Leap Program Curriculum – Apprenti

# Summary

This page details the proposed LEAP program curriculum for Apprenti cohorts. The training consists of lectures, hands-on exercises, and collaborative labs.

* All content used for this program can be found on the LEAP Community SharePoint at [https://microsoft.sharepoint.com/teams/LEAPCommunity](https://microsoft.sharepoint.com/teams/LEAPCommunity/)
* All content used for the pre-work can be found on OneDrive at <https://1drv.ms/f/s!AtDiTjHAmps1kAVVCr0-YIQIVA10>

## Lectures and Exercises

* The lectures are meant to be “hands-on” and will be interrupted with small sample exercises, which students will complete on their own.
* The exercises will then be solved by the instructor in front of the class. This helps ensure the students can immediately explore new topics and gain understanding before moving on.
* **All lecture materials and exercises will be in C#, unless otherwise specified. Furthermore, all lectures are meant for both engineers and PM’s unless otherwise specified.**

Labs

* The labs will be completed in teams, with the team size depending on the lab.
  + Nobody works by themselves at Microsoft, being able to collaborate is a big part of your job
* Each lab will take a week to complete.
  + This allows teams to practice common agile/scrum processes (sprint planning, task breakdown, estimates, sprint execution, daily standups, sprint retrospective)
* Some of the labs are heavily scaffolded ahead of time.
  + This is intentional, since it's rare to work on a product from scratch.
  + Students will be exposed to existing code and learn to modify that codebase without understanding the entire thing.
* The final lab is meant to be worked on by the entire class, with smaller "feature teams" as appropriate. This more accurately mimics working on a real product.
* **All labs are meant for both engineers and PM’s.**

# Hours

Most days will have the following hours:

* 10:00 AM – Lecture / Exercises (55 min)
* 10:55 AM – Bathroom break (10 min)
* 11:05 AM – Lecture / Exercises (55 min)
* 12:00 PM – Lunch break (1 hour)
* 1:00 PM – Lecture / Exercises (55 min)
* 1:55 PM – Bathroom break (10 min)
* 2:05 PM – Lecture / Exercises (55 min)
* 2:55 PM – Bathroom break (10 min)
* 3:05 PM – Lab (3 hours)
* 6:00 PM – End of day

The first week is an exception, since many people do not get their credentials immediately, which means they can’t access internal company resources (SharePoint, VSTS, etc…). Instead of a week-long lab, the first lab is all day on Friday of the first week.

# Prerequisites

## Downloads

* Get **Visual Studio 2017 Enterprise** from <https://www.visualstudio.com/downloads/>.
* You get a 90-day trial for free, which you’ll be able to extend indefinitely with your Microsoft credentials once you get them.
* Get **SQL Server Management Studio** from <https://docs.microsoft.com/en-us/sql/ssms/download-sql-server-management-studio-ssms>

## Pre-work

You won’t be able to access training materials on SharePoint until you get your Microsoft credentials. Therefore, all pre-work lectures and exercises can be found at <https://1drv.ms/f/s!AtDiTjHAmps1kAVVCr0-YIQIVA10>

Students should familiarize themselves with the following topics on their own before starting the program:

### C#

* Console application “Hello World”, program structure, .NET framework, comments, statements, variables, constants, types, implicit types, expressions, operators, casting and conversion, strings, string operations, enums, structs, console I/O, command-line arguments
* Previous training materials for these topics are at <https://microsoft.sharepoint.com/:f:/r/teams/LEAPCommunity/_layouts/15/guestaccess.aspx?share=ElNmiQZwui1JswEM3htoCg4BdHuL-a4DSvdJ_DXLsstEsQ>
* Logical expressions, logical operators, branching, loops, arrays, multi-dimensional arrays, functions, optional parameters, output parameters, value types vs reference types, reference parameters, variable scope
* Previous training materials for these topics are at <https://microsoft.sharepoint.com/:f:/r/teams/LEAPCommunity/_layouts/15/guestaccess.aspx?share=Em8YLfgWRKxMnrvlZp4xrYMBKLujrrUHtgiVJ0adQV3wmQ>
* Training videos:
  + <https://mva.microsoft.com/en-US/training-courses/c-fundamentals-for-absolute-beginners-16169>
  + <https://mva.microsoft.com/en-US/training-courses/programming-in-c-jump-start-14254>

