# CS 499 Module One Assignment Template

Complete this template by replacing the bracketed text with the relevant information.

1. **Self-Introduction:** Address all of the following questions to introduce yourself.
   1. How long have you been in the Computer Science program?

**2 years**

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

Programming & Software Design Gained strong skills in languages like Python and C++, and learned to write clean, modular code.

Data Structures & Algorithms: Learned how to build efficient programs using structures like lists, trees, and sorting/searching algorithms.

Version Control and Collaboration: Became proficient with Git and GitHub for managing code and collaborating on projects**.**

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

Through my enhancements, I aim to demonstrate strong code documentation and the ability to write clear, concise, and well-structured code. My goal is to make my projects easy to understand, maintain, and build upon, while also following best practices for readability and organization.

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

The skills I plan to demonstrate such as writing clean, well-documented code are essential for a career in software engineering. Clear code and good documentation improve collaboration, make debugging easier, and are highly valued in professional development environments. These skills directly support my goal of working on real-world software projects as a software engineer.

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

Although I haven’t chosen a specific specialization yet, building strong foundational skills like writing clear, maintainable code and documenting my work will support any path I choose within computer science. These are core skills that apply to all areas, whether I pursue software engineering, embedded systems, data science, or another focus in the future.

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.

A screenshot of a computer

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.

For me this choice would have to beCS 330: Computational Graphics and Visualization. Specifically, the final project.

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 enhance my CS 330 project, I plan to expand and refine the 3D desk scene I originally created. My focus will be on cleaning up and organizing the code to make it more efficient and readable, as well as adding thorough documentation and comments to explain each major section of the program. One of the key areas I want to improve is the lighting, which I was never fully satisfied with. In the original version, the lighting felt flat and unrealistic, so I plan to revisit it by incorporating a combination of ambient, directional, and point lighting to better simulate a real desk environment. I’ll update the lighting logic to support more realistic shading and depth, using techniques like light attenuation and directional vectors to control how objects are illuminated. In terms of planning, I’ll refactor the project into modular functions—for example, separating model loading, transformations, and rendering—and include pseudocode and inline comments to clearly explain the logic behind the enhancements. This work will not only strengthen the visual quality of the scene but also demonstrate my ability to write professional, well-documented graphics code that aligns with the course outcomes.

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.

In CS 330, I aim to demonstrate skills in 3D modeling, rendering, and geometric transformations using OpenGL, as well as clear and effective code commenting. By applying mathematical concepts like vectors and matrices, I can manipulate objects accurately in a virtual scene. I’ll also ensure that my code is well-commented, making it easier to understand, maintain, and debug—an essential skill in graphics programming where code can quickly become complex

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

My enhancement aligns most closely with Course Outcomes **2**, **3**, and **4**. By improving the documentation and organization of my code, I am meeting Outcome 2, which focuses on producing clear, professional-quality written communication. Enhancing the lighting and overall scene design demonstrates Outcome 3, as I’m applying computer science principles to improve the visual accuracy and performance of my 3D scene, while managing design trade-offs related to rendering and realism. Finally, Outcome 4 is reflected in my use of OpenGL and graphics techniques to implement a more refined, visually effective solution that mirrors real-world expectations for interactive graphical applications.

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.

For this category, I selected my CRUD application from **CS 340: Advanced Programming Concepts**. The final project connects to a MongoDB database and allows users to create and read animal records. It demonstrates practical use of object-oriented programming (OOP), data handling, and basic algorithmic logic through the manipulation of data structures like dictionaries and lists. The artifact originated from a course assignment where we learned to integrate database operations into Python applications using best practices in design and modular programming.

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 enhance my CS 340 CRUD project, I plan to address a few issues and expand its functionality. First, I will fix the constructor method, which currently uses \_init\_ instead of Python’s correct \_\_init\_\_ syntax. This will ensure the class initializes properly. Next, I’ll add update and delete functions to complete the full CRUD operations, improving the utility of the class. I also plan to add better error handling and input validation, along with clear inline comments and docstrings for each method to improve readability and maintainability. These enhancements will align with the course outcomes by demonstrating advanced object-oriented programming skills and the use of efficient data handling techniques.

