

Digital Technology & Programming Merit Badges

Updated: 2/15/2025

Important information about how to prepare for the merit badges

Parents, please review the content of a merit badge prior to registering your Scout; some badges may be challenging for younger Scouts. Also, the class discussions are more interesting if Scouts review *all* the requirements for the badge before the program. The chances of your scout completing all the work for the badge increases dramatically when they are properly motivated and the badge content is age-appropriate. Digital Technology and programming is complex and academic in nature and will be easier for Scouts older than 13 years of age to complete.

Scouts who are familiar with digital technology (usually much more than their parents,) should not have difficulty with this badge.

A note on programming: The Scout will not be required to program anything from scratch to earn this badge. We will provide the code, the Scout will be asked to copy and paste the code into a compiler (they may have to download the compiler if they don't already have it) and run the code. Then make a few simple changes, and run it again. The idea is to expose the Scout to programming, not make them a programmer. We have a lot of resources for the Scout to use when accomplishing this! If the Scout is really interested in the topic, they will succeed with a little bit of effort.

Merit badges are not designed to be completed in a day and require independent work on the part of the Scout outside of the workshop.

It is the Scout's responsibility to answer the requirements. NOT THE PARENT
A Scout may use a parent's email account to submit requirement answers BUT:

It is NOT the parent's responsibility to scan in your work and send it to me

That is the Scout's responsibility

Parents are not to act as an agent of the Scout. All assignments must be completed by the Scout and if there are issues, the Scout must communicate those to me.

Before attending, please make sure your Scoutmaster knows the Scout is taking this virtual merit badge class and indicates the Initial Unit Leader Signature in the merit badge in Scoutbook. [Click on the Scout in Scoutbook, click on their advancement, the merit badge and Initial Unit Leader Signature, enter a date.] (The Scoutmaster may alternately sign the front of a blue card for the badge. Blue cards are available here: <https://support.grandcanyonbsa.org/wp-content/uploads/2022/11/mb-app-blue-card-fillable.pdf> send the signed card to: bill.nelson@scouting.org)

IMPORTANT: For full credit for the badge, the Scout must attend the first 3 classes and individually pass a quiz after each class, evidence of the prerequisites, as explained below, must be sent to: bill.nelson@scouting.org

The merit badge classes will be held in three sessions about 2-3 hours long each. We will go over many of the requirements in the classes and give the Scouts a lot of assistance on getting the requirements completed.

Though not required, Scout workbooks are very useful and we prefer that Scouts use the workbook during the program. A workbook for Digital Technology can be found at: <http://usscouts.org/usscouts/mb/mb154.asp> (you don't need one for Programming)

About blue cards: We will utilize Scoutbook.com and record requirement completion online. Blue cards can be printed by parents and unit leaders in Scoutbook by clicking on the Scout, the Scout's advancement, the merit badge, and print blue cards.

Prerequisites

- TYPE OR WRITE LEGIBLY AND WHERE NOT ASKED FOR A LIST, IN COMPLETE SENTENCES.
- PUT YOUR NAME IN EMAILS TO ME AND IN ALL ATTACHMENTS
- READ THE REQUIREMENTS CAREFULLY, YOU MUST ANSWER THE REQUIREMENTS AND PROVIDE WHAT IS BEING ASKED FOR.
- COPY A PARENT OR GUARDIAN ON ALL CORRESPONDENCE

PREREQUISITES

Digital Technologies: Requirements: 1, 2b, 4b, 5b, 6, 9a

Programming: Requirement: 5

You need to do the prerequisites on your own. We will cover the other requirements in class and provide a lot of the information you need to complete them successfully. You need to send the prerequisites to: bill.nelson@scouting.org (ALWAYS COPY A PARENT OR GUARDIAN)

The Scouts don't have to hand in the material for the requirements covered in class. We will instead have a quiz at the end of the class that the Scout will need to pass for credit.

Prerequisites

DT 1, P 1a View the Personal Safety Awareness “Digital Safety” video (with your parent or guardian’s permission). [Follow this link to the Personal Safety Awareness videos.](#)

Send me a screen image of the final page of the video. The one that shows the blue check mark and completed emblem.



(Note: Cyber Chip has been discontinued, so if you see any references to cyber chip, you can ignore them.)

DT 2b: Describe what kinds of computers or devices you imagine might be available when you are an adult. Send your answer to bill.nelson@scouting.org

DT 4b: Name four software programs or mobile apps you or your family use, and explain how each one helps you.

