



Environmental Science Merit Badge at Lake Fairfax Park

Welcome to the Environmental Science Merit Badge Program at Lake Fairfax Park. The exact meeting location for the class is at the Lake Fairfax Park Main Office. Lake Fairfax Park is located at:

1400 Lake Fairfax Drive

Reston, VA 20190.

Scouts should be dressed appropriately for the weather. Part of our time will be spent outdoors, rain or shine, heat or cold. Be Prepared!

Important Merit Badge information for parents:

- Please be familiar with the requirements of the program your scout has selected. Some badges take considerable time and planning to complete. Some badges may not be appropriate for younger scouts.
- Blue cards must be signed by the troop leader before attending the merit badge program. Lake Fairfax Park does not have blue cards.
- This badge program is a single 5-hour class. Every badge requires some independent work by your scout. All requirements, including prework, the program, and postwork, must be completed before park staff can sign the merit badge card. Note: Not all badges will have postwork.
- Please be prepared for the possibility that you may have to stay for the program and not just drop off your scout. We encourage that one or more adults remain. There is no fee for adults, and you are sure to learn something. This will allow the instructor to concentrate more fully on the difficult task of imparting all the required information and assisting the boys individually if necessary. Additionally, adults may help keep the atmosphere calm and productive. It is also in keeping with the scouting guidelines for youth protection.
- **ARRIVE ON TIME – EARLY IS BETTER! PLAN TO ARRIVE 10 MINUTES EARLY. IF SCOUTS ARE LATE, THEY MAY NOT COMPLETE THE BADGE.**

What to bring to the program:

- Bring your completed homework. It is OK if you cannot complete the homework before class. You can bring the completed homework in at a later date for sign-off and will receive partial credit till the rest is completed.
- Come prepared to discuss and present your homework. As we move from one topic to the next during class scouts will be asked to present homework elements completed. It will be more important to prove that you have understood a requirement orally rather than just presenting written information.
- Bring 4 sandwich size Ziploc bags for packaging material experiment and a used grocery bag to carry them all.
- Bring a tent if you have one.
- Bring your blue card signed by your scout master. (Lake Fairfax Park does not have blue cards.)
- Bring/wear weather appropriate clothing/outerwear. We will not go outdoors in heavy rain or thunderstorms. Boy Scout uniform is not required.
- Bring a pencil and pen.
- Bring a clipboard for taking notes outside.
- Bring a snack and lunch and water bottle.

TO DO AT HOME as PREWORK prior to class:

- Read the Environmental Science Merit Badge booklet!!!

Below is the recommended homework to be completed before the program:

Please download the merit badge worksheets from meritbadge.org and bring these worksheets to class. These worksheets help scouts organize their homework and classwork. We will go over all the merit badge requirements during class, but it is helpful if the scout has reviewed the worksheet ahead of time.

Do Requirement 1.

1. Make a **timeline** of the history of environmental science in America. **Identify** the contribution made by the Boy Scouts of America to environmental science. Include dates, names of people or organizations, and important events.

Do Requirement 2.

2. **Define** the following terms: population, community, ecosystem, biosphere, symbiosis, niche, habitat, conservation, threatened species, endangered species, extinction, pollution prevention, brownfield, ozone, watershed, airshed, nonpoint source, hybrid vehicle, fuel cell.

Do Requirement 3b.

3b. Air Pollution (Choose 1 to do) (PLEASE READ CAREFULLY)

1. Perform an experiment to test for particulates that contribute to air pollution. Discuss your findings with your counselor.
2. Record the trips taken, mileage, and fuel consumption of a family car for seven days, and calculate how many miles per gallon the car gets. Determine whether any trips could have been combined ("chained") rather than taken out and back. Using the idea of trip chaining, determine how many miles and gallons of gas could have been saved in those seven days.
3. Explain what is acid rain. In your explanation, tell how it affects plants and the environment and the steps society can take to help reduce its effects.

