PROGRAMMING

BOY SCOUTS OF AMERICA®

STEM-Based

PROGRAMMING

"Enhancing our youths' competitive edge through merit badges"

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Requirements

1. Safety. Do the following:

   a. Show your counselor your current, up-to-date Cyber Chip.

   b. Discuss first aid and prevention for potential injuries, such as eyestrain and repetitive stress injuries, that could occur during programming activities.

Earn the Cyber Chip

Earning the Cyber Chip can help you learn how to stay safe while you are online and using social networks or the latest electronic gadgets. Topics include cell phone use, texting, blogging, gaming, cyberbullying, and identity theft. Find out more about the Cyber Chip at www.scouting.org/cyberchip.

2. History. Do the following:

   a. Discuss with your counselor the history of programming and programming languages, and discuss how programming languages have evolved over time to become easier to use while adding additional capabilities.

   b. Discuss with your counselor the history of programming and the evolution of programming languages.

3. General knowledge. Do the following:

   a. Create a list of 10 popular programming languages in use today and describe which industry or industries they are primarily used in and why.

   b. Describe three different programmed devices you rely on every day.

4. Intellectual property. Do the following:

   a. Explain the four types of intellectual property used to protect computer programs.

   b. Describe the difference between licensing and owning software.

    c.   Describe the differences between freeware, open source, and commercial software, and why it is important to respect the terms of use of each.

5. Projects. Do the following:

    a.   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.

> The Programming merit badge website, http://www. boyslife.org/programming, has a number of sample programs that you could use for requirement 5a. However, you have the option of finding a program on your own. It's a good idea to seek your merit badge counselor's guidance.

    b.   With your counselor's approval, choose a second programming language and development environment, different from those used for requirement 5a and in a different industry from 5a. Then write, debug, and demonstrate a functioning program to your counselor, using that language and environment.

    c.   With your counselor's approval, choose a third programming language and development environment, different from those used for requirements 5a and 5b and in a different industry from 5a or 5b. Then write, debug, and demonstrate a functioning program to your counselor, using that language and environment.

    d.   Explain how the programs you wrote for requirements 5a, 5b, and 5c process inputs, how they make decisions based on those inputs, and how they provide outputs based on the decision making.

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.

Programming Resources

Scouting Literature

Animation, Communication, Digital Technology, Electronics, Game Design, and *Robotics* merit badge pamphlets

Visit the Boy Scouts of America's official retail website (with your parent's permission) at http://www.scoutstuff.org for a complete listing of all merit badge pamphlets and other helpful Scouting materials and supplies.

Books

Foxall, James. *Sams Teach Yourself Visual Basic 2012 in 24 Hours.* Sams Publishing, 2012.

Henney, Kevlin. 97 *Things Every Programmer Should Know: Collective Wisdom From the Experts.* O'Reilly Media, 2010.

Horstmann, Cay S. *C++ for Everyone,* 2nd ed. Wiley, 2010.

Newsome, Bryan. *Beginning Visual Basic 2012*. Wrox, 2012.

Sharp, John. *Microsoft Visual C# 2012.* Microsoft Press, 2013.

Watson, Karli, Jacob Vibe Hammer, Jon Reid, Morgan Skinner, et al. *Beginning Visual C# 2012 Programming.* Wrox, 2012.

Organizations and Websites

Android
Tutorials for Android app building
website: http://developer.android.com/training/index.html

Code.org
Free tutorials and introductions to programming
website: http://www.code.org

HowToStartProgramming.com
Beginner information about programming for Visual Basic and PHP
website: http://howtostartprogramming.com

The best place to start your programming journey is with the companion website for this merit badge, www.boyslife.org/programming. There you will find many examples and free resources appropriate for Scouts. You will be up and running quickly and be able to find what you need to fulfill the Programming merit badge requirements.

InterConnecting Automation Inc.
Free access to Scouts (send them a note);
learn about PLCs (programmable
logic controllers)
website: http://www.interconnecting
    automation.com

Learn C++
Free tutorials and other resources on
how to program in C++
website: http://learncpp.com

Learnpython.org
Interactive Python tutorial
website: http://www.learnpython.org

Oracle Corporation
Java tutorials
website: http://docs.oracle.com/
    javase/tutorial

**Robotics Academy of
Summer Learning**
From the Carnegie Mellon Robotics
Academy, animation, robotics, web
design, game design, and more
website: http://www.cs2n.org

Scratch
Good, free examples of programs
website: http://scratch.mit.edu

U.S. Copyright Office
Copyright Office
website: www.copyright.gov

U.S. Patent and Trademark Office
website: http://www.uspto.gov

W3schools.com
Tutorials for all web design
programming tools
website: http://www.W3schools.com

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