



Class Overview

CSCI E-94

Fundamentals of Cloud Computing
with Azure & Open AI

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Agenda

- Class Overview
 - First Night
 - Teaching Staff
 - What the course covers
 - Course Coverage FAQs



Agenda

- Class Overview ...
 - House Rules
 - Use of AI
 - Grading
 - Development Hardware & Tools
 - Some more FAQs



First Night

- Class Overview
- Assignment 01 Overview
- ASP .NET Web API REST Introduction
- Microsoft Foundry Part 1



Class Overview- Teaching Staff

- Who
 - Instructor
 - Joseph Ficara
 - Head TA
 - Jonathan Franck
 - TAs
 - Max Eringros
 - Jessica Pratt
 - Nancy Forero
 - Gustavo Varo



Class Overview - Coverage

- In depth coverage
 - Key Microsoft Azure PaaS offerings
- Essentials
 - Microsoft Azure Serverless
 - .NET 10
 - Web API & MVC, Middleware, Entity Framework
 - VNETs
 - CICD



Class Overview - Coverage

- The Fundamentals
 - REST
 - Scalable REST Services
 - Security (Authentication & Authorization)
 - Multi-tenancy
 - Architectural Patterns
 - Cache-Aside
 - Pushback, Throttling
 - Retry & Circuit breaker
 - Command and Query Responsibility Segregation
 - And more...



Class Overview - Coverage

- The Fundamentals ...
 - Azure AI – Open AI
 - What is offered in Azure
 - Focus on Azure AI Foundry
 - Microsoft Agent Framework
 - Integrating AI into your Applications
 - AI Orchestration & Agents, Plugins, Prompts & Plans
 - LLM Overview
 - Prompt Engineering
 - Embedding
 - Fine Tuning
 - Best practices & Considerations



Class Overview - Coverage

- The Fundamentals ...
 - AI an essential tool for software development
 - GitHub Copilot Fundamentals
 - Techniques for get better results
 - Interactive and async Agent mode
 - Remember you own the code



Class Overview - Coverage

- How?
 - Lectures
 - Sections
 - Course Work
 - Homework assignments
 - Microsoft Teams
 - Place to ask async questions
 - Reading material



Course Coverage FAQ

- Can I be successful if ?
 - I know Java, C++
 - Some other OO language
- Yes, if you are a quick study
 - You should be able to pickup C# easily
 - Teaching staff is well versed in C#
 - We can and want to help you!
 - In Section we will cover fundamentals of C#



Course Coverage FAQ

- Will this class teach me ...
 - Azure (**IaaS**) Infrastructure **as a Service** ?
 - No
 - Azure (**PaaS**) Platform **as a Service** services ?
 - YES! (*Many but not all...*)
 - Azure Serverless
 - YES! Logic Apps and Azure Functions
 - How to
 - Build cloud native applications that run in Azure's cloud ?
 - YES!



Course Coverage





Class Overview – House Rules

- House Rules
 - Silence all noise making devices:
 - Cell phones, Laptop, tablet, etc.
 - Still rocking a pager ?
 - Good for you, but please silence it
- We are remote
 - Turn on your camera for a better experience!
- Ask questions!



Class Overview - Use of AI

- GitHub Copilot is encouraged
 - As a learning and development tool for all assignments
 - Not required
- All Copilot usage must be
 - Clearly acknowledged and cited in your **projectnotes.md** file
 - Include instruction files, skills, AGENTS.md, prompts, and any MCP servers used, **basically everything and anything you provided to the AI for context, constraints and instruction.**
- Students are responsible for evaluating
 - The accuracy & appropriateness of Copilot-generated output



Class Overview - Use of AI

- Students must
 - Fully understand & be able to explain
 - Any code generated by Copilot, TAs may ask
- The course teaches
 - Effective & responsible use of
 - AI Assisted development, focus on GitHub Copilot
 - Using AI to
 - Improve software development
 - Improve your understanding & increase your skill set



Class Overview - Use of AI

- Can I use AI to
 - Develop the assignment
 - Yes
 - To develop the extra credit
 - Yes
 - To build tests
 - Yes
- Must I understand code that is generated
 - Yes



Class Overview - Use of AI

- Can I use AI coding tools besides GitHub Copilot
 - No
- Do I have to pay for GitHub Copilot
 - Should be able to get an education grant
[Apply to GitHub Education as a student - GitHub Docs](#)
 - Only degree students receive Harvard domain emails which may affect eligibility
- Can I use my company GitHub account
 - No
- Can I provide the assignment to AI and have AI build the whole thing?
 - No, you must decompose the assignment yourself and learn AI assisted development techniques presented in class to achieve the desired result if you use AI assisted development.



