# CS 499 Module One Assignment Template

1. **Self-Introduction:** 
   1. How long have you been in the Computer Science program?

**My name is Gregoria Ramirez, and I have been in the Computer Science program since June 2022 at SNHU, I graduated last May 2024 with my associate in computer science, and this year in August I will be finished with my studies for my bachelor’s degree.**

* 1. What have you learned while in the program? List three of the most important concepts or skills you have learned.

**I have learned the importance of understanding how a computer works and its functions to be able to create code to run smoothly using ethical practices. I have learned that there are various program languages to write code, and they are used in different tasks with different software. I also have learned you have to have critical thinking skills and be able to solve problems to be able to code efficiently. I have also learned the importance of using version control and saving code frequently to avoid data loss and maintain a reliable workflow.**

* 1. Discuss the specific skills you aim to demonstrate through your enhancements to reach each of the course outcomes.

**The skills I want to highlight through my enhancements include improving the overall look of my project, especially the charts I added to better display the data. I’m also adding filters to give users more options for sorting and viewing the information. On the backend, I plan to clean up my code by organizing it into separate folders and functions. This will make the code more modular and easier to work with, instead of having everything in one long script. It also helps with debugging, testing, and keeping things scalable.**

* 1. How do the specific skills you will demonstrate align with your career plans related to your degree?

**The skills that I will demonstrate will align with my career by showing that I can effectively apply critical thinking, write modular code, and collaborate with teams to ensure smooth project development and transitions in the workplace. My skills will also show that I am always teachable to further my career.**

* 1. How does this contribute to the specialization you are targeting for your career?

**This supports my focus in the computer science field because the skills I am learning can be used in many different jobs. Being able to think clearly, write clean and organized code, and work well with others helps me solve problems and finish tasks in a better way. Good communication is also important because I need to understand what is expected by others, no matter what kind of project I am working on. These skills make me feel more confident and better prepared for any challenges I may face in this field.**

1. **ePortfolio Set Up:**
   1. Submit a **screen capture** of your ePortfolio GitHub Pages home page that clearly shows your URL.
      1. You already have a repository in GitHub where you uploaded projects in previous courses. Your ePortfolio will reside in GitHub but can link to work at other sites, such as Bitbucket.
   2. Use the GitHub Pages link in the Resource section for directions on:
      1. How to create your GitHub website and publish code to GitHub Pages
      2. Issues, such as adding links to other sites
   3. Paste a screenshot of your GitHub Pages home page with your URL clearly showing in the space below. <https://gregoriaramirez.github.io/>

Graphical user interface, text, application, email

AI-generated content may be incorrect.

1. **Enhancement Plan:** 
   1. **Category One:** Software Engineering and Design
      1. **Select an** **artifact** that is **aligned with** **the** software engineering and design **category** and explain its origin. Submit a file containing the code for the artifact you choose with your enhancement plan.

**I chose my final project from CS 340, which is a dashboard website I created for an animal shelter. I originally built it using Jupyter Notebook, where I worked with Python files (.ipynb) and CSV files to process and display the data. I also used the MongoDB shell to run database commands and interact with the data directly. The app is written in Python and uses a tool called Dash, which helps turn the data into interactive charts, maps, and tables. The dashboard pulls animal records from a NoSQL database and shows them in a way that’s easy to understand and use. Users can search, filter, and explore the data to help make decisions or track shelter activity.**

**This project aligns with the software engineering and design category because it required me to design the user interface, structure the backend logic, and manage how data flows between the database and the app. It involves decisions about how to organize code, how to present information visually, and how to build a responsive system that supports real-time user interaction.**

Note: Your artifact may be work from the following courses:

* IT 145: Foundation in Application Development
* CS 250: Software Development Lifecycle
* CS 260: Data Structures and Algorithms
* IT 315: Object Oriented Analysis and Design
* CS 320: Software Testing, Automation, and Quality Assurance
* CS 330: Computational Graphics and Visualization
* **CS 340: Advanced Programming Concepts**
* CS 350: Emerging Systems Architectures and Technologies
* CS 360: Mobile Architecture and Programming
* IT 365: Operating Environments
* IT 380: Cybersecurity and Information Assurance
* CS 405: Secure Coding
* CS 410: Reverse Software engineering
* IT 340: Network and Telecommunication Management
* IT 380: Cybersecurity and Information Assurance
  + 1. **Describe** a practical, well-illustrated **plan** for enhancement in alignment with the category, including a pseudocode or flowchart that illustrates the planned enhancement.