Send your answer to bill.nelson@scouting.org

DT 5b: Using an internet search engine (with your parent or guardian's permission), find ideas from at least three different websites about how to conduct a troop court of honor or campfire program. Present the ideas to your counselor, and explain how you used a search engine to find this information.

What I need from you:

1. Give me the links to the sites you visited
2. From each site give me a list of ideas you found
3. Explain how you used a search engine to find this information.

Send to: bill.nelson@scouting.org

DT 6. Do THREE of the following. For each project you complete, copy the files to a backup device and share the finished projects with your counselor.

- a. Using a spreadsheet or database program, develop a food budget for a patrol weekend campout OR create a troop roster that includes the name, rank, patrol, and telephone number of each Scout. Show your counselor

that you can sort the roster by each of the following categories: rank, patrol, and alphabetically by name.

- b. Using a word processor, write a draft letter to the parents of your troop's Scouts, inviting them to a troop event.
- c. Using a graphics program, design and draw a campsite plan for your troop OR create a flier for an upcoming troop event, incorporating text and some type of visual such as a photograph or an illustration.
- d. Using a presentation software program, develop a report about a topic approved by your counselor. For your presentation, create at least five slides, with each one incorporating text and some type of visual such as a photograph or an illustration.
- e. Using a digital device, take a picture of a troop activity. Send or transfer this image to a device where it can be shared with your counselor. Let me know what the troop activity was.
- f. Make a digital recording of your voice, transfer the file to a different device, and have your counselor play back the recording.
- g. Create a blog and use it as an online journal of your Scouting activities, including group discussions and meetings, campouts, and other events. Include at least five entries and two photographs or illustrations. Share your blog with your counselor. You need not post the blog to the Internet; however, if you choose to go live with your blog, you must first share it with your parent or guardians AND counselor AND get their approval.
- h. Create a web page for your troop, patrol, school, or place of worship. Include at least three articles and two photographs or illustrations. Include at least one link to a website of interest to your audience. You need not post the page to the internet; however, if you decide to do so, you must first share the web page with your parent or guardians AND counselor AND get their approval.

DT 9a, P 6: Careers. Find out about three career opportunities that require knowledge in programming. Pick one and find out the education, training, and experience required. Discuss this with your counselor and explain why this career might be of interest to you.

ref: <https://www.bls.gov/ooh/computer-and-information-technology/home.htm>

P 5. Projects.

There is a lot of information provided below. Don't get overwhelmed! We will go over it in class and it will become easy!

PROGRAMMING PROJECTS

A video on how to complete this requirement is here:

<https://youtu.be/nkCo01-2Yjg>

If you run out of ideas, ask Bing or another AI tool for help. That's right! I will let you use an AI tool to assist you in writing and modifying your first programming projects for requirement 5!!! AI is the future of programming. It is a tool, not all knowing, and it makes mistakes, but it helps you get started. Bing is available at:

<https://www.bing.com> A tutorial on using Bing to generate code is here:

https://youtu.be/06f1Ht1qMsl?si=-wQ1lrCH_b0ixYh5

For Programming requirement 5:

Here is the requirement:

5. With your counselor's guidance, select three different programming languages and development environments. For each sub-requirement below, do the following: Write or modify a program using the indicated programming language and development environment. The program must take input and produce output based on computations and decisions made on the input. Debug and demonstrate the program to your counselor. Explain how each program processes inputs, makes decisions based on those inputs, and provides outputs based on computations and decision making.

- (a) In the first language and environment, write or modify a program, debug and demonstrate, and explain as above.

With your counselor's approval, choose a sample program. Modify the code or add a function or subroutine to it. Debug and demonstrate the modified program to your counselor.

- (b) In the second language and environment, write or modify a program, debug and demonstrate, and explain as above.
- (c) In the third language and environment, write or modify a program, debug and demonstrate, and explain as above.

What I need:

For THREE(3) different programming languages, do the following:

1. Write or modify an existing program. (see link to samples in Information Document)

The program must take input and produce output based on computations and decisions made on the input.

2. Debug and demonstrate the program to your counselor.
Show me screen shots of the program and the program running (or a video)
3. Explain (in words) how each program processes inputs, makes decisions based on those inputs, and provides outputs based on computations and decision making.

