GNG 1103
Group 11

Project Schedule and Cost

The focus of this deliverable is to plan and actively manage the design team's project schedule. The design team will include details on the remaining tasks and milestones of this project. A calendar and Gantt Chart will be created to ensure proper organization of dates and deadlines. Task owner, contingencies, and risk management will also be considered when creating these resources. Interdependencies and material purchasing are also massive aspects of this deliverable.

Another critical aspect of this deliverable is to plan out the prototyping and testing phases of the design project. Special consideration will be given to material, client meetings, and prototype fidelity when planning out these aspects. Different concerns are given to individual prototype and testing phases, which the design team will examine closely.

Also provided in this deliverable will be a bill of material and a justification of purchases. These will be crucial to help the design team remain on budget and keep track of materials.

Project Schedule

In the first schedule, only critical milestones and deliverables will be displayed. Since these are the most crucial parts of the project, the design team will revolve the remaining tasks around these dates. These dates are the basis for the project, they dictate when and how different tasks will get completed. Also included in this schedule are some dates when extra time is given to the design to work on the project. Once the deliverables and milestones have been recorded, the design team will reconvene and determine the best timeline to complete these tasks. This timeline will be seen quite effectively using the project Gantt Chart.

Task Name	**Type of Task (Process or Milestone)**	**Task Owner**	**End Date**	**Estimated Duration (days)**
Client Meeting #2	Milestone	All	February 14	1
PD-E: Project Schedule and Cost	Process	All	February 16	2

PD-F: Prototype 1 & Customer Feedback	Process	All	March 1	10
Client Meeting #3	Milestone	All	March 4	1
PD-G: Prototype 2 & Customer Feedback	Process	All	March 8	4
Lab 9: Project Work	Milestone	All	March 13	1
Project Work in MakerLab #1	Milestone	All	March 18	1
Lab 10: Project Work	Milestone	All	March 20	1
PD-H: Prototype 3 & Customer Feedback	Process	All	March 22	10
Project Work in MakerLab #2	Milestone	All	March 23	1
PD-I: Material Submission	Process	Peter Shawn	March 24	2
PD-J: Submit Final Presentation	Process	All	March 24	5
PD-I: Design Day	Milestone	All	March 26	1
PD-J: Present Final Presentation	Milestone	All	March 25 or March 30 or April 1	1
Lab 11: Project Work	Milestone	All	March 27	1
Lab 12: Paperwork	Milestone	All	April 3	1
PD-K: User Manual	Process	Hairuo Spencer	April 23	7

Prototyping and Testing Schedule

As seen above, there are 3 prototyping deliverables that must be completed. All these prototypes have different purposes and must undergo different testing and analysis. The design team needs to take special considerations when discussing these deliverables, such as time, budget, personnel, and several other factors.

Task Name	**Type of Task (Process or Milestone)**	**Task Owner**	**End Date**	**Estimated Duration (days)**
Molecular and Macroscopic Models	Process	Shawn	February 22	5
Researching Unity Methods and Manipulating Interface	Process	Hairuo Spencer Peter	February 22	7
Researching Chemistry	Process	Peter Hairuo	February 22	5
Add Help Menu	Process	Spencer	February 29	7
Conceptualize Quizzes and Student Progress	Process	Hairuo	February 29	7
Testing Prototype 1	Process	All	February 23	7
Submit Prototype 1	Milestone	All	March 1	1
Adding Scripts to Unity	Process	Spencer Peter	March 6	4
Run Reactions with Models	Process	Shawn	March 6	3
Finalize Quizzes and Student Progress	Process	Hairuo Peter	March 6	4
Testing Prototype 2	Process	All	March 7	5
Submit Prototype 2	Milestone	All	March 8	1
Connect Code to	Process	Peter	March 18	7

Reactions		Shawn		
Connect Code to Quizzes and Student Progress	Process	Peter Hairuo	March 18	7
Connect Code to Help Menu	Process	Peter Spencer	March 18	7
Visual Refinements	Process	All	March 18	3
Testing Prototype 3	Process	All	March 20	10
Submit Prototype 3	Milestone	All	March 22	1

For the first prototype, there is a greater focus on planning and truly understanding the project. Whether it would be chemistry related to the reactions, or *Unity* itself, there are several factors that go into prototype 1. There is minimal testing in this phase, as there is very little production that needs to be tested. Some examples of testing include checking if the molecules are accurate in all dimensions or checking if the rates of reactions are accurate. The design team is given some time to research their roles and to analyse their findings. This entire process takes place in 14 days.

For the second prototype, there is a significant focus on applying the research and manipulating it to satisfy the client's needs. Whether it would be adding scripts to *Unity*, or working on quizzes and student progress, a lot of work is done to ensure the components are working well together. Also, for prototype 2, there is a lot of testing, to ensure that progress is being made. Using *Unity* and different compilers, it is being affirmed that all the components of the VR system are running properly. The design team does not have much work on this prototype, so time management is key. This entire process takes place in 7 days.

