

# FINAL PROJECT: UNIT PLAN

For the last two weeks of this program, students will break into groups to design and build a project from the ground up. Students can choose to build a project using a technology from a previous week of the curriculum, or they may choose to tackle a new technology. The main goal of this unit is for students to use what they've learned so far to create a final project that showcases their computer science skills and knowledge. By the end of the unit, students will have designed, built, and tested a product of their own creation.

The ideal number of students per group is 4-5. Should a student be extremely motivated to do work on a subject no one else wishes to take part in, she may work on her own. A student should only work alone under extreme circumstances (i.e. student is extremely high performing and wants to go above and beyond).

## Final Project Ideas

The work need not be project-based; a team could build anything from an application to a physical device to scientific research. For inspiration, here are some projects made in previous years:

- Online, touch-enabled video games.
- An application to help disabled individuals navigate the NYC public transit system.
- A robotic hamster ball built with Arduino and controlled by a mobile phone.
- An umbrella with LED panels that light up upon impact of rain.
- An application that matches local soup kitchens and restaurants with leftovers.
- Machine learning research on breast cancer tumors.
- A mobile application to promote tourism by creating a 5-borough-wide scavenger hunt.

Check out more final projects from previous years on the [Girls Who Code Project Gallery](#).

## Managing Ambitious Projects

As the teacher, you will have to manage expectations and guide students simpler solutions and tools they can use to achieve their goals along each step of the way. Below are some really helpful APIs and other tools aside that your students may find useful (in addition to the ones they used throughout the summer):

- CouchDB and CloudAnt: Most students will not be capable of implementing both a front-end and back-end for their project in the short amount of time. However some talented groups might be able to set up something simple. CouchDB is hands down the quickest way to do this. CloudAnt provides free CouchDB services.
- Meteor is an alternative to the CouchDB. It is a full stack tool for building web applications both front-end and back-end. Resources:
  - <http://docs.meteor.com>
  - <http://www.discovermeteor.com/>
  - <http://www.youtube.com/watch?v=ISAKFkxq4jA>
  - <http://yauh.de/articles/376/best-learning-resources-for-meteorjs>
- EaselJS: No tool is better for creating touch-based video games. EaselJS makes use of the canvas in the same way ProcessingJS does, but is more sophisticated and compatible with mobile devices.
- WEKA: Students might not be able to implement clustering algorithms in just a few days but they can learn Machine Learning basics and use WEKA to get results on a dataset.

## Graduation Details

Please refer to [GRADUATION DETAILS DOCUMENT] for more information about what you can expect on graduation day.

Unit Essential Questions	Unit Enduring Understandings
Who are Computer Scientists?	<p>GWC girls are computer scientists!</p> <p>Computer scientists come from all different backgrounds. Diversity is important in CS because a diverse set of voices and perspectives improve us as people, as well as the products we create.</p> <p>Women were some of the earliest software designers</p>
<p>What is Computer Science?</p> <p>What tools do computer scientists use to solve problems?</p>	<p>Computer science is the study of solving problems using computational thinking, or by taking the steps needed to solve a problem and turning it into something a computer can follow.</p> <p>Girls explain why they chose a particular programming language, based on the problem they are solving. Girls explain why object oriented programming is powerful.</p> <p>There are many ways to store information in programs. Each has its own advantages and drawbacks.</p>

How and why do we use computer science to solve problems?

Computer science is more than building programs - "doing" computer science requires problem solving.

Have plan on paper before trying to code.

You hardly ever get it working the first time, but keep trying!

How and why do we work with people to solve problems?

How do I work best?

How can I communicate effectively with my teachers & peers?

Working with different kinds of people can be hard, but it pushes you to think outside of your comfort zone, create better projects, and become a better person.

## STUDENT OUTCOMES

### Classroom Culture Goals:

- Students have shown appreciation for their classmates before the end of the program.
- Students have built trust with an adult by having at least one 1:1 check-in with someone on the teaching staff.
- Students have meaningfully reflected on their developing understanding through journaling.
- Students have discussed at least one woman leader in technology.

### Skill Goals:

#### Students will be able to:

- Use their computer science knowledge and programming skills from previous weeks to create an original open-ended project.
- Design and develop a product with a team.
- Confidently discuss their product and their development process in front of an audience.
- Reflect on their learning this summer.

### Knowledge Goals:

#### Students will know:

- How to design and develop a product.
- How to work with a team to complete a group project.

