

UTEP Computer Science Department

**Course Syllabus**

Fall 2021

<b>Course Title and Section CRNs</b>	CS 1310 - Introduction to Computational Thinking (Public Health Focus) CRN: 18056 (Roy) CRN: 19583 (Loza)
<b>Meeting Times and Location</b>	The course is hybrid including face-to-face instruction in the classroom and online synchronous using BlackBoard Collaborate Ultra TR 3:00 pm - 4:20 pm Location: Undergraduate Learning Center (UGLC), Room <b>TBD</b>
<b>Instructors and Office Hours</b>	<p>Name: Mary K. Roy Email: mkroy@utep.edu Office: CCSB (3rd floor Research Area) Office Hours: <b>TBD</b> Location: Zoom</p> <p>Name: Oralia Loza, Ph.D. (pronouns: she; they) Email: oloza@utep.edu Office: College of Health Sciences and School of Nursing Building (HSSN), Room 405 Office Hours: Tuesdays 1130a-1p and Thursdays 1130a-1p Location: Zoom</p>
<b>Teaching Assistant (TA)</b>	Name: A N M Niaz Morshed Email: amorshed@miners.utep.edu Office: <b>TBD</b> Office hours: <b>TBD</b>
<b>Catalog Description and Goals</b>	<p>Introduction to computers and problem solving with digital computers. Introduction to Computational Thinking (Common Course Number: COSC 1301). An introduction to computational thinking. Computational thinking is the process of converting a real-world problem into a software-based approach for solving it. Towards that goal, students learn analytical skills that are transferrable to many other disciplines. Visualization methods will also be used to provide an experimental approach to problem-solving.</p> <p>As a Core Curriculum class, an important goal of CS 1310 is to develop students' problem-solving and critical thinking skills. Students work individually and in groups to facilitate effective communication as they investigate topics, generate hypotheses, gather data, and build skills in software strategies to process and represent data. As part of their projects, students evaluate their results; generate conclusions; make predictions, pose new questions raised by their work; and examine the impacts of technology on society as well as the individual.</p>
<b>Prerequisites</b>	There are no prerequisites for this course.

<p><b>Grading</b></p>	<p>Your semester grade will be based on a combination of classwork/homework, lab assignments, participation in-class activities, quizzes, online textbook assignments, and a final comprehensive project. The approximate percentages are as follows:</p> <ul style="list-style-type: none"> <li>25% Homework and Lab Assignments</li> <li>25% Quizzes</li> <li>25% SPSS Assignments</li> <li>25% Data Visualization Project</li> </ul> <p>The nominal percentage-score to letter-grade conversion is as follows:</p> <ul style="list-style-type: none"> <li>• 90% or higher is an 'A'</li> <li>• 80-89% is a 'B'</li> <li>• 70-79% is a 'C'</li> <li>• 60-69% is a 'D'</li> <li>• below 60% is an 'F'</li> </ul> <p>Keys to success:</p> <ul style="list-style-type: none"> <li>• Attend class sessions! Participate as an individual and as an effective team member for group projects and peer review.</li> <li>• Work on practice problems.</li> <li>• Complete and submit assignments on time.</li> </ul>
<p><b>Details of grade components</b></p>	<p><b>Attendance and participation:</b> Attendance and participation in-class activities will improve your grade, as this is a hands-on workshop type of class. Course sessions are held synchronously at the time and days scheduled for the class.</p> <p><b>Assignments:</b> There is no separate lab time requirement for this course, but you will receive regular lab assignments and other classwork/homework assignments.</p> <p><b>Quizzes:</b> The purpose of quizzes is to ensure that you are staying current with reading and practice assignments, recent lectures, and concepts learned during assignments. Make-up quizzes will only be available for excused absences, with instructor approval, and only with prior notification (unless due to situations such as illness). If you have test-taking difficulties or special requirements, please let us know as soon as possible.</p> <p><b>Final Data Visualization Project:</b> This is a comprehensive project involves selecting a public health topic; identifying relevant data source; analyzing, evaluating and processing related data; constructing a program with functions producing various data visualizations; evaluating graphs and statistical test results; generating interpretation statements and conclusions; making predictions; and posing new questions based on results.</p>
<p><b>Textbook</b></p>	<p>The Python for Everybody (PY4E) website (<a href="https://www.py4e.com/">https://www.py4e.com/</a>) has links to the free online textbook for Python, as well as links to the author's other Python materials. Direct links to textbook versions: <a href="http://do1.dr-chuck.com/pythonlearn/EN_us/pythonlearn.pdf">http://do1.dr-chuck.com/pythonlearn/EN_us/pythonlearn.pdf</a> or <a href="https://www.py4e.com/html3/">https://www.py4e.com/html3/</a></p>