**To improve my project, I plan to move it out of Jupyter Notebook and stop using the MongoDB shell. Instead, I will use Visual Studio Code for development and MongoDB Compass for managing the database. This change will make it easier to organize files, manage code, and interact with the database using a visual tool instead of manually typing commands. I also plan to restructure the code into multiple folders to follow a modular design which will separate the layout, callbacks, and data-handling logic into clearly organized parts.**

**The database interaction will be improved by moving from manual shell commands to a more visual and manageable environment with Compass. These updates will make the project easier to maintain, debug, and expand in the future.**

**The new structure will make the code easier to read, update, and scale in the future. By switching tools and organizing the project like a real-world application, I’m moving from a simple, beginner-level version to something that looks and works more like a professional product.**

**This kind of upgrade will change the way I work on the project, how the code is set up, and how everything runs. It makes the project easier to manage, lets me use better tools, and makes it look more professional.**

**My pseudocode before and after will be as follows:**

**Pseudocode:**

**Main App:**

**Load the layout for UI**

**Import the AnimalShelter class**

**Set up Dash features (buttons, charts, etc.)**

**Start the server**

**AnimalShelter class:**

**Connect to the MongoDB database**

**Define the following methods:**

**create() # create data and insert a new record**

**read() #query to retrieve records**

**update() # query to modify data**

**delete() # remove data**

For this category of enhancement, consider improving a piece of software, transferring a project into a different language, reverse engineering a piece of software for a different operating system, or expanding a project’s complexity. These are just recommendations. Consider being creative and proposing an alternative enhancement to your instructor.

Think about what additions to include to complete the enhancement criteria in this category. Since one example option is to port to a new language, that is the kind of scale that is expected. This does not mean you need to port to a new language but instead have an equivalent scale of enhancement. Underlying expectations of any enhancement include fixing errors, debugging, and cleaning up comments, but these are not enhancements themselves.

* + 1. Explain how the planned enhancement will **demonstrate** specific **skills** and align with course outcomes.
       1. Identify and describe the specific skills you will demonstrate that align with the course outcome.

**By improving my project, I will show that I know how to organize and structure my code in a better, more professional way. I plan to break the code into smaller parts( modular code), which makes it easier to update or fix later. I will also switch from using basic tools like Jupyter Notebook and MongoDB shell to more real-world tools like Visual Studio Code and MongoDB Compass. This will show that I can use tools that are used in real jobs, keep my work structured and organized, and build something that is easier to grow or improve later on.**

* + - 1. Select one or more of the course outcomes below that your enhancement will align with.

**My enhancement will align with Number 3 and 4 below :**

**-Outcome 3: Design and evaluate computing solutions that solve a given problem using algorithmic principles and computer science practices and standards appropriate to its solution while managing the trade-offs involved in design choices.**

**- Outcome 4: Demonstrate an ability to use well-founded and innovative techniques, skills, and tools in computing practices for the purpose of implementing computer solutions that deliver value and accomplish industry-specific goals.**

Course Outcomes:

1. Employ strategies for building collaborative environments that enable diverse audiences to support organizational decision-making in the field of computer science.
2. Design, develop, and deliver professional-quality oral, written, and visual communications that are coherent, technically sound, and appropriately adapted to specific audiences and contexts.
3. Design and evaluate computing solutions that solve a given problem using algorithmic principles and computer science practices and standards appropriate to its solution while managing the trade-offs involved in design choices.
4. Demonstrate an ability to use well-founded and innovative techniques, skills, and tools in computing practices for the purpose of implementing computer solutions that deliver value and accomplish industry-specific goals.
5. Develop a security mindset that anticipates adversarial exploits in software architecture and designs to expose potential vulnerabilities, mitigate design flaws, and ensure privacy and enhanced security of data and resources.
   1. **Category Two:** Algorithms and Data Structures
6. **Select an artifact** that is **aligned with the** algorithms and data structures **category** and explain its origin. Submit a file containing the code for the artifact you choose with your enhancement plan. You may choose work from the courses listed under Category One.

**To enhance this part of the project, I plan to expand the filtering features by adding more control over how users view the data. Right now, users can filter animals using basic conditions, such as whether the animal was part of a water rescue or a disaster response. I want to improve that by adding new buttons that allow users to filter animals by breed and by color.**

**These new filters will give users more options and flexibility when searching through the records. The app will need to respond to different inputs, run those filters, and update the charts and tables in real time. This will require me to write new filtering logic, use condition-based checks, and connect those filters to the database.**

1. **Describe** a practical, well-illustrated **plan** for enhancement in alignment with the category, including a pseudocode or flowchart that illustrates the planned enhancement.