Do these 3 steps 3 times, once for each programming language

A video on how to complete this requirement is here: <https://youtu.be/nkCo01-2Yjg>

SUGGESTED LANGUAGES FOR REQUIREMENT 5

REMEMBER: YOU ONLY NEED TO DO THREE (3) LANGUAGES

Suggested language: Visual Basic (VBasic)

In the Education Industry; Difficulty: 1 out of 5 Visual Basic.NET is a thoroughly modernized language that will likely become the premier development tool for creating a wide range of .NET applications. .NET is a fancy way of saying a lot of the work is already done for you.

Go here for an example you can use for this requirement:

<https://docs.google.com/document/d/1CYQrjLlwsPE6iEdg2BdkmsxH59DvIIAkYLu2eH5Pdc/edit?usp=sharing>

Help With Visual Basic

Visual Basic for Beginners video: <https://www.youtube.com/watch?v=HFwQdGn5DaU>

=====

Suggested language: Visual Basic for Applications (VBA)

Business, Education, Engineering Industries – Difficulty 1 out of 5

Visual Basic for Applications (VBA) is an event-driven programming language developed by Microsoft. It is built into most desktop Microsoft Office applications, including Excel, Word, PowerPoint, and Access. VBA enables users to automate repetitive tasks, create custom forms, graphs, and reports, and add new functionality to Office applications. VBA is effective and efficient when it comes to repetitive solutions to formatting or correction problems. It is a simple, but powerful programming language that can be used to extend Office applications.

Go here for an example you can use for this requirement:

https://docs.google.com/document/d/1wzQGLyG43oBrBGM3cp4uTE5l3Ft9Vh_ne1uVhJnZ-U0/edit?usp=sharing

Help with VBA

A VBA tutorial of getting code written from Excel is here:

<https://youtu.be/X6ZxqrXpbt0?si=Y9Y9T7kpbAGI8bmb>

=====

Suggested language: Java

in the Business, Animation, Education, Engineering, Entertainment, Social Media, Mobile Devices, Science or Security example category Difficulty 2 out of 5. Java is a general purpose programming language in wide use.

Go here for an example you can use for this requirement:

https://docs.google.com/document/d/1Ao-RyKcrJHT_OwyKVWoRzZd1m2s6GEw7ks47LJJkvGw/edit?usp=sharing

Learning more Java

- There are a number of tutorials at <http://docs.oracle.com/javase/tutorial/> And <http://www.roseindia.net/java/>
- This is a very good, short, beginner's tutorial: <https://youtu.be/RRubcjpTkks?si=9rviC5IP2MKYzjzR>
- Here is another Java Tutorial for beginners: <https://www.youtube.com/watch?v=elrMbAQSU34>
- This video shows how to program a simple Java-based dice-rolling program. It is relatively easy to program. Write the program and make simple modification to it for the requirement. <https://youtu.be/ucS3vwP9jnk?si=KksRKZIT6tViOW4d>

=====

Suggested language: Python

in the Animation, Business, Entertainment, Engineering, Mobile Devices, or Science industry category. Example Difficulty 1 out of 5. It can run on nearly every device, which makes it very useful. Microsoft is even embedding it in future versions of MS Office!

Go here for an example you can use for this requirement:

<https://docs.google.com/document/d/1M31530nVY3mWptbUPNyMARUsq9q9XYND3zRMUxEiM7E/edit?usp=sharing>

Learn More Python:

- Here is a Python tutorial: <https://youtu.be/b093aqAZiPU?si=kmwJaXUXRuTrneOU>
- See this video for more samples: <https://youtu.be/OXi4T58PwdM?si=4MCYQe8laKrR084q>
- www.python.org/doc — The official documentation site for Python along with links to other tutorial and sample sites.
- Learnpython.org — A step by step tutorial site. Starts with a “Hello World” program and extends into advanced language features.

=====

Suggested language: Javascript

in the Business, Entertainment, Internet/Social Media or Mobile Devices, industry category - Difficulty: 1 out of 5

Javascript is a programming language that is used to bring websites to life. You see it in action every time you visit a website that has any interaction. Learning Javascript is quick, easy and fun because you already have all the tools needed on your computer and you see the results instantly.