### Introduction to Visual Studio

* Previous training materials are at <https://microsoft.sharepoint.com/:f:/t/LEAPCommunity/EkNF6qx0pwhFnliRehgQt30BzoYG4zbn5PXjLaUiLIravA>
* Training videos:
  + <https://mva.microsoft.com/en-US/training-courses/getting-started-with-visual-studio-2017-17798>

### C++ (wait to see if your team requires it)

* Training videos:
  + <https://mva.microsoft.com/en-US/training-courses/c-a-general-purpose-language-and-library-jump-start-8251?l=fVmOhQKy_5104984382>

### Git

* Training videos:
  + <https://channel9.msdn.com//Shows/Visual-Studio-Toolbox/Git-Fundamentals/>

### Communication tools

* Outlook
  + <https://support.office.com/en-us/article/Outlook-training-8a5b816d-9052-4190-a5eb-494512343cca>
* Skype for Business
  + <https://support.office.com/en-us/article/Video-What-is-Skype-for-Business-3a21eca4-434d-41f1-ab06-3d4a268573b7?ui=en-US&rs=en-US&ad=US>
* Microsoft Teams
  + <https://support.office.com/en-us/article/Microsoft-Teams-Quick-Start-422bf3aa-9ae8-46f1-83a2-e65720e1a34d#ID0EAABAAA=Overview>

# Curriculum

## **Week 1 – Tools and processes**

### Monday – Lecture – Job responsibilities, teamwork, and Microsoft tools

* Job responsibilities, working as a team, Microsoft tools, how Microsoft measures impact, growth mindset, training resources
* <https://microsoft.sharepoint.com/:f:/t/LEAPCommunity/EjWg985-fXlJnLXdUfxoj7oB_3FWiRNnHJO5pMsZmJzyIg>

### Tuesday – Lecture – Version control using Git and Visual Studio

* Exercises: Cloning a repo, creating a local branch, creating a tracked branch, switching branches, committing local changes, syncing changes between a local and remote branch, creating a pull request between remote branches, performing a code review, merging branches, handling merge conflicts (local and remote)
* <https://microsoft.sharepoint.com/:f:/t/LEAPCommunity/Er3rIRVfUBZDoy-fKFOJ8kEBZhKCr5cmMcN1jwy7O4u0bw>

### Wednesday – Lecture – Agile and task management using VSTS

* Exercises: Browsing to the web portal, connecting to VSTS through Visual Studio, work items, backlogs, writing and running queries, creating links to other work items, browsing code, cloning Git repos, creating pull requests
* <https://microsoft.sharepoint.com/:f:/t/LEAPCommunity/EhfTAH8SbaNKlWRWwoWosFkB1348WdO53e4NXztFfOh-wQ>

### Thursday – Lecture – Build and release management using VSTS

* Exercises: creating build definitions, triggering builds manually, triggering builds on commit, create release definitions, triggering releases manually, triggering releases on build completion, deploying to environments manually, deploying to environments on release creation
* <https://microsoft.sharepoint.com/:f:/t/LEAPCommunity/Elg2aaQ7QoRGrGZWk8CN8-4BFy_FHlTv42kXapQuYwtVtg>

### Friday – Lab – Mock sprint

* Students will form teams and will create a large (arbitrary) user story. Each team will be responsible for sprint planning (task breakdown and prioritization, time estimates, etc…), sprint execution (no real work since this is a mock sprint), interacting with VSTS, interacting with git, creating pull requests, resolving merge conflicts, performing code reviews, creating automated builds/releases, and performing sprint retrospectives.
* <https://microsoft.sharepoint.com/:w:/t/LEAPCommunity/ERd8HfTjGyVLgvdmY7odCwgBbZt33p6jUgbMesr-HkN01g?e=zHg3Oz>

## **Week 2 – Exception handling, basic unit testing, OOP, data structures, LINQ**

### Weekly Lab – Connect 4

* <https://microsoft.sharepoint.com/:w:/t/LEAPCommunity/ET6eGhT2EFZNuBHUpZ-DGE4B_ieZGphXAimhv0FKN0xJyw>

