

KaushikDhawane Summer Camp 2023 Syllabus

1. Singing

- a. Introduction to Classical vocal music - various thaats and notes
- b. Introduction to raags such as Bhoopali
- c. Learning Swar malika and songs
- d. Learn singing techniques such as voice modulation and voice projection

2. Keyboard/Guitar

- a. Introduction to musical notes
- b. Learning tunes such as twinkle twinkle, london bridge, happy birthday, and others
- c. Introduction to scales and chords
- d. Introduction to staff notations

3. Art & Craft

- a. Drawing, sketching and shading
- b. Painting with crayons, oil pastels, sketch pens, and water colors
- c. Still life or landscape drawing using water colors
- d. Origami and flower, bird, puppies making

4. Cursive Writing

- a. Writing capital and small letters in cursive
- b. Writing words such as city names in cursive
- c. Writing small sentences in cursive
- d. Writing one or two paragraphs in cursive

5. Shloka

- a. Learning everyday use shlokas (Dainik Prarthana)
- b. Learning shlokas to be recited in the morning, before taking bath, before meal, evening prayer, and before going to bed
- c. Shlokas of Saraswati, Lord Ram
- d. Shanti Mantra

Summer Camp CODING 2023 Syllabus

COMPUTER SCIENCE EXPRESS (FOR AGES 4-8)

1. SEQUENCING

- a. Lesson 1: Learn to Drag and Drop
This skill-building lesson will give students an idea of what to expect when they head to the computer lab. It begins with a brief discussion introducing them to computer lab manners, then they will progress into using a computer to complete online puzzles.
- b. Lesson 2: Sequencing with Scrat
In this skill-building lesson, students will develop sequential algorithms to move a squirrel character from one side of a maze to the acorn at the other side. To do this they will stack code blocks together in a linear sequence.
- c. Lesson 3: Programming with Angry Birds
In this skill-building lesson, students will continue to develop sequential algorithms.
- d. Lesson 4: Programming with Rey and BB-8
In this skill-building lesson, students will use their newfound programming skills in more complicated ways to navigate a tricky course with BB-8.
- e. Lesson 5: Programming with Harvester
In this skill-building lesson, students will apply the programming concepts that they have learned to the Harvester environment. Students will continue to develop sequential algorithm skills and start using the debugging process.

2. LOOPS

- a. Lesson 6: Loops with Scrat
In this skill-building lesson, students will practice the concept of loops in programming puzzles where the goal is to help the squirrel reach the acorn.
- b. Lesson 7: Loops with Laurel
In this lesson, students continue learning the concept of loops. Here, Laurel the Adventurer uses loops to collect treasure in open cave spaces. A new `get` treasure block is introduced to help her on her journey.
- c. Lesson 8: Ocean Scene with Loops
In this skill-building lesson, students learn to draw images by looping simple sequences of instructions. Here, loops are creating patterns. At the end of this lesson, students will be given the opportunity to create their own images.
- d. Lesson 9: Drawing Gardens with Loops
In this skill-building lesson, students learn to draw images by looping simple sequences of instructions. Here, students use loops to create patterns. At the end of this lesson, students will be given the opportunity to create their own images.

3. EVENTS

- a. Lesson 10: On the Move with Events
In this mini-project, students will have the opportunity to learn how to use events in Play Lab and to apply all of the coding skills they've learned to create an animated game. It's time to get creative and make a story in the Play Lab!

b. Lesson 11: Mini-Project – Create an animated game

In this mini-project, students will have the opportunity to learn how to use events in Play Lab and apply all of the coding skills that they've learned to create an animated game.

4. Introduction to App Development

5. Introduction to AI

COMPUTER SCIENCE FUNDAMENTALS EXPRESS (FOR AGES 9-12)

SEQUENCING

- 1. Lesson 1: Programming with Angry Birds**
In this skill-building lesson, students will develop sequential algorithms to move a bird from one side of a maze to the pig on the other side. To do this, they will stack code blocks together in a linear sequence, making them move straight, turn left, or turn right.
- 2. Lesson 2: Debugging in Maze**
In this skill-building lesson, students will encounter pre-written code that contains mistakes. They will need to step through the existing code to identify errors.
- 3. Lesson 3: Collecting Treasure with Laurel**
In this skill-building lesson, students will continue to develop their understanding of algorithms and debugging. With a new character, Laurel the Adventurer, students will create sequential algorithms to get Laurel to pick up treasure as she walks along a path.
- 4. Lesson 4: Creating Art with Code**
In this skill-building lesson, students will take control of the Artist to complete drawings on the screen
- 5. Lesson 5: Swimming Fish in Sprite Lab**
Students will program a simple animated underwater scene in this skill-building lesson.
- 6. Lesson 6: Making Sprites**
In this skill-building lesson, students will work through a series of programming levels on the computer, finishing with an open-ended "free play" task where they can build whatever they like. Students will write programs and learn about the two concepts at the heart of Sprite Lab: sprites and behaviors.