**To improve the logic and structure of my project, I plan to add new filters that let users narrow down the data by breed and by color. These filters will give users more control when exploring animal shelter data. Right now, the dashboard only includes a few basic filters (like by rescue type), so this will add more layers of filtering and make the app more useful and interactive.**

**I will use condition-based logic in Python to check what the user selects and then filter the dataset accordingly. These additions will require me to use data structures like DataFrames and write new filtering algorithms. It will also improve how the app updates charts and tables in real time based on user input. This makes the app more dynamic and shows my ability to apply control structures and logic in a real-world context.**

**The pseudocode example of how this new logic will work:**

**When the user selects a breed or color from the filter:**

**Capture the selected input**

**Apply filtering logic:**

**If breed filter is selected:**

**filtered\_data = dataframe[dataframe["breed"] == selected\_breed]**

**If color filter is selected:**

**filtered\_data = dataframe[dataframe["color"] == selected\_color]**

**Update the charts and tables with filtered\_data**

For this category of enhancement, consider improving the efficiency of a project or expanding the complexity of the use of data structures and algorithms for your artifact. These are just recommendations. Consider being creative and proposing an alternative enhancement to your instructor. Note: You only need to choose **one type** of **enhancement per category.**

Think about what additions to include to complete the enhancement criteria in this category. Since one example option is to port to a new language, that is the kind of scale that is expected. Perhaps you might increase the efficiency and time complexity of an algorithm in an application and detail the logic of the increased time complexity. Remember, you do not need to port to a new language but instead have an equivalent scale of enhancement. Underlying expectations of any enhancement include fixing errors, debugging, and cleaning up comments, but these are not enhancements themselves.

1. Explain how the planned enhancement will **demonstrate** specific **skills** and align with course outcomes.
   1. Identify and describe the specific skills you will demonstrate to align with the course outcome.

**By adding breed and color filters to my project, I will show that I understand how to use logic and condition-based statements in a real-world app. I will also demonstrate how to work with data structures (DataFrames) to sort and narrow down information based on what the user selects. This helps show that I can build features that are more dynamic and useful, and that I can write code that responds to user input in a smart and organized way.**

* 1. Select one or more of the course outcomes listed under Category One that your enhancement will align with.

**- Outcome 3: Design and evaluate computing solutions that solve a given problem using algorithmic principles and computer science practices and standards appropriate to its solution while managing the trade-offs involved in design choices.**

**- Outcome 4: Demonstrate an ability to use well-founded and innovative techniques, skills, and tools in computing practices for the purpose of implementing computer solutions that deliver value and accomplish industry-specific goals.**

* 1. **Category Three: Databases**
     1. **Select an artifact** that is **aligned with the** databases **category** and explain its origin. Submit a file containing the code for the artifact you choose with your enhancement plan. You may choose work from the courses listed under Category One.

**For this category, I selected my animal shelter dashboard project from CS 340: Advanced Programming Concepts. This project is a web-based client-server application built using Python, Dash, and MongoDB. I originally developed it in Jupyter Notebook and used the MongoDB shell to load and interact with a NoSQL database. I imported a CSV file with animal records and used the data to generate charts and tables inside the app.**

**In the original version, I worked with the database by typing commands manually in the MongoDB shell. It got the job done, but it was harder to manage and not as organized. I now plan to improve this by using MongoDB Compass, which is a visual tool that lets me see and manage my data more easily. I will also improve how I organize my database queries by putting them into separate Python methods for Create, Read, Update, and Delete (CRUD). This makes the code more reusable and easier to manage.**

**This artifact aligns with the databases category because it connects directly to a MongoDB database to store and retrieve animal data. The application uses real-time database queries to support user interaction, data visualization, and filtering. All of the information shown in the app, like animal type, color, breed, and rescue outcome comes from the database. These changes will improve how the database connects to the app and make the project feel more like a professional, real-world solution.**

* + 1. **Describe** a practical, well-illustrated **plan** for enhancement in alignment with the category, including a pseudocode or flowchart that illustrates the planned enhancement.

**For this category, I plan to improve how my project connects to and interacts with the MongoDB database. In the original version, I used the MongoDB shell to type database commands manually. While this approach was functional, it was not efficient and made development more difficult. I now plan to use MongoDB Compass, which is a visual interface that allows me to browse collections, test queries such as { "outcome\_type": "Adoption" }, and view my data in a more organized and user-friendly way. This tool upgrade will help me understand the data more clearly and reduce typing errors.**

**In addition to using Compass, I also plan to improve the code structure by creating a separate Python class that handles all database operations. This class will include reusable methods for the four main database actions: Create, Read, Update, and Delete (CRUD). By separating this logic into its own file, the main application code will be easier to manage, and I can reuse the methods across different parts of the application. For example, instead of writing a full query every time I need to look up animal records, I will be able to call the read() method from my AnimalShelter class.**