Follow the instructions on this page and create the program. Run it to see it work! Then modify it (they provide some suggested modifications.)

https://docs.google.com/document/d/1fnjVprxpPKHoUsvQhb_zhainjF4M51NNKYCqGU2B3xA/edit?usp=sharing

Learn More Javascript:

W3schools.com – A well organized tutorial with a lot of working examples and source code

=====

Suggested Language: C

C in the Animation, Business, Entertainment, Internet/Social Media or Mobile Devices, industry category – Example Difficulty: 2 out of 5

C is a general purpose programming language in wide use.

Follow the instructions on this page and create the program. Run it to see it work! Then modify it (they provide some suggested modifications.)

<https://docs.google.com/document/d/1iHJnz1fRIHc4Fjdu1drVxYD3CE8YhCkZZz9n7bf587k/edit?usp=sharing>

LEARN MORE

- <http://www.cprogramming.com/tutorial.html>
- <http://www.tutorialspoint.com/cprogramming/>

=====

Suggested Language: C++

C++ in the Animation, Business, Entertainment, Internet/Social Media or Mobile Devices, industry category – Example Difficulty: 2 out of 5

C++ is a general purpose programming language in wide use. Object-oriented languages such as C++ and Java leverage three principles called encapsulation, inheritance, and polymorphism to make programming more connected to concepts that people are familiar with.

Follow the instructions on this page and create the program. Run it to see it work! Then modify it (they provide some suggested modifications.)

https://docs.google.com/document/d/1TWvV2MDYbJqr9016jPTcZJSRCQMDUVT50PAGGujGe_0/edit?usp=sharing

LEARN MORE

There are some good C++ tutorials on the web.

<http://www.cplusplus.com/doc/tutorial/>

<http://www.learncpp.com/>

<http://www.cprogramming.com/tutorial/c++-tutorial.html>

=====

Suggested Language: Ruby

Ruby in the Business, Internet/Social Media or Mobile Devices, industry category – Example Difficulty: 1 out of 5

Ruby is a general purpose interpreted object oriented language popular for building websites (search Google for “Ruby on Rails”). It is similar to Python and Perl.

Follow the instructions on the page linked and create the program. Run it to see it work! Then modify it (they provide some suggested modifications.)

<https://docs.google.com/document/d/1cmWHFp1HSGL-E1Vjgrv9CjYCiZmnqlv1t0vmrdk9xs/edit?usp=sharing>

LEARN MORE

- [Programming Ruby](#) – an excellent on line book
- [Ruby in Twenty Minutes](#)

=====

Suggested Language: Perl

Ruby in the Business, Internet/Social Media or Mobile Devices, industry category –

Example Difficulty: 1 out of 5

Perl is a scripting language that is supported on all computing platforms (Windows, Unix, Linux, Mac, and mobile devices). It is called a scripting language because it executes immediately without the need for a compile step. This makes writing programs in Perl very fast, but the programmer has to keep track of the variables being used and make sure they are set before they are tested.

Follow the instructions on the page linked and create the program. Run it to see it work! Then modify it (they provide some suggested modifications.)

<https://docs.google.com/document/d/1uQTFvWwDmKG1aRqaXLNxxkw9ACrtcqMaUctFo4KNH4u0/edit?usp=sharing>

LEARN MORE

- learn.perl.org — This site has many examples and other tutorials.
- Perl-tutorial.org — This hub site has links to many other tutorials and examples.
- Cpan.org — Comprehensive Perl Archive Network. Contains many libraries of pre-written programs that can be downloaded and used in your projects. Animation, graphics, encryption, and network utilities are just a few of the kinds of resources available.

=====

Suggested Language: C Sharp (C#)

Animation, Business, Engineering, Entertainment, Internet/Social Media or Mobile Devices, industry category – Example Difficulty: 2 out of 5

C# (pronounced C-Sharp) is a general purpose object oriented programming language developed by Microsoft for the Windows platform. It uses the .NET platform, which is a fancy way of saying that a lot of the work has been done for you — you just write a program that takes advantage of all the code that has already been written.

Follow the instructions on the page linked and create the program. Run it to see it work! Then modify it (they provide some suggested modifications.)

<https://docs.google.com/document/d/1Cg3sTUXDMDtgk-8qfpqwG2R0SGBDjKfwjmTNJ1yn8ck/edit?usp=sharing>

LEARN MORE

- learn.perl.org — This site has many examples and other tutorials.
- Perl-tutorial.org — This hub site has links to many other tutorials and examples.