EVENTS

- 7. Lesson 7: Sprites in Action**
In this skill-building lesson, students will work through a series of programming levels on the computer, finishing with an open-ended "free play" task where they can build whatever they like. Students will write programs that respond to timed events and user input.
- 8. Lesson 8: Virtual Pet with Sprite Lab**
Students will create an interactive Virtual Pet that looks and behaves how they wish in this mini-project lesson. Students will use Sprite Lab's "Costumes" tool to customize their pet's appearance. They will then use events, behaviors, and other concepts they have learned to bring their project to life.
- 9. Lesson 9: Dance Party**
In this skill-building lesson, students will program an interactive dance party.

LOOPS

- 10. Lesson 10: Loops with Rey and BB-8**
This skill-building lesson has students using loops to help the Star Wars character BB-8 efficiently traverse a maze.
- 11. Lesson 11: Mini-Project: Sticker Art**
This mini-project lesson builds on the understanding of loops. Students will create unique artwork with the Artist.
- 12. Lesson 12: Nested Loops in Maze**
In this skill-building lesson, students will learn how to program a loop inside of another loop.
- 13. Lesson 13: Snowflakes with Anna and Elsa**
This mini-project lesson takes students through a series of exercises to create snowflake images using characters from the Frozen movies.
- 14. Lesson 14: Looking Ahead with Minecraft**
This skill-building lesson gives students the chance to practice concepts that they have learned up to this point and get their first experience with conditionals!
- 15. Lesson 15: End of Course Project**
- 16. Introduction to AI (Optional)**

AI AND MACHINE LEARNING

UNDERSTANDING MACHINE LEARNING

1. Lesson 1: Introduction to Machine Learning

In this lesson students are introduced to a form of artificial intelligence called machine learning and how they can use the Problem Solving Process to help train a robot to solve problems. They participate in three machine learning activities where a robot - A.I. Bot - is learning how to detect patterns in fish.

2. Lesson 2: Types of Machine Learning

In this lesson students will consider how they create “mental” models when learning new concepts, and how those can be similar to a “machine learning” model. They participate in a color pattern activity to simulate building a machine learning model without help, then they play a game called "Green Glass Door" as an example of supervised learning, and finally, they will sort several scenarios into “supervised” or “unsupervised” learning.

3. Lesson 3: Innovations in AI

In this lesson, students explore an application of AI called Seeing AI and examine how it is supporting people with visual impairments. Then, students research other examples of how AI is impacting society, focusing on users who are impacted by the examples they find. Finally, students share their findings with each other.

4. Lesson 4: Patterns in Data

In this lesson students will examine several apps that make decisions about what shoes to wear, ultimately building up to an understanding of how machine learning can help make this decision. Students are guided to the conclusion that surveying their users can help them make the best decision by looking for patterns in the data and basing their decisions on these patterns.

5. Lesson 5: Classification Models

In this lesson students will participate in an unplugged activity simulating one of the machine learning algorithms computers use to separate data into groups to help make decisions. Students will be tasked with helping a computer learn to classify food as fruits or vegetables, graph 20 different fruits on two axes comparing “sweetness” to “easy to eat”, and then try to separate the data into groups - a fruit area, and a veggie area.

6. Lesson 6: Introduction to AI Lab

In this lesson students will dive into the AI Lab tool for the first time, where they select features to train a model that predicts a given label. They start by exploring AI Lab and training a model to recognize shapes. Then they pretend they have been hired by several restaurants who would like to make recommendations to new customers based on survey data they’ve collected, go through each dataset, and use data visualization tools to identify features with high relationships in the data.

7. Lesson 7: Importing Models in App Lab

In this lesson students are introduced to importing their models into App Lab and linking their model to their screens. They help create a book recommendation app and learn how to add a welcome screen and events to their code. This lesson assumes students are already familiar with App Lab - for classrooms that have not seen App Lab before, consider extending this lesson and including additional videos or activities that are recommended in the lesson plan.

8. Lesson 8: Model Cards

In this lesson, students will investigate a model for bias and be introduced to a Model Card, which is a way of representing important information about a trained model that could help uncover bias. They will be investigating a Medical Priority app, which helps a hospital decide how soon to view patients based on their symptoms. As students go through the activity, they realize that the app is biased based on personal information and examine how this could happen.