Class AnimalShelter:

Initialize MongoDB connection (\_\_init\_\_)

Function create(data):

If valid data:

insert into MongoDB

Else:

raise exception

Function read(query):

return results from MongoDB matching query

Function update(query, new\_values):

update matching documents with new values

Function delete(query):

delete matching documents

Main:

Connect to AnimalShelter

Show menu:

1. Create

2. Read

3. Update

4. Delete

5. Exit

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.

To align with the course outcome for CS 340, I will demonstrate skills in object-oriented programming, modular code design, and data manipulation using external databases. By fixing class structure issues, implementing full CRUD functionality, and improving documentation and error handling, I’ll show my ability to design and maintain clear, scalable, and efficient Python applications that interact with real-world data systems.

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

My enhancement aligns with **Outcome 3** by improving the design and functionality of the program using solid programming principles and efficient data handling. It also supports **Outcome 4** through the use of object-oriented design and external tools like pymongo to implement a practical, real-world solution. Additionally, improved documentation contributes to **Outcome 2** by making the code clearer and more maintainable.

* 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.

The artifact I selected is my final project from CS 260: Data Structures and Algorithms. This program was designed to help users load, view, and search a list of college courses along with their prerequisites. It uses fundamental data structures such as vectors and strings to store and manage course information. The program also demonstrates algorithmic logic through tasks like file parsing, user interaction, and data lookup. I chose this artifact because it showcases my ability to apply core concepts from the course in a practical application, including reading structured data, organizing it efficiently, and presenting it in a user-friendly way.

* + 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 enhance my CS 260 final project, I plan to improve the program by adding sorting functionality that displays the course list in alphabetical order by course number, using a more efficient algorithm such as **Merge Sort**. This would improve both performance and usability, especially with large datasets. Additionally, I will refactor and clean up the code, improving naming conventions and adding clear inline comments and **documentation** to make the logic easier to follow. I also want to improve the user input validation to make the program more robust. These enhancements align with the course's focus on algorithmic thinking and efficient data handling.

Function sortCoursesByNumber(courses):

If number of courses <= 1:

return courses

Else:

Divide courses into two halves

Sort each half recursively

Merge the two sorted halves based on courseNumber

Return merged list

Main Menu Option:

Case 4: Sort and print courses in order

If courses list is empty:

Prompt user to load data

Else:

sortedCourses = sortCoursesByNumber(courses)

Print sortedCourses

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.

To align with the course outcome for CS 260, I will demonstrate skills in algorithm implementation, data structure selection, and code optimization. Specifically, I will apply a sorting algorithm (like Merge Sort) to organize course data efficiently, showing my understanding of algorithmic design and analysis. Additionally, I will improve the structure and clarity of the code using best practices in modular programming and inline documentation, ensuring the program is maintainable, efficient, and scalable.

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

My enhancement aligns with Outcome **3** by applying algorithmic principles to improve the program’s efficiency and structure. It also supports Outcome 4 through the use of reliable techniques and clean code practices to deliver a more professional and effective computing solution.

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

The code reviews will showcase my ability to write clean, well-structured, and efficient code using proper programming techniques. They will highlight skills such as modular design, error handling, commenting, and the implementation of data structures and algorithms, all aligned with industry standards and course outcomes.

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

The narratives will reflect my growth as a developer, explaining my decision-making process, the challenges I encountered, and how I applied course concepts to solve real-world problems. These narratives demonstrate strong technical communication, critical thinking, and alignment with outcomes related to design choices, communication, and collaboration.

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

In the professional self-assessment, I will reflect on how my education has prepared me for the field, including the development of a security mindset, collaborative problem-solving, and continuous improvement. This section will align with broader program outcomes such as professional readiness, adaptability, and ethical responsibility in computing practices.