<p><b>Software</b></p>	<p><b>Anaconda Distribution</b>  Free software installations to support programming with the Python language as well as data science and visualization tools may be downloaded from:  <a href="https://www.anaconda.com/products/individual">https://www.anaconda.com/products/individual</a>  (Select the correct version for your operating system.)</p> <p><b>SPSS Version 26</b>  UTEP students can securely connect to network resources from remote locations through the VPN. The VPN service is enhanced with Duo's two-factor authentication software and will require students to register for Duo service before establishing a VPN connection. Once the VPN is established, students may install SPSS. The instructions are below:</p> <p><b>Step 1:</b> Set-up Duo 2 Factor Authentication  <a href="https://www.utep.edu/information-resources/iso/_Files/docs/DUO%20-%20How%20to%20Register.pdf">https://www.utep.edu/information-resources/iso/_Files/docs/DUO%20-%20How%20to%20Register.pdf</a></p> <p><b>Step 2:</b> Configure VPN  <a href="https://www.utep.edu/technologysupport/ServiceCatalog/NET_VPNGlobalProtect.html">https://www.utep.edu/technologysupport/ServiceCatalog/NET_VPNGlobalProtect.html</a></p> <p><b>Step 3:</b> Download SPSS  <a href="https://www.utep.edu/technologysupport/ServiceCatalog/SOFTWARE_PAGES/soft_spssibm.html">https://www.utep.edu/technologysupport/ServiceCatalog/SOFTWARE_PAGES/soft_spssibm.html</a></p> <p>Click on "Download a copy of IBM SPSS 26" to begin download after connecting to VPN. Then click on license my copy of SPSS to finish off the installation.</p>
<p><b>University Policies</b></p>	<p><b>Standards of Conduct:</b>  You are expected to conduct yourself in a manner as prescribed by the UTEP Standards of Conduct (<a href="http://sa.utep.edu/osccr/student-conduct/">http://sa.utep.edu/osccr/student-conduct/</a>).</p> <p><b>"Netiquette":</b></p> <ul style="list-style-type: none"> <li>• Always consider the audience. Remember that members of the class and the instructor will be reading any postings that you make.</li> <li>• <b>Respect</b> and <b>courtesy</b> must be provided to classmates, teaching assistants, and instructors at all times. No harassment or inappropriate postings will be tolerated.</li> <li>• When reacting to someone else's message, address the ideas, not the person. Post only what anyone would comfortably state in a F2F situation.</li> <li>• Blackboard is not a public Internet venue; all postings to it should be considered <b>private</b> and <b>confidential</b> within this course. Whatever is posted on these online spaces is intended for classmates and teaching staff only. Please <b>do not copy documents and paste them to a publicly accessible website, blog, or other space</b>. If students wish to do so, they have the ethical obligation to first request the permission of the writer(s).</li> </ul> <p><b>Academic Honesty:</b>  Graded work is to be completed independently and should be unmistakably your own work (or, in the case of group work, your team's work), although you may discuss your</p>

project with other students in a general way. You may not represent as your own work material that is transcribed or copied from another person, book, or any other source (for example, a web page).

Academic dishonesty includes but is not limited to cheating, plagiarism, and collusion.