**Additionally, I will not include hardcoded credentials in the updated version of the application. Instead, I plan to follow best practices by keeping sensitive information like usernames, passwords, and URIs stored securely. This reflects real-world security practices.**

**These updates improve the way the application manages data and make the overall design more structured and professional. Although I am not changing the programming language, the improvements I am making to database interaction are equal in scale to rewriting the project in another language. I am changing the development workflow, introducing a new database tool, and applying structured programming practices. These changes reflect how real applications are developed and maintained in the industry.**

**Pseudocode illustrates the planned enhancement as follows:**

**Connect to MongoDB using Compass with secure URI**

**If connection is successful:**

**→ View database and test queries (example: { "color": "Black" })**

**Define AnimalShelter class:**

**- create(data): add new record**

**- read(query): return results**

**- update(query, new\_data): update record**

**- delete(query): delete record**

**Use these methods in the main application:**

**→ Call read() when user selects a filter (such as breed or color)**

**→ Pass filtered data to update charts and tables**

For this category of enhancement, consider adding more advanced concepts of MySQL, incorporating data mining, creating a MongoDB interface with HTML/JavaScript, or building a full stack with a different programming language for your artifact. These are just recommendations; consider being creative and proposing an alternative enhancement to your instructor. Note: You only need to choose one type of enhancement per category.

Think about what additions to include to complete the enhancement criteria in this category. Since one example option is to port to a new language, that is the kind of scale that is expected. Perhaps you might increase the efficiency and time complexity of an algorithm in an application and detail the logic of the increased time complexity. Remember, you do not need to port to a new language but instead have an equivalent scale of enhancement. Underlying expectations of any enhancement include fixing errors, debugging, and cleaning up comments, but these are not enhancements themselves.

* + 1. Explain how the planned enhancement will **demonstrate** specific **skills** and align with course outcomes.
       1. Identify and describe the specific skills you will demonstrate that align with the course outcome.

**By enhancing the way my project interacts with the database, I will demonstrate the ability to structure and manage database connections in a more professional and scalable way. Instead of typing commands manually in the MongoDB shell, I will show that I can work with a more advanced and user-friendly database tool like MongoDB Compass. I will also demonstrate that I can separate the database logic into its own Python class using object-oriented principles. This shows that I can build clean, reusable methods that manage Create, Read, Update, and Delete operations. These skills reflect real-world software practices that improve project maintainability, reduce errors, and make the code easier to extend.**

* + - 1. Select one or more of the course outcomes listed under Category One that your enhancement will align with.

**- Outcome 3: Design and evaluate computing solutions that solve a given problem using algorithmic principles and computer science practices and standards appropriate to its solution while managing the trade-offs involved in design choices.**

**- Outcome 4: Demonstrate an ability to use well-founded and innovative techniques, skills, and tools in computing practices for the purpose of implementing computer solutions that deliver value and accomplish industry-specific goals.**

1. **ePortfolio Overall Skill Set**
   1. Accurately describe the **skill set** to be illustrated by the **ePortfolio** **overall**.
      1. Skills and outcomes planned to be illustrated in the code review

**My ePortfolio will highlight how I have grown from completing beginner-level coding tasks to building full projects using real tools, structured code, and industry practices. The project I selected shows that I can build working applications, connect them to databases, and organize code in a way that is reusable, maintainable, and professional. The enhancements included in my ePortfolio demonstrate how I have applied what I have learned to improve my earlier work, reflecting both technical growth and a maturing understanding of professional software development.**

* + 1. Skills and outcomes planned to be illustrated in the narratives

**The code review will show that I can refactor code into smaller, organized parts using modular design. It will also show that I understand how to structure a program using object-oriented concepts, such as separating database logic into its own class. I will highlight how I use tools like Visual Studio Code and MongoDB Compass to build and test my application more effectively. These updates align with course outcomes that focus on design, development, and technical communication.**

* + 1. Skills and outcomes planned to be illustrated in the professional self-assessment

**In the self-assessment, I plan to explain how my skills have grown since the beginning of the Computer Science program. I will discuss how I learned to use updated tools such as Visual Studio Code and MongoDB Compass, and how I improved my ability to work with organized, modular code. I will also reflect on the problem-solving skills I developed and how I applied them to improve my earlier projects. In addition, I will describe how I plan to continue learning new techniques and technologies to stay current in the field. This will show that I understand how to apply what I learned in real-world situations and that I am prepared to grow as a professional in computer science.**

**I have some files I can build upon for the project enhancements that I will upload in Brightspace and look forward to your feedback as I continue to develop and refine the project.**