### Key Evidence of Success

#### Performance Task:

- Final Project + Poster/Presentation

## LEARNING PLAN

Lesson Plan and Overview	Daily Goal	Outputs and Look-Fors
<p><b>Monday: Design the Product Overview:</b></p> <p>The main goal of today is to start brainstorming and designing final projects! Students will brainstorm project ideas and form teams based on what they're interested in building. Then, teams will finalize their project ideas, work individually to design solution sketches, and select one design to flesh out into a more detailed storyboard.</p>	<p><b>Students can:</b></p> <ul style="list-style-type: none"> <li>• Research projects or causes to inspire their own final project.</li> <li>• Use affinity mapping and dot voting to decide on final project products and teams.</li> <li>• Create wireframe sketches of their product designs.</li> <li>• Work with their teammates to create a storyboard of their product experience.</li> </ul>	<p><b>Solution Sketches</b></p> <ul style="list-style-type: none"> <li>• Girls limit their designs to 3-5 wireframes or panels.</li> </ul> <p><b>Product Storyboard</b></p> <ul style="list-style-type: none"> <li>• All girls are participating</li> </ul>
<p><b>Tuesday: Plan Project + Develop Product Overview:</b></p> <p>Students will learn about Scrum and Kanban, two practices used by real software engineers in the industry. They will then create a product backlog and timeline to help them manage their time throughout the rest of the unit. Then they will begin developing their final projects with their teams.</p>	<p><b>Students can:</b></p> <ul style="list-style-type: none"> <li>• Research women in tech to inspire their own final project.</li> <li>• Create a project backlog and timeline by dividing their final project into smaller tasks.</li> <li>• Update their teammates on their progress on their assigned tasks.</li> <li>• Work independently or in small groups to complete tasks from the product backlog.</li> </ul>	<p><b>Product Backlog:</b></p> <ul style="list-style-type: none"> <li>• All girls are participating.</li> </ul> <p><b>Project Timeline</b></p> <ul style="list-style-type: none"> <li>• All girls are assigned meaningful contributions to the project.</li> </ul>

<p><b>Wednesday: Develop Overview:</b></p> <p>Students will spend the whole day working on developing their final project with their teams. The beginning of the day will start with a scrum meeting so teammates can co-ordinate their work for the day.</p>	<p><b>Students can:</b></p> <ul style="list-style-type: none"> <li>• Update their teammates on their progress on their assigned tasks.</li> <li>• Work independently or in small groups to complete tasks from the product backlog.</li> </ul>	<p><b>Final Project (in progress):</b></p> <ul style="list-style-type: none"> <li>• All girls are contributing in a meaningful capacity.</li> </ul>
<p><b>Thursday: Develop Overview:</b></p> <p>Students will spend the whole day working on developing their final project with their teams. The beginning of the day will start with a scrum meeting so teammates can co-ordinate their work for the day.</p>	<p><b>Students can:</b></p> <ul style="list-style-type: none"> <li>• Update their teammates on their progress on their assigned tasks.</li> <li>• Work independently or in small groups to complete tasks from the product backlog.</li> </ul>	<p><b>Final Project (in progress):</b></p> <ul style="list-style-type: none"> <li>• All girls are contributing in a meaningful capacity.</li> </ul>
<p><b>Friday: Develop + Sprint Retrospective Overview:</b></p> <p>Students will spend the whole day working on developing their final project with their teams. The beginning of the day will start with a scrum meeting so teammates can coordinate their work for the day. At the end of the day, students will participate in a sprint retrospective, in which they will reflect on how their team is working together and plan adjustments for the upcoming week.</p>	<p><b>Students can:</b></p> <ul style="list-style-type: none"> <li>• Update their teammates on their progress on their assigned tasks.</li> <li>• Work independently or in small groups to complete tasks from the product backlog.</li> <li>• Reflect on the team's process during this final projects sprint.</li> <li>• Identify ways the team can improve in the future.</li> </ul>	<p><b>Final Project (in progress):</b></p> <ul style="list-style-type: none"> <li>• All girls are contributing in a meaningful capacity.</li> </ul>