For the final prototype, a lot of work is put in to ensure that all the components of the system are working properly. Whether it would be adding the code to all the necessary components, or finalizing the visuals, there is a heightened focus on closing out the project. This prototype requires the most testing, to ensure the system is ready for Design Day. With testing in *Unity*, and using the VR headset, the team can affirm minimal faults. By using the VR headset, the design team can easily find their mistakes and adjust accordingly. As this is the final deliverable, the design team is given more time to finalize the details, ensuring that the product works properly. This entire process takes place in 14 days.

Gantt Chart

To help keep the team organized and on schedule, a Gantt Chart will be created using Microsoft Excel. With this chart, it is much easier to visualize the duration and interdependencies of the many tasks that the design team must tackle.

In this chart, task owner, interdependencies, and end dates are clearly shown. This will allow the design team to avoid confusion and conflict; this will also help ensure that the project gets done on time and on budget.

The Gantt Chart has been attached in Brightspace, but it is, of course, subject to change. It is crucial that the design team can adapt to and overcome the many obstacles that accompany this project.

Risk Management and Contingency Plans

A significant risk that could deeply impact the design team would be if *Unity* crashes. If this would happen, all unsaved progress would be lost, which could dramatically hinder the timeline of the project. Not only would the team lose precious time, they will have also lost any creative ideas that they had during the process. To manage this contingent event, one that most people would not see coming, all team members must save their work periodically. Along with saving their work to their own personal computers, members of the design team will also share their progress with the rest of the team. This can help mitigate the loss that can take place if *Unity* crashes.

Another contingency that could take place, however unlikely, would be if too many other teams are using the VR headset. Closer to design day, more teams will be finalizing their projects, which can limit this design team's ability to use the system. If this would take place, the design team would waste valuable time waiting for a turn, or not even getting a chance to use the system. To prevent this issue, the design team will plan and reserve time for the headset, to ensure that it will be available when needed. Proper organization, preparation, and communication will help ensure that no unnecessary time gets wasted because of the VR headset.

Going over budget can also be a risk later in the project when unpredicted materials are required. When working on the project, some materials may be needed, which were not previously mentioned in the cost plans. Since this risk would be unforeseeable, the team might have already spent their entire budget, which would be very bad. To mitigate the critical risk, the design team should reserve some money to prevent the risk from happening during the prototyping and testing phases.

Another risk that may also happen while running the project is components do not work together properly, since there are too many of them. For example, when students ask for help, using the help menu, the subsystems of quiz, helping center and student progress may not all work at the same time. To prevent this risk, the design team should give the subsystems a precedence relationship to make sure they can run fluently through an order (for example, helping system can be a affiliate of the main system so the code will dump back to the main system after finishing help and the student progress always run after the quizzes).

Another risk would be if a group member becomes badly ill, delaying the project's progress. If the group member's task during the illness is multi-person cooperation, the group member who cooperates with him/her will lead all multi-person tasks, and we will let all other members help with the workload. If the group member's task during the illness is a single person task, then his/her task will be transferred to the other group members to complete, and the sick group member should give the maximum degree of work guidance and help to allow other group members know the task progress and task plan.

The final contingency that will be considered is if the models crash after reaction or displays reactions that should not be presented. The members responsible for model building will check if there is a problem with the model, then adjust and rebuild accordingly. The member responsible for the coding section will check for problems with the code and the connection of the different sections, then correct them. Another member will check if there is a problem with the parameter adjustment and connection of the VR device and correct it. The last member will repeatedly test the entire system and feedback the problems they found in the VR test to other team members, then work with other team members to find out the cause of the problem.

Project Cost (Spencer)

Attached along with this document is a .pdf document containing two spreadsheets. In the document, both an official bill of materials and an unofficial materials list are contained. The "Bill of Materials" estimates the total cost of the project by providing each individual item cost, as well as a potential $10 for unforeseen costs. Such issues could occur during the development phase, where new assets must be bought to solve the issue.

The "Materials List" contains all potential materials, their cost, and a brief description of how those materials may be important to the project. The *Chemistry Bundle* provides a clear macroscopic model of key chemical tools such as beakers and hot plates; this will help produce key visuals. The *Reaction Game Kit* is a template for multiple choice interactive quizzes, which will be used before each reaction takes place to guide students. The *IK Helper Tool* provides smoother interaction between player and the game objects, which will be helpful to the sizable percentage of potential students that have no prior experience with virtual reality. *Physics Prediction* displays an on-screen display of the predicted physics of a particle, which would allow for users to clearly see the happenings on the microscopic level. *Hand Physics Controller* (the most expensive asset selected) is also most likely the most helpful asset. The asset provides clear instructions for the hand controller that correspond smoothly to ongoing physics. The controller will provide extremely high ease of use for all players interacting with molecules. These assets combined should provide a smooth and comprehensive game, therefore entailing all the necessary project costs.