- [Cpan.org](#) — Comprehensive Perl Archive Network. Contains many libraries of pre-written programs that can be downloaded and used in your projects. Animation, graphics, encryption, and network utilities are just a few of the kinds of resources available.
-

Suggested Language: Swift

Business, Internet/Social Media industry category – Example Difficulty: 1 out of 5

Swift is a general-purpose, open-source programming language designed by Apple. It is mainly used for native iOS and macOS development. Some popular apps such as LinkedIn, Lyft, and WordPress are written in Swift. Swift is fast, safe, and easy to use, with a modern syntax accessible to beginners and experienced programmers. It is also designed for safety, eliminating entire classes of unsafe code. Swift code is safe by design and produces software that runs lightning-fast. Swift is also open source and has a package manager.

Follow the instructions on the page linked and create the program. Run it to see it work! Then modify it (they provide some suggested modifications.)

https://docs.google.com/document/d/1C5lt1Kr8pJrnRULryb0kog-f_xgH3xfqmPhMpi53wx4/edit?usp=sharing

LEARN MORE

1. **Swift Programming Tutorial for Beginners (Full Tutorial):** This video tutorial covers the basics of Swift programming, including how to install and use Xcode, create and run a playground, declare and use variables and constants, perform operations on variables and constants, use different data types, and print values to the console using the print keyword. [The tutorial is 3 hours and 22 minutes long and is available on YouTube ¹.](#)
2. **Swift Programming Tutorial | FULL COURSE | Absolute Beginner:** This video tutorial is a full course on Swift and iOS development for absolute beginners. It covers the basics of Swift programming, including variables and constants, data types, math operators, if statements, switch statements, for-in loops, while loops, functions, classes, subclassing, UIKit, initializers, optionals, properties, arrays, and dictionaries. [The tutorial is 10 hours and 32 minutes long and is available on YouTube ².](#)
3. **(2020) Swift Tutorial for Beginners: Lesson 1:** This video tutorial is a beginner-friendly tutorial that covers the basics of Swift programming, including how to download and install Xcode, create and use a playground, write Swift code to create variables, use the print command to output data to the console area, and assign new data to existing variables. [The tutorial is 21 minutes long and is available on YouTube ³.](#)

=====

Suggested Language: HTML (Hypertext Markup Language)

Business, Internet/Social Media industry category – Example Difficulty: 2 out of 5
HTML is an essential programming language for web developers and designers who work on the Internet. It helps both professionals and novices make simple web pages, create WordPress pages, optimize for SEO, and even write blogs regarding its uses. Knowledge of HTML is also necessary for those who want to learn other programming languages, as it makes the process of understanding them easier.

Follow the instructions on the page linked and create the program. Run it to see it work! Then modify it (they provide some suggested modifications.)

https://docs.google.com/document/d/1ZCpl1OmgiZ3v9lLjh7-ok_5E_8W1WzcYrluTdizzQU/edit?usp=sharing

LEARN MORE

- <https://youtu.be/MDLn5-zSQQL?si=9GEvGEvahMbl-hOA> — HTML for beginners.
- **W3Schools:** W3Schools provides a comprehensive HTML tutorial that covers all aspects of HTML, including HTML elements, attributes, events, color names, entities, character-sets, URL encoding, language codes, HTTP messages, browser support, and more. The tutorial is easy to follow and includes examples, exercises, and quizzes. [You can access the tutorial at ¹.](#)

=====

Suggested Language: PHP

Business, Internet/Social Media industry category – Example Difficulty: 1 out of 5
PHP is a language that is used on web servers to merge web page output with optional content or results from a database or user input. Web pages by themselves are static, but intelligence placed on the web server through programs (like PHP) allow a web page to change based on data it gets from the user or from other sources.

PHP is not a stand-alone language, it requires a web server like Apache or IIS to be running to send it the user input. However, you can compile and run it on the <https://www.onlinegdb.com/> compiler.

Follow the instructions on the page linked and create the program. Run it to see it work! Then modify it (they provide some suggested modifications.)

<https://docs.google.com/document/d/1H4wdubhKOEArB0rAqy0FBgEfrCY8xLPkke4JLjZBhc/edit?usp=sharing>

LEARN MORE

- <http://www.php.net/manual/en/> — The official documentation site for PHP.
- <http://www.w3schools.com/php/> — A step-by-step tutorial site that contains lots of useful sample code.
- [Google.com](#) — Search for other code and samples.

=====

Or use other languages of your choosing. You can find example languages here:

<https://scoutlife.org/merit-badges/programming-merit-badge/>