- Cheating may involve copying from or providing information to another student, possessing unauthorized materials during a test, or falsifying data (for example program outputs) in laboratory reports.
- Plagiarism occurs when someone represents the work or ideas of another person as his/her own.
- Collusion involves collaborating with another person to commit an academically dishonest act.

Professors are required to--and will--report academic dishonesty and any other violation of the Standards of Conduct to the Dean of Students (<http://sa.utep.edu/dean/>).

**Accommodations for Disabilities:**

If you have a disability and need classroom accommodations, please contact The Center for Accommodations and Support Services (CASS) at 747-5148, or by email to [cass@utep.edu](mailto:cass@utep.edu), or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at [www.sa.utep.edu/cass](http://www.sa.utep.edu/cass).

**COVID-19 PRECAUTION STATEMENT**

Please stay home if you have been diagnosed with COVID-19 or are experiencing COVID-19 symptoms. If you are feeling unwell, please let me know as soon as possible, so that we can work on appropriate accommodations. If you have tested positive for COVID-19, you are encouraged to report your results to [covidaction@utep.edu](mailto:covidaction@utep.edu), so that the Dean of Students Office can provide you with support and help with communication with your professors. The Student Health Center is equipped to provide COVID-19 testing.

The Center for Disease Control and Prevention recommends that people in areas of substantial or high COVID-19 transmission wear face masks when indoors in groups of people. The best way that Miners can take care of Miners is to get the vaccine. If you still need the vaccine, it is widely available in the El Paso area, and will be available at no charge on campus during the first week of classes. For more information about the current rates, testing, and vaccinations, please visit [epstrong.org](http://epstrong.org).

**Course Outcomes**

**Level 1: Knowledge and Comprehension**  
Level 1 outcomes are those in which the student has been exposed to the terms and concepts at a basic level and can supply basic definitions. Upon successful completion of this course, students will be able to describe, at a high level:

1. Basic computer hardware organization and high-level understanding of operating systems, editors, compilers, interpreters, networks, and common applications

2. Computer representation of simple data types and operations, including binary/decimal conversions
3. Contributions of significant developments and historical figures in computing
4. Basic features and differences between high-level programming languages
5. Fundamental concepts such as abstraction, decomposition, and procedural control flow
6. Examples of how computing applications have contributed to different fields
7. The relationship between computing and society, including ethical, legal, and security issues

### **Level 2: Application and Analysis**

Level 2 outcomes are those in which the student can apply the material in familiar situations, e.g., can work a problem of familiar structure with minor changes in the details. Upon successful completion of this course, students will be able to:

1. Apply problem-solving and critical thinking skills to analyze problems and express solutions in pseudocode algorithms
2. Implement algorithms in a high-level language, including the correct use of:
  - a. Basic variable types and user-defined data types
  - b. Arithmetic and logical expressions
  - c. Iteration and selection control statements
  - d. Simple I/O operations, which may include files
  - e. Pre-defined functions
  - f. User-defined functions and modules
3. Apply professional programming styles and practices such as input validation
4. Use testing and debugging strategies, including black-box and white-box testing with test plans to identify software faults, and evaluate their projects and results
5. Use teamwork roles and methods in the classroom

### **Level 3: Synthesis and Evaluation**

Level 3 outcomes are those in which the student can apply the material in new situations. This is the highest level of mastery. Upon successful completion of this course, students will be able to apply Level 1 and 2 outcome skills to develop solutions for new computing-based problems of their choice. Students will be able to:

1. Propose hypotheses and research topics of student choice (subject to approval), gather and process data to support the topic, and design and produce programs to produce data visualizations for the data (subject to the constraints of the programming environment).
2. Document and evaluate data sources used, and interpret data visualizations produced in terms of the effectiveness of data presentation, their original hypotheses vs. project results, any issues/problems encountered during the project, and usefulness of visualizations as a basis for decision-making or predictive analysis.
3. Showcase their projects to classmates, and evaluate projects of other students.

