



UNIVERSITY of HAWAII®
MAUI COLLEGE

Using AI Tools as a Programming Assistant

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Agenda

1. Overview
 - a. Exams using ChatGPT
2. AI Tools
 - a. ChatGPT
 - b. GitHub Copilot
 - c. Visual Studio Code with GitHub Copilot
3. Reflections

Introducing ChatGPT

We've trained a model called ChatGPT which interacts in a conversational way. The dialogue format makes it possible for ChatGPT to answer followup questions, admit its mistakes, challenge incorrect premises, and reject inappropriate requests.

Final Exam 2022

Questions were all in text format and provided clear and concise instructions for students to write or fix code.

ChatGPT answered all questions with correct/elegant answers!

Final Exam 2022 - HTML Coding

Write the HTML code for a simple form that requires a mandatory text input fields for username mandatory, a mandatory password type input field, and an optional text input type of Last Name. Ensure you have a placeholder with hints for every field and require input for uid and pwd.

```
<form>
  <label for="username">Username:</label><br>
  <input type="text" id="username" name="username" placeholder = "Please enter
your username" required><br>

  <label for="pwd">Password:</label><br>
  <input type="password" id="pwd" name="pwd" placeholder = "Please enter a valid
password" required>

  <label for="lastname">LastName:</label><br>
  <input type="text" id="lastname" name="lastname" placeholder = "Please enter your
last name" >
</form>
```

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>Simple Form</title>
</head>
<body>
  <form>
    <label for="username">Username:</label>
    <input type="text" id="username" name="username" placeholder="Enter your username" required>
    <br><br>

    <label for="password">Password:</label>
    <input type="password" id="password" name="password" placeholder="Enter your password"
required>
    <br><br>

    <label for="lastName">Last Name:</label>
    <input type="text" id="lastName" name="lastName" placeholder="Enter your last name (optional)">
    <br><br>

    <input type="submit" value="Submit">
  </form>
</body>
</html>
```


Final Exam 2022 - Question on MongoDB and Mongoose Schema

Question 1 – 4 points – Respond with answers in a Word Document

Consider the following code that creates a Mongoose Schema:

```
const postSchema = {  
  title: {  
    type: String,  
    required: [true, 'Title of Blog is required']  
  },  
  content: {  
    type: String,  
    required: [true, 'Content of Blog is required']  
  }  
};
```

Extend the schema with the following four elements:

1. **Description** of type String but always in lowercase, required field
2. **PostDate** of type Date, with default of today's date, not a required field
3. **Rating** of type Number, with a min rating of 1, not a required field
4. **isValid** is a Boolean, required field

Final Exam 2022 - Official Answer to Question on MongoDB and Mongoose Schema

Answer 1

```
const postSchema = {
  title: {
    type: String,
    required: [true, 'Title of Blog is required']
  },
  content: {
    type: String,
    required: [true, 'Content of Blog is required']
  },
  Description: {
    type: String,
    lowercase: [true],
    required: [true]
  },
  PostDate: {
    type: Date,
    default: [Date.now]
  },
  Rating: {
    type: Number,
    min: [1]
  },
  isValid: {
    type: Boolean,
    required: [true, "Need to enter True or False"]
  }
};
```


Final Exam 2022 - MongoDB Answer from ChatGPT

```
const mongoose = require('mongoose');
const { Schema } = mongoose;

