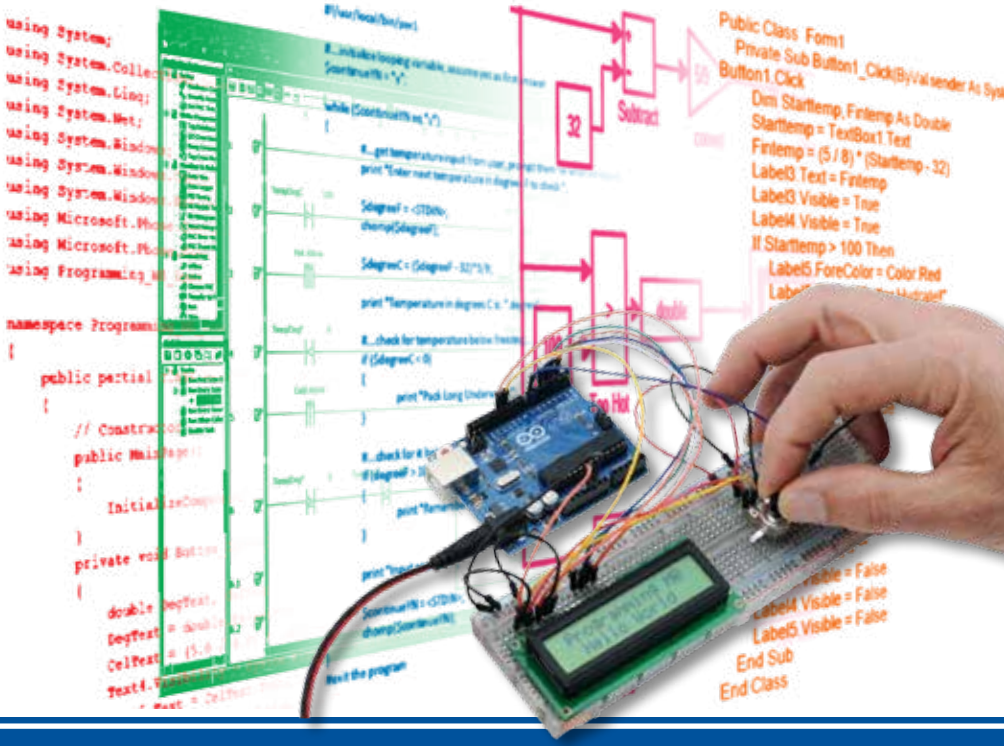
MERIT BADGE SERIES

PROGRAMMING



BOY SCOUTS OF AMERICA®

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MERIT BADGE SERIES

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 the types of injuries or illnesses that could occur during programming activities, including repetitive stress injuries and eyestrain.

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. Give a brief history of programming, including at least three milestones related to the advancement or development of programming.
   b. Describe the evolution of programming methods and how they have improved over time.
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 how software patents and copyrights protect a programmer.
   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. Then, as a minimum, modify the code or add a function or subprogram 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 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

Communication, Computers, Electronics, 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
Website: www.copyright.gov–Copyright Office

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

Acknowledgments

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Rick Folea—Eagle Scout; Programming merit badge lead; AutomationDirect.com; *Robotics* merit badge pamphlet co-author

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Laszlo Hideg, Ph.D., P.E.—Electrical engineering components, electric motor controls, Chrysler LLC; *Robotics* merit badge pamphlet co-author; *FIRST*® Robotics competition judge, volunteer, and mentor of Team 33, "The Killer Bees"

James Francisco, Ph.D.—Associate faculty, School of Advanced Studies, University of Phoenix, software quality engineering, software test automation