Class Overview - Grading

- Students registered for Graduate Credit
 - Required to complete one extra credit option
 - The selected option
 - Must be from the **assignment's listed extra credit options**
 - Is included in the **base grade calculation**
 - **Cannot increase the assignment score above 100%**
 - If the required extra credit option is not completed
 - A point deduction will be applied
 - Deduction equals point value of lowest-value extra credit option
 - **Additional extra credit options**
 - May be completed from the **assignment's listed options**
 - Can be used to earn a score above 100%



Class Overview - Grading

■ Assignments

- Lowest assignment grade is dropped
- Upload to canvas by **5:00 PM EST** date due
 - **1.5 Points deducted per day late**
 - Assignments more than **14 days late**
 - Receive a grade of **0%**

■ Extra points

- 1 Point per day early up to **5 points max**
- See *syllabus* for more details



Class Overview - Grading

Assignments ...

- Accepted submission – **Canvas Website**
- **Students' responsibility**
 - Complete assignment & submit it to canvas
 - 5:00 PM EST on due date
- **No excuses accepted ...**
 - Corrupted Zip file, Computer Crashed
 - My clock was off
 - The internet was broken
 - My mouse ate it
 - Still late!



Class Overview - Grading

Assignments ...

- A TA is assigned to grade your assignment
 - Assignments are posted in Microsoft Teams
 - Under the assignment channel
 - Grading TA changes for each assignment
- **No resubmits!**
 - *Unless requested by your grading TA*
 - If resubmit is required by a TA?
 - All early submission extra credit points are forfeit



Class Overview - Grading

- Evaluation (How you are graded)
 - **Homework is 100% of your final grade**
 - There are **7** assignments
 - The **assignment with lowest grade is dropped**
 - Student can skip a single assignment
 - Skipped assignment receives a score of zero
 - Is considered lowest grade and dropped
 - **Uses up the lowest grade dropped benefit**



Class Overview

Assignments ...

- Students are not permitted to make coursework
 - Open source
- Students **must keep all course work private**
 - Repositories used for assignments must be private
 - Exceptions
 - Prospective employer
 - Showcase during section when permitted
 - TAs will coordinate section showcase sessions
- Students are **not permitted to share**
 - Any course material, slides, videos, course work



Grading





Class Overview - Logistics

- Connectivity Requirements
 - Internet Access
 - Email
 - Your favorite internet browser



Class Overview - Logistics

- **Sections**
 - Thursday from 5:30 to 6:30 PM EST
 - Student Q&A & supplemental content
 - Recorded
- **Instructor office hours**
 - Typically, Saturday or Sunday 1-1.5 Hours
 - Day & Time posted on Teams and Canvas
 - Student Q&A & supplemental content
 - Recorded



Class Overview - Logistics

- Class Website
 - <https://canvas.harvard.edu/courses/166214>
 - Your Harvard Key Credentials
 - Login Name & Password



Demo

Class Website

<https://canvas.harvard.edu/courses/166214>



Development Tools & Environment

- Software & Hardware
 - Windows 11 Professional, Mac or Linux
 - Visual Studio 2026 - Windows
 - Community, Pro or Enterprise with latest updates
See hardware/software requirements [here](#)
Download Visual Studio 2026 Community [here](#)
- Visual Studio Code - Mac, Linux
 - You can download VS Code it [here](#)
- Microsoft software is free for educational use
- Most Azure Resources are also “free”
 - Students are provided Azure **\$100.00**
 - We will use several free services



Development Tools & Environment

■ Visual Studio 2026 Install Selection

The screenshot shows the Visual Studio 2026 Install Selection interface. It displays a grid of development tools categorized by color:

- ASP.NET and web development** (Top Left): Build web applications using ASP.NET Core, ASP.NET, HTML/JavaScript, and Containers including Docker support. (Selected)
- Azure and AI development** (Top Right): Azure SDKs, tools, and projects for developing cloud apps (including AI agents) and creating resources using .NET a... (Selected)
- Python development** (Bottom Left): Editing, debugging, interactive development and source control for Python. (Selected)
- Node.js development** (Bottom Right): Build scalable network applications using Node.js, an asynchronous event-driven JavaScript runtime. (Selected)
- Desktop & Mobile (5)**: A section header.
- .NET Multi-platform App UI development**: Build Android, iOS, Windows, and Mac apps from a single codebase using C# with .NET MAUI.
- .NET desktop development**: Build WPF, Windows Forms, and console applications using C#, Visual Basic, and F# with .NET and .NET Frame...
- Desktop development with C++**: Build modern C++ apps for Windows using tools of your choice, including MSVC, Clang, CMake, or MSBuild.
- WinUI application development**: Build applications for the Windows platform using WinUI with C# or optionally C++.
- Mobile development with C++ (Out of support)**: Build cross-platform applications for iOS, Android or Windows using C++.



Development Tools & Environment

■ Visual Studio 2026 Install Selection

Gaming (2)



Game development with Unity

Create 2D and 3D games with Unity, a powerful cross-platform development environment.



Game development with C++

Use the full power of C++ to build professional games powered by DirectX, Unreal, or Cocos2d.

Other Toolsets (5)



Data storage and processing

Connect, develop, and test data solutions with SQL Server, Azure Data Lake, or Hadoop.



Note: You may not see the **Data storage and processing** option in Visual Studio 2026.

I do see it in my installation, but I have multiple versions and editions of Visual Studio installed, so this may be due to cached or carried-over components, even though Visual Studio 2026 Community is selected.