### Monday – Lecture – Exception handling, basic unit testing

* Exercises: try/catch block, throwing exceptions, rethrowing exceptions, finally block
* <https://microsoft.sharepoint.com/:f:/t/LEAPCommunity/EsseifRq9gRDnClENQfa07YBK2SYmdmONeC79SRkBdpBdw>
* Exercises: Creating a unit test project, writing unit tests, running/debugging unit tests, viewing test results, testing exceptions, code paths, code coverage analysis
* <https://microsoft.sharepoint.com/:f:/t/LEAPCommunity/EngIw9f9enJOpi-VwJywctYBSlclf1HNHXMzolhexANq5Q?e=mxEZkh>

### Tuesday – Lecture – Classes, object-oriented design

* Exercises: defining and instantiating classes, constructors, static vs instance, encapsulation and access modifiers, getters/setters, properties and auto-properties, object-oriented design
* <https://microsoft.sharepoint.com/:f:/t/LEAPCommunity/Ehum5r77SLtHqgOuA5mYUeoBjckuYYaJM-EI97bUHAhYZQ>

### Wednesday – Lecture – Inheritance and Polymorphism

* Exercises: Inheritance, Polymorphism
* <https://microsoft.sharepoint.com/:f:/t/LEAPCommunity/Ev2RFrgrFOdGqyEhKZLw2_UB3XhdqZuP6MGA1j-0UsGL1g>

### Thursday – Lecture – Abstraction and Interfaces

* Exercises: Abstraction, interfaces
* <https://microsoft.sharepoint.com/:f:/t/LEAPCommunity/Er6-bAqIih1KilQiMpCHrMMBJk00wQ4LdQ0ytGlUDj-2eg>

### Friday – Lectures – Data structures in C#, introduction to Linq

* Exercises: Lists, Dictionaries, Stacks, Queues, Trees, Graphs
* <https://microsoft.sharepoint.com/:f:/t/LEAPCommunity/EgcaMY0WdiJJp2fFPLTFwfYB0u7d37JQbUVT80gbagwo5w>
* Exercises: Querying collections, chaining queries
* <https://microsoft.sharepoint.com/:f:/t/LEAPCommunity/Em-ABOUpLMxOk_X3wfbfVGYBAGFI_6QO8kBBYBb33kjGlA>

## **Week 3 – Writing good code, advanced unit testing, services**

### Weekly Lab – Blackjack

* <https://microsoft.sharepoint.com/:w:/t/LEAPCommunity/ESnsHlbBWZxMj6UCO7z8DsoB5K7xpCnan_qnF5Q9L1qKuQ?e=d5b9d2a23ac9433b882662926d4ea1af>

### Monday – Lecture – Writing maintainable and testable code

* Exercises: Refactoring code to be more maintainable and testable
* <https://microsoft.sharepoint.com/:f:/t/LEAPCommunity/Ep29HvEeIzpHrLPFT99eu6IBeAXuRX5c4MuF72KGWMD6Zg>

### Tuesday – Lecture – Advanced unit testing

* Exercises: deploying items, using mock classes, using the Moq framework, writing functional tests, testing “untestable code” using Microsoft Fakes
* <https://microsoft.sharepoint.com/:f:/t/LEAPCommunity/EngIw9f9enJOpi-VwJywctYBXLI5B_8_-xsR3lBXIgNERw>

### Wednesday – Lecture – Memory in managed and unmanaged code

* Exercises: Finalizers, implementing IDisposable
* <https://microsoft.sharepoint.com/:f:/t/LEAPCommunity/ElaoC567mBJAoX15OGFAxTcBgcI9sO3zsZelQgYPpPDPfw>

### Thursday – Lecture – Software as a Service (SaaS)

* Exercises: logging, profiling, telemetry
* <https://microsoft.sharepoint.com/:f:/t/LEAPCommunity/Eps-Z8t6ySdFpJFpvWvJPKIBWoXZbdceyDd49hn-YoF9fQ>

### Friday – TBD

* Maybe design patterns, maybe concurrency, maybe T-SQL