const postSchema = new Schema({
  title: {
    type: String,
    required: [true, 'Title of Blog is required']
  },
  content: {
    type: String,
    required: [true, 'Content of Blog is required']
  },
  description: {
    type: String,
    required: [true, 'Description is required'],
    set: (value) => value.toLowerCase()
  },
  postDate: {
    type: Date,
    default: Date.now,
  },
  rating: {
    type: Number,
    min: [1, 'Rating must be at least 1']
  },
  isValid: {
    type: Boolean,
    required: [true, 'isValid field is required']
  }
});
```

Final Exam 2023 - May 9, 2023!

Open book exam for online students, live on Zoom

Students were allowed to prepare for the exam with ChatGPT or any other learning tool.

Students had access to ChatGPT during the exam. They were specifically instructed not to cut and paste from ChatGPT output.

Exam questions were based on images, minimum text, exam was a protected, non-editable PDF file...

ChatGPT

v3.5 - Free

v4.0 - \$20/mo

ChatGPT v3.5

Free!

Started using in March 2023

Students learned how to write clear and concise prompts and converse

Understand code snippets and examples from class

Used to generate sample code

Students used ChatGPT for homework and final exam

ChatGPT v4.0 - Plus

Useful for an Instructor

Paid service for \$20/month

More powerful engine for generating code and explanations

Assists instruction by providing an online coding “assistant”

Helpful for generating sample code for students based on existing documentation

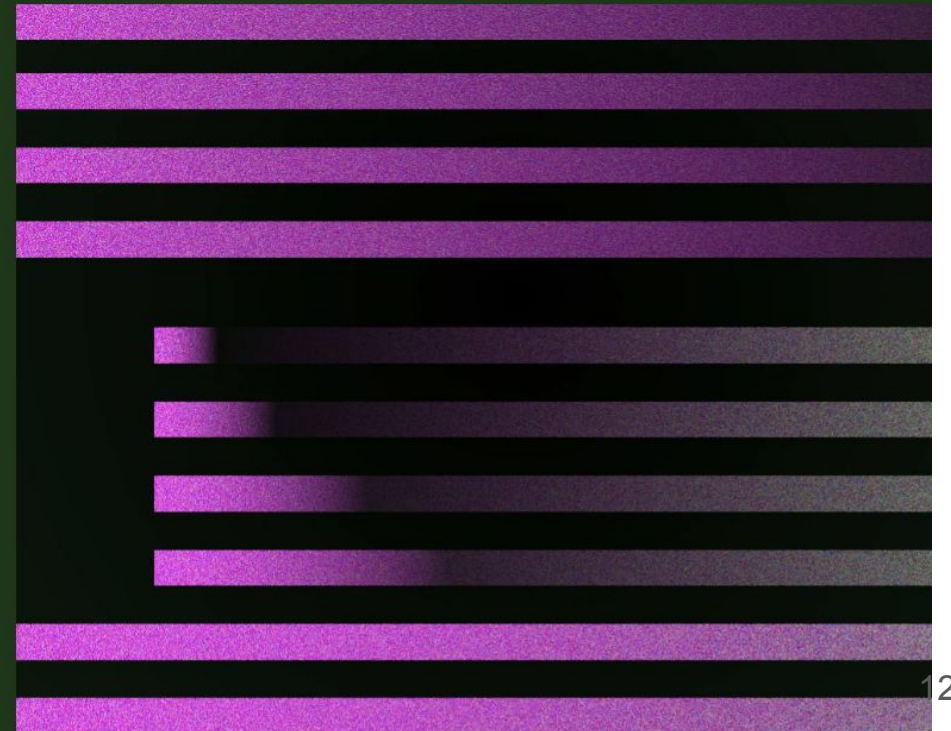


Introducing ChatGPT

We've trained a model called ChatGPT which interacts in a conversational way. The dialogue format makes it possible for ChatGPT to answer followup questions, admit its mistakes, challenge incorrect premises, and reject inappropriate requests.

[Try ChatGPT ↗](#)

[Read about ChatGPT Plus](#)



+ New chat



⚡ GPT-3.5

✦ GPT-4

Yesterday

📄 Sphere Volume Calculation

ChatGPT **PLUS**



//create javascript code for volume of a sphere
//create a function that calculates the volume of a sphere
//volume = $\frac{4}{3} * \pi * r^3$
//create a function that calculates the volume of a sphere



Sure, here's a simple function in JavaScript that can be used to calculate the volume of a sphere, where `r` is the radius of the sphere.



javascript

Copy code

```
function volumeOfSphere(r) {  
  const pi = Math.PI;  
  const volume = (4 / 3) * pi * Math.pow(r, 3);  
  return volume;  
}  
  
//Usage  
console.log(volumeOfSphere(5)); // radius = 5 units
```




Your AI pair programmer

GitHub Copilot uses the OpenAI Codex to suggest code and entire functions in real-time, right from your editor.

GitHub Copilot enables developers to

- **Get AI-based coding suggestions:** Get code suggestions that match a project's context and style conventions, and cycle through different options to decide what to accept, reject, or edit.
- **Use your preferred environment:** Integrate GitHub Copilot with popular editors, including Neovim, JetBrains IDEs, Visual Studio, and Visual Studio Code as an unobtrusive extension.
- **Code confidently in unfamiliar territory:** Code in new languages or try something new, and let GitHub Copilot suggest syntax and code in dozens of languages—so you can spend more time learning by doing.

What can you do with GitHub Copilot?

Convert comments to code

GitHub Copilot uses a special version of GPT-3 that has been trained on a large body of public source code. It is as good at writing natural language as it is at writing code, so in fact it can complete your comments for you. In the example below, we first let it complete our explanation, and then, line by line, we tab through the code that does what we just said in English.