<b>Modules</b>	<ol style="list-style-type: none"><li>1. Computing and Language Concepts and Background (history of computing)</li><li>2. Problem-solving, Software Engineering, Python Programming</li><li>3. Public Health and Data Sources (ethics, privacy, data security, authenticity, bias, implications)</li><li>4. Biostatistics (data types, descriptive statistics, univariate tests, bivariate tests)</li></ol>
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Dates	Class Session (review modules before class)	Assignments DUE
<b>WEEK 1</b>		
Tuesday Aug 24	Introductions Lecture: Introduction to Datasets and Sources SPSS 1. Introduction to SPSS and Importing data	
Thursday Aug 26	Topics: Computational Thinking Concepts, Problem-Solving Process and Algorithms, Software/Hardware Background Information, High/low-level Languages and Language Concepts, Number systems, History of Computing Intro PY4E Book: Chap.1 (See assignments in the Assignments DUE column for Sept. 2)	
<b>WEEK 2</b>		
Tuesday Aug 31	Lecture: Introduction to Public Health and National Dataset SPSS 2. Entering Data and Defining Variables	Installation of SPSS on your computer SPSS 1 DVP1: DATASET - DRAFT
Thursday Sept 2	Topics: Modeling and Abstraction, Data Types and Structures, Python and Data Science, Intro to Spyder and other tools, IDE's, Software Engineering Process Intro <a href="http://think.cs.vt.edu">think.cs.vt.edu</a> , Book - 2.1 and 2.2: Modelling and Abstraction (See assignments in the Assignments DUE column for Sept. 9)	Installation of Anaconda on your computer QUIZ 1: (Open-book) CT Concepts Computing History Video #1
<b>WEEK 3</b>		
Tuesday Sept 7	Lecture: Introduction to Variable Types Lecture: Database Management SPSS 3. Data Manipulation SPSS 4. Introduction to Graphing	SPSS 2 DVP1: DATASET
Thursday Sept 9	Topics: Python Variables and Assignment Statements, Arithmetic Operators and Expressions, Using Input/Output Functions, Writing Programs to Solve Computational Problems, Elements of Good Programming Style, Handling Basic Errors ("debugging"), Preview of Graphing Examples in Python PY4E Book: Chap. 2 Lab #1 (in class): Opening, modifying, and running a Python program (computing mean) Lab Assignment #2	Homework Assignment: Abstraction Table Computing History Video #2
<b>WEEK 4</b>		
Tuesday Sept 14	Lecture: Biostatistics - Descriptive Statistics SPSS 5. Univariate Descriptive Statistics and Plots	SPSS 3 SPSS 4 (w/o assignment) DVP2: VARIABLES
Thursday Sept 16	Topics: Logic and Boolean expressions, Conditional (Branching) Control Statements, Flowcharts/Graphs, Testing Intro, Intro to Data Files PY4E Book: Chap. 3 Quiz #2	LAB 2: Computational Problem (sequence only)
<b>WEEK 5</b>		
Tuesday Sept 21	Lecture: Biostatistics - Univariate Analysis and Tests SPSS 6. One-Sample Binomial Test	SPSS 5 DVP3: UNIVARIATE - DRAFT
Thursday Sept 23	Topics: Applications of conditional control statements: • Filtering (Subsetting) Health Data • Testing with Ranges	QUIZ 2: (Open-book) Problem-solving, algorithms, computing history

