defined objects. (C5, C6, C8, F1, F5, F11, F13)
   b. The instructor will demonstrate how to create C# classes using proper code with fields, methods and constructors techniques. (C5, C6, C8, F1, F5, F11, F13)
   c. The instructor will demonstrate algorithms that use arrays of objects. (C5, C6, C8, F1, F5, F11, F13)
   d. The instructor will demonstrate how to store objects into List form controls. (C5, C6, C8, F1, F5, F11, F13)
   e. The instructor will demonstrate how to determine where and when to use classes when coding a solution during problem solving. (C5, C6, C8, F1, F5, F11, F13)
   f. The instructor will demonstrate how to create multiple form classes, instantiating those classes and displaying them. (C5, C6, C8, F1, F5, F11, F13)
   g. The students will write a program using the materials presented. (C1, C3, C8, C17, F2, F3, F9)
   h. Debugging of a computer program (C8, C16, C17, F9)

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

J. **Unit Ten: Inheritance and Polymorphism**

1. **Learning Outcomes:** Upon successful completion of this unit the student will be able to:
   a. Write C# programs utilizing base classes and derived classes.
   b. Create polymorphic C# classes that utilize method overriding and cascaded constructors.
c. Create C# abstract classes and methods.

2. **Learning Activities:**
   a. The instructor will demonstrate how to create base classes and derived classes. (C5, C6, C8, F1, F5, F11, F13)
   b. The instructor will demonstrate how to incorporate the use of method overriding and cascaded constructors. (C5, C6, C8, F1, F5, F11, F13)
   c. The instructor will demonstrate how to create and use abstract classes and methods. (C5, C6, C8, F1, F5, F11, F13)
   d. The students will write a program using the materials presented. (C1, C3, C8, C17, F2, F3, F9)
   e. Debugging of a computer program (C8, C16, C17, F9)

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

K. **Unit Eleven: Databases**

1. **Learning Outcomes:** Upon successful completion of this unit the student will be able to:
   a. Create a SQL Server database using Visual Studio.
   b. Write C# programs that connect to a database.
   c. Write C# programs that use the C# DataGridView form control.
   d. Write C# programs that incorporate SQL Select statements to retrieve data from a table.

2. **Learning Activities:**
   a. The instructor will demonstrate how to create a SQL Server database using Visual Studio. (C5, C6, C8, F1, F5, F11, F13)
   b. The instructor will demonstrate how to connect to a database in C#. (C5, C6, C8, F1, F5, F11, F13)
   c. The instructor will demonstrate how to use the C# DataGridView form control. (C5, C6, C8, F1, F5, F11, F13)
   d. The instructor will demonstrate how to create SQL Select statements to retrieve data from a table. (C5, C6, C8, F1, F5, F11, F13)
   e. The students will write a program using the materials presented. (C1, C3, C8, C17, F2, F3, F9)
   f. Debugging of a computer program (C8, C16, C17, F9)

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