Visual Studio extension development

Create add-ons and extensions for Visual Studio, including new commands, code analyzers and tool windows.



This option is not required for the course. You will be fine without it. For SQL-related work, we will use SQL Server Management Studio (SSMS) or Visual Studio Code with the SQL extension, which fully cover what you'll need.



Linux, Mac, and embedded development with C++

Create and debug applications running in a Linux or Mac environment or on an embedded device.



Development Tools & Environment





Class Overview – FAQ

- I am new to Azure and all this ...
 - What do I have to setup how do I do it?
 - See the welcome letter
 - [Welcome Letter](#)
 - See the setup video
 - [Microsoft Account, Azure & Teams Setup Video](#)



Class Overview – FAQ

- How long do assignments take to complete?
 - Median student
 - Spends between 15 to 20 hours on each assignment.
- What is submitted?
 - See details provided in each assignment
 - Don't submit the binary
 - Required AI Attribution
 - See assignment and syllabus
 - Ensure **projectnotes.md** is submitted
 - With required information
 - See assignment and syllabus



Class Overview – FAQ

- What assistance is available for students
 - Unfamiliar with the technology stack?
 - Several sections include lectures on C# and .NET
 - Weekly instructor office hours
 - Sample code provided
 - In every lecture pack
 - Instructor Office Hours & Section supplemental content
 - Async Q&A regarding lectures and assignments
 - Take place on Microsoft Teams



Class Overview – FAQ

What assistance is available for students unfamiliar with the technology stack ..

- Should I use GitHub for my source code?
 - YES, and keep it private
 - You can share it with your Instructor / TA if/when needed for assistance
 - Assignment submission only happens through Canvas not GitHub
- Microsoft Teams Assignment Channel
 - Post your question in the assignment channel
 - **Don't include assignment source code**
 - Do include context
 - Challenge you are facing
 - Error messages
 - What you have tried so far
 - Other students and TAs can help you
- **Don't use email**



Class Overview – FAQ

What assistance is available for students unfamiliar with the technology stack ..

- **Limited availability** for TA 1:1 sessions
 - Request to your grading TA or Jonathan Franck
 - To schedule a time that works for you both
 - TAs Need 2-3 days notice
 - ½ Hour sessions
 - **First come first serve**
 - Always post your question
 - In Teams Assignment channel first
 - **TA's schedule may be full**
 - Alternatives
 - Microsoft Teams async Q&A
 - Section
 - Instructor office hours



Class Overview – FAQ

- How long before my assignment is graded
 - **Typically, 2 weeks from date it was turned in**
- Make sure your service is working **in Azure**
 - TAs will try to restart it, **once**
 - If they can't get it working, they will reach out
 - **Respond in 24 hours or less**
 - **If they don't hear from you, they will grade as is, working or not**
- How do I get my assignment's grade?
 - Check canvas grading,
 - Reach out to grading TA via Microsoft Teams
 - To check on progress if not gradated within 2 weeks



Class Overview – FAQ

OS/Software	Can it be used ?	Support Available ?
macOS	✓ Yes	✓ Yes
Linux	✓ Yes	✗ No
Windows 11, 10	✓ Yes	✓ Yes
Windows 7, 8, 8.1	✗ No	✗ No
Visual Studio for Mac	✗ No	✗ No
Visual Studio Code	✓ Yes, <i>Required for Bicep</i>	✓ Yes
Visual Studio 2022	✗ No	✗ No
Visual Studio 2026	✓ Yes	✓ No
JetBrains Rider	✓ Yes	✗ No



Class Overview – FAQ

- Mac Tip
 - To run Windows on a Mac
 - Use: Parallels or VMWare Fusion or Bootcamp
 - We recommend Parallels if using a Mac
 - Academic version available for \$39.95
 - <http://www.onthehub.com/parallels/>
 - JetBrains Rider License
 - They offer a free license
 - See [Free Educational Licenses](#)



Class Overview – FAQ

- Do I need an Azure account
 - Yes – See welcome letter for instructions
 - I already have an Azure account can I use it?
 - No
 - We need to have full admin rights to your account
- Can I add to my existing Azure account
 - No, Use a new Microsoft account
 - Don't use any special characters in email address
 - [A-Za-z0-9] Keep email address small and simple
 - See: <https://account.microsoft.com/account>
 - Use a Private / Incognito tab to do so



Class Overview – FAQ

- Will I be charged for my Azure account?
 - When using academic subscription
 - **No**
 - What happens when I exceed my limit
 - You will be **unable** to access paid resources
 - **We won't be able to grade your assignment**
 - **Use free resources as instructed**
 - If I want to pay how much will it cost me?
 - Depends on usage
 - Billed monthly



Class Overview – FAQ

- Can I use the Azure simulator?
 - **Sometimes**
 - For available services during your development
 - Not all Azure services have simulations
 - **Must deploy finished solution to Azure cloud**
 - Grading is against your Azure cloud deployment
 - **Recommendation**
 - Use Azure Cloud and remote debugging



Class Overview