Dates	Class Session (review modules before class)	Assignments DUE
	<ul style="list-style-type: none"> <li>• Min/Max Value Algorithms, Evaluation of Algorithm Efficiency</li> <li>• Application Program GUI's (ex: SPSS): "Behind the curtain"</li> <li>• Developing menus</li> </ul> PY4E Book: Chap. 3 (cont'd) Lab Assignment #3	
<b>WEEK 6</b>		
Tuesday Sept 28	Lecture: Biostatistics - Univariate Analysis and Tests (con't) SPSS 7. One-Sample t-Test	SPSS 6 DVP3: UNIVARIATE
Thursday Sept 30	Topics: Looping Control Structures (Iteration), While-loop and for-loop examples and applications, Basic List Processing PY4E Book: Chaps. 5, 8.1-3 Quiz #3	LAB 3: Using Conditionals
<b>WEEK 7</b>		
Tuesday Oct 5	Lecture: Introduction to Health Disparities	SPSS 7
Thursday Oct 7	Topics: Iterative processing of Health Data, Strings, Using Text Data Files, Intro to Dictionary Structures, Ethics and Societal Impact(s) of Data Collection and Analysis PY4E Book: Chaps. 6, 7.1-4 Lab Assignment #4	QUIZ 3: Variables, arithmetic operations and expressions, Python statements ( <b>not</b> including Conditionals), handling errors, good programming style
<b>WEEK 8</b>		
Tuesday Oct 12	Lecture: Biostatistics - Bivariate Analysis and Tests	
Thursday Oct 14	Topics: User-Defined Functions, Benefits of Decomposition and Modular Design, Testing Functions, Creating a bar chart in Python PY4E Book: Chap. 4 Quiz #4	LAB 4: Using Iteration to Process Data
<b>WEEK 9</b>		
Tuesday Oct 19	Lecture: Biostatistics - Bivariate Analysis and Tests (con't) SPSS 8. Bivariate Descriptive Statistics and Plots	
Thursday Oct 21	Topics: Creating a box plot in Python, Selection of Data, Using Tools to Access Data, Defining Functions to Create Graphs Lab Assignment: Lab #5	QUIZ 4: Logic, Boolean Expressions, Conditional Statements
<b>WEEK 10</b>		
Tuesday Oct 26	Lecture: Biostatistics - Bivariate Analysis and Tests (con't) SPSS 9. Two-Sample t-Tests and Paired t-Test SPSS 12. Correlation	SPSS 8 DVP4: HYPOTHESES
Thursday Oct 28	Topics: Creating a scatter plot in Python, Comparison of online environments for presentation of coding projects Quiz #5	LAB 5: Implementing User-Defined Functions, Creating Graphs
<b>WEEK 11</b>		
Tuesday Nov 2	Lecture: Biostatistics - Bivariate Analysis and Tests (con't) Lecture: Biostatistics - Non-Parametric Bivariate Tests SPSS 11. Chi-square Analysis and Odds Ratios	SPSS 9 SPSS 12
Thursday Nov 4	Topics: Creating histograms in Python, Using Jupyter Notebooks for coding project (or Google Colab) Lab Assignment #6	QUIZ 5: Iteration and List Processing Tasks



Dates	Class Session (review modules before class)	Assignments DUE
<b>WEEK 12</b>		
Tuesday Nov 9	Lecture: Biostatistics - Non-Parametric Bivariate Tests (con't) SPSS 10. One-Way ANOVA and Multiple Comparisons SPSS 13. Nonparametric tests	SPSS 11 DVP5: BIVARIATE - DRAFT
Thursday Nov 11	Topics: Working with Data and Developing Python graphs for Data Visualization Project, Data Analysis Questions Quiz #6	LAB 6: Read data, define function to create histogram, analyze results, document within Jupyter notebook
<b>WEEK 13</b>		
Tuesday Nov 16	Lecture: Reports and Summary Tables Data Visualization Project (DVP) PRESENTATION Guidelines	SPSS 10 SPSS 13 DVP5: BIVARIATE
Thursday Nov 18	Examples and Uses of Data Visualizations, Artistic and Cognitive Aspects of Visualizations, Intro to other data sources (Ex: web pages) Data Visualization Project Presentation Guidelines	QUIZ 6: User-defined Functions
<b>WEEK 14</b>		
Tuesday Nov 23	DVP PRESENTATION - DRAFT - PEER REVIEW	DVP PRESENTATION - DRAFT
Thursday Nov 25	DVP PRESENTATION - DRAFT - PEER REVIEW	
<b>WEEK 15</b>		
Tuesday Nov 20	Data Visualization Project (DVP) PRESENTATION	DVP PRESENTATION
Thursday Dec 2	Data Visualization Project (DVP) PRESENTATION	