## WEEK 2

Lesson Plan and Overview	Daily Goal	Outputs and Look-Fors
<p><b>Monday: Round Robin Testing + Develop</b></p> <p><b>Overview:</b></p> <p>Students will spend the first part of the day testing other teams' project in a round robin activity. Then, teams will review feedback on their own projects, make adjustments to their plans where appropriate, and continue developing their final projects.</p>	<p><b>Students can:</b></p> <ul style="list-style-type: none"> <li>• Provide constructive feedback to other teams on their final project progress.</li> <li>• Incorporate feedback from classmates to improve their project.</li> <li>• Update their teammates on their progress on their assigned tasks.</li> <li>• Work independently or in small groups to complete tasks from the product backlog.</li> <li>•</li> </ul>	<p><b>Final Project (in progress):</b></p> <ul style="list-style-type: none"> <li>• All girls are contributing in a meaningful capacity.</li> </ul>
<p><b>Tuesday: Develop + Code Freeze</b></p> <p><b>Overview:</b></p> <p>Students will spend the whole day working on developing their final project with their teams. The beginning of the day will start with a scrum meeting so teammates can coordinate their work for the day. By the end of the day, students should be completely finished with their projects and enter a "code freeze," meaning that they no longer make edits to their code after today.</p>	<p><b>Students can:</b></p> <ul style="list-style-type: none"> <li>• Update their teammates on their progress on their assigned tasks.</li> <li>• Work independently or in small groups to complete tasks from the product backlog.</li> <li>•</li> </ul>	<p><b>Final Project (in progress):</b></p> <ul style="list-style-type: none"> <li>• All girls are contributing in a meaningful capacity.</li> </ul>

<p><b>Wednesday: Create Presentation</b></p> <p><b>Overview:</b> Students will spend the whole day working on developing their final project with their teams. The beginning of the day will start with a scrum meeting so teammates can co-ordinate their work for the day.</p>	<p><b>Students can:</b></p> <ul style="list-style-type: none"> <li>Summarize their process and showcase their projects by creating a poster and presentation.</li> </ul>	<p><b>Final Project Poster:</b></p> <ul style="list-style-type: none"> <li>All girls are writing content and helping assemble the poster.</li> </ul> <p><b>Final Project Presentation:</b></p> <ul style="list-style-type: none"> <li>All girls have a piece to present.</li> </ul>
<p><b>Thursday: Project Postmortem</b></p> <p><b>Overview:</b> Students will spend the beginning of the day finishing and practicing their presentations. At the end of the day, the whole class will take some time to complete a project postmortem, in which they'll reflect on the final projects process and their entire SIP experience.</p>	<p><b>Students can:</b></p> <ul style="list-style-type: none"> <li>Speak confidently in front of a group.</li> <li>Reflect on their learning and growth this summer.</li> <li></li> </ul>	
<p><b>Friday: Last Day of SIP!</b></p> <p><b>Overview:</b> Students will complete end-of-program surveys, learn about the Girls Who Code Alumni Network, and have free time to bond as a class before the end of the program.</p>	<p><b>Students can:</b></p> <ul style="list-style-type: none"> <li>Spend time together as a class before the end of the summer.</li> </ul>	



## Suggested Calendar

<b><u>Monday - Day 1</u></b>	<b><u>Tuesday - Day 2</u></b>	<b><u>Wednesday - Day 3</u></b>	<b><u>Thursday - Day 4</u></b>	<b><u>Friday - Day 5</u></b>
<p><u>Choose final project teams and topics (1 hr 30 min)</u></p> <p><u>Design final project product (4 hr)</u></p> <p><u>Reflection and Wrap Up (30 min)</u></p>	<p>Choose a woman in tech inspiration (30 min)</p> <p>Plan project (1 hr 30 min)</p> <p>Develop final project product (3 hr)</p> <p>Reflection and Wrap Up (30 min)</p>	<p>Develop final project product (5 hr)</p> <p>Reflection and Wrap Up (30 min)</p>	<p>Develop final project product (5 hr)</p> <p>Reflection and Wrap Up (30 min)</p>	<p>Develop final project product (4 hr)</p> <p>Sprint Retrospective (1 hr)</p> <p>Reflection and Wrap Up (30 min)</p>

## Suggested Calendar

<b><u>Monday - Day 6</u></b>	<b><u>Tuesday - Day 7</u></b>	<b><u>Wednesday - Day 8</u></b>	<b><u>Thursday - Day 9</u></b>	<b><u>Friday - Day 10</u></b>
<u>Round Robin Testing (1 hr 30 min)</u>  <u>Develop final project product (3 hr 30 min)</u>  <u>Reflection and Wrap Up (30 min)</u>	Develop final project product (5 hr)  - Code Freeze -  Reflection and Wrap Up (30 min)	Create poster and presenta- tion (4 hr)  Practice presen- tation (1 hr)  Reflection and Wrap Up (30 min)	Practice presen- tation (3 hr)  Upload final projects to Proj- ect Gallery (30 min)  Project Post- mortem (1 hr 30 min)  Reflection and Wrap Up (30 min)  - Graduation -	- Last Day of SIP -  SIP Evaluation  Sign up for Loop  Clubs / En- gagement post program  Letter to Myself  Celebrate / Free play