9. Lesson 9: Saving Models in AI Lab

Students complete the full process of training and saving a model, then importing into App Lab. For the first time, students are able to choose the label they would like to predict and spend time deciding the features they will use to help predict their label of choice. Students also create a model card for their models in order to save them and import it into App Lab

10. Lesson 10: Model Cards in App Lab

In this lesson, students practice importing their models into App Lab, this time including models that have numerical data and using model cards to help improve the user experience of filling out their form. They will then learn how to view the model card within App Lab and use this to add more descriptive elements to an app. Next, they focus on improving the user experience by adding informational text to help guide users through completing the form and adding a style to their app to improve the user experience.

11. Lesson 11: Numerical Models

In this lesson, students participate in an unplugged activity simulating a zombie outbreak. Students must predict which parts of town have the least amount of zombies using data from a neighboring town. Students will use degrees of similarity and averages to make predictions about the number of zombies at a particular location. Then, students are rescued and get to compare their predictions to the actual numbers as a way to discuss how accuracy is different for numerical data compared to categorical data.

12. Lesson 12: Numerical Data in AI Lab

In this lesson, students will be introduced to numerical data which represents a range of values. Students are presented with a scenario where every feature and label is represented with numerical data, and they learn to use the new data visualization tools within AI Lab to help find patterns.

13. Lesson 13: Customizing Apps

In this lesson, students will explore how to customize the code of their app to make additional changes to the design of their app. They will start by exploring a single-screen app and then practice expanding the app to two-screens and updating the code to use the new design mode elements. After this, students help create a Driver Alert app that requires changes to the code using new design mode elements. Using the skills from this lesson, students will be able to create multi-screen apps where questions can appear on multiple screens instead of a single screen.

14. Lesson 14: AI Code of Ethics

In small groups, students conduct research using articles and videos that expose ethical pitfalls in an Artificial Intelligence (AI) area of their choice. Afterward, each group develops at least one solution-oriented principle that addresses their chosen area. These principles are then assembled into a class-wide "Our AI Code of Ethics" resource (e.g. a slide presentation, document, or webpage) for AI creators and legislators everywhere.

15. Lesson 15: Project: Make a Machine Learning App

In this one or two day mini-project, students apply their skills from the unit so far and create a machine learning app using real-world data. Students are provided with several real-world datasets from a variety of contexts, and they choose which dataset they would like to investigate. They train and save their model, then make a simple App Lab app that uses the model. This mini-project is an opportunity to assess how well students can use features to create accurate machine learning models, and how well they can create apps that use machine learning.

DESIGN A MACHINE LEARNING APP

16. Lesson 16: Issue Statements

This is the first of a five-day sequence of lessons that prepare students for the final project. In this lesson, students meet a team of fictional students who want to use machine learning to address an issue in their community. Students participate in an issue brainstorm using the 5 Why's strategy, then they help evaluate the ideas that the other student team came up with. The steps students take in this lesson are identical to the steps students will take in their final project.

17. Lesson 17: Survey Planning

This is the second in a five-day sequence of lessons that prepare students for the final project. In this lesson, students learn that the other team of students would like to create a club recommender app based on the clubs at their school. Students imagine what questions would be most useful to help make this recommendation, then they learn how to use a Google Form template to create a survey. The steps students take in this lesson are identical to the steps students will take in their final project.

18. Lesson 18: Survey Data in AI Lab

This is the third in a five-day sequence of lessons that prepare students for the final project. In this lesson, students learn how to view survey data in Google Sheets and save the data to their computer as a csv file. Then, they upload the saved data to AI Lab and examine the survey results from one of the students to train a model using their data. Then, students use Google Sheets to examine data from another student where the data has errors and then try to fix the errors. The steps students take in this lesson are identical to the steps students will take in their final project, and the problem-solving strategies they develop will help them overcome challenges in their own final project.

19. Lesson 19: Troubleshooting Models

This is the fourth of a five-day sequence of lessons that prepare students for the final project. In this lesson, students examine survey data from other members of the student team and analyze why their models are not working correctly. In examining the data, students develop strategies for avoiding these issues in the future and strategies for coping with these issues should they happen again. These are skills students will use in the final project as they develop their own surveys and collect data.

20. Lesson 20: Creating an App

This is the fifth of a five-day sequence of lessons that prepare students for the final project. In this lesson, students import the club recommender app into App Lab and begin customizing the app. Students add a welcome screen and update the descriptions of each feature, then they can decide how they would like to further customize the app. The steps students take in this lesson are identical to the steps students will take in their final project.

21. Lesson 21: Project - Design an AI App

To conclude this unit, students develop an AI app that addresses the social issue they have returned to throughout the unit. After looking at a sample app, students follow a project guide to complete this multi-day activity. In the first step, students prepare the data they will use to train their model in AI Lab. After training, testing, and generating a model card, they export their model into App Lab for development. Here they use their model to create a user-friendly app based on their mockup from the previous lesson, "Planning Your App". Students perform a peer review and make any necessary updates to their projects before preparing a presentation to the class.