```
//create javascript code for volume of a sphere  
//create a function that calculates the volume of a sphere  
//volume = 4/3 * pi * r^3
```

Create unit tests

An important use case of GitHub Copilot is to take some of the drudgery out of writing unit tests. Below, we already have an implementation of a function that computes the common prefix of two lists, and we want to test that. To do so, we import the unit test package, and then we start writing a test function to let Copilot generate the asserts which we accept just by hitting the Tab key.

← →

☰ ☰

EXTENSIONS 🔍 ↻ ☰ ⋮

Search Extensions in Marketplace

✓ **INSTALLED** 9

C/C++
C/C++ IntelliSense, debug...
Microsoft ⚙️

GitHub Copilot 🕒 370ms
Your AI pair programmer
GitHub 🔧 🗑️

Jupyter
Jupyter notebook support, ...
Microsoft 🔧 ⚙️

Jupyter Cell Tags
Jupyter Cell Tags support

✓ **RECOMMENDED** 6

Debugger f... 🔗 2.9M ★ 4.5
Debug your web applicatio...
Firefox DevTools Install

Microsoft E... 🔗 2.2M ★ 4.5
Use the Microsoft Edge To...
Microsoft Install

ESLint 🔗 28.1M ★ 4.5
Integrates ESLint JavaScri...
Microsoft Install

GitHub Copilot

v1.95.233

GitHub github.com
🔗 7,341,863
★★★★★

Your AI pair programmer

Disable
Uninstall ▼
Switch to Pre-Release Version ⋮

This extension is enabled globally.

DETAILS
FEATURE CONTRIBUTIONS
CHANGELOG
RUNTIME STATUS

👤 Followers 26k
🐦 Follow @github

📺 Views 13M
Try Copilot Free trial

Your AI pair programmer

Get Code Suggestions in real-time, right in your IDE

```

1
2 def common_prefix(a, b):
3     """Return the common prefix of two lists."""
4     if len(a) < len(b):
5         return common_prefix(b,a)
6     for i in range(len(a)):
7         if a[i] != b[i]:
8             return a[:i]
9     return a
10
11 def test_common]
12

```

Categories

Programming Languages

Machine Learning

Education

Snippets

Extension Resources

Marketplace
GitHub



JS test.js



Users > debasisbhattacharya > JS test.js > ...

```
1 //create javascript code for volume of a sphere
2 //create a function that calculates the volume of a sphere
3 //volume = 4/3 * pi * r^3
4 //r = radius of sphere
5 //pi = 3.14
6
7 function volumeOfSphere(r) {
8     const pi = 3.14;
9     const volume = (4 / 3) * pi * Math.pow(r, 3);
10    return volume;
11 }
12
13 //usage
14 console.log(volumeOfSphere(5)); // radius = 5 units
15
16
```



Reflections - AI Tools as Programming Assistants

1. Extends the current toolsets and learning aids
 - a. Intelligent IDEs, Stack Overflow, Online Docs, Google Search, GitHub etc.
2. Introductory Programming Courses
 - a. HTML, CSS, Javascript, Python
 - b. Students understand basic syntax
 - c. Students learn to write comments/prompts -> generate code
 - d. Students learn to test code
3. Intermediate Programming and Database Courses
 - a. MERN Stack - MongoDB, Express, React, NodeJS
 - b. Databases - MySQL, MongoDB, Mongoose
 - c. Installation process, Code Generation, Test Scripts, GitHub Repo
 - d. Group Projects where students work together
4. Integrate ChatGPT and AI models into the curriculum



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Questions?
 Comments?!

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**Summer Working
 Connections 2023**



**MIT
 Technology
 Review**

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Shroom speak
 Monitoring moods
 in the classroom
 What we learned from
 learning to code

AI
 is coming for
 the classroom.

Meet the teachers
 who believe it could
 improve
 education.