Do Requirement 3c.

3c. Water Pollution (Choose 1 to do) (PLEASE READ CAREFULLY)

1. Conduct an experiment to show how living things react to thermal pollution. Discuss your observations with your counselor.
2. Conduct an experiment to identify the methods that could be used to mediate (reduce) the effects of an oil spill on waterfowl. Discuss your results with your counselor.
3. Describe the impact of a waterborne pollutant on an aquatic community. Write a 100-word report on how that pollutant affected aquatic life, what the effect was, and whether the effect is linked to biomagnification.

Do Requirement 3e.

3e. Endangered Species (Choose 1 to do) (PLEASE READ CAREFULLY)

1. Do research on one endangered species found in your state. Find out what its natural habitat is, why it is endangered, what is being done to preserve it, and how many individual organisms are left in the wild. Prepare a 100-word report about the organism, including a drawing. Present your report to your patrol or troop.
2. Do research on one species that was endangered or threatened but which has now recovered. Find out how the organism recovered, and what its new status is. Write a 100-word report on the species and discuss it with your counselor.
3. With your parent's and counselor's approval, work with a natural resource professional to identify two projects that have been approved to improve the habitat for a threatened or endangered species in your area. Visit the site of one of these projects and report on what you saw.

Do Requirement 3f.

3f. Pollution Prevention, Resource Recovery, and Conservation (Choose 1 to do) (PLEASE READ CAREFULLY)

1. Look around your home and determine 10 ways your family can help reduce pollution. Practice at least two of these methods for seven days and discuss with your counselor what you have learned.
2. Determine 10 ways to conserve resources or use resources more efficiently in your home, at school, or at camp. Practice at least two of these methods for five days and discuss with your counselor what you have learned.
3. Perform an experiment on packaging materials to find out which ones are biodegradable. Discuss your conclusion with your counselor.

Do Requirement 3h.

3h. Invasive Species (Choose 1 to do) (PLEASE READ CAREFULLY)

1. Learn to identify the major invasive plant species in your community or camp and explain to your counselor what can be done to either eradicate or control their spread.
2. Do research on two invasive plant or animal species in your community or camp. Find out where the species originated, how they were transported to the United States, their life history, how they are spread, and the recommended means to eradicate or control their spread. Report your research orally or in writing to your counselor.
3. Take part in a project of at least one hour to eradicate or control the spread of an invasive plant species in your community or camp.

Do Requirement 4.

4. Choose two outdoor study areas that are very different from one another (e.g., hilltop vs. bottom of a hill; field vs. forest; swamp vs. dry land). For BOTH study areas, do ONE of the following:

(a) Mark off a plot of 4 square yards in each study area, and count the number of species found there. Estimate how much space is occupied by each plant species and the type and number of nonplant species you find. Report to your counselor orally or in writing the biodiversity and population density of these study areas.

(b) Make at least three visits to each of the two study areas (for a total of six visits), staying for at least 20 minutes each time, to observe the living and nonliving parts of the ecosystem. Space each visit far enough apart that there are readily apparent differences in the observations. Keep a journal that includes the differences you observe. Discuss your observations with your counselor.

Do Requirement 5.

5. Using the construction project provided or a plan you create on your own, **identify** the items that would need to be included in an environmental impact statement for the project planned. **(SEE HANDOUT BELOW TO HELP YOU EVALUATE YOUR PROJECT)** It should be a pretend construction project, like a building, home, highway or bridge. THIS IS A REQUIREMENT THAT REQUIRES SOME THOUGHT ABOUT HOW PROJECTS ARE EVALUATED.

Do Requirement 6.

6. Find out about three career opportunities in environmental science. Pick one and find out the education, training, and experience required for this profession. Discuss this with your counselor and explain why this profession might interest you.

Requirements to be demonstrated, practiced and assessed during the class:

We will be reviewing recommended homework to ensure a thorough understanding and will also be covering the following requirements during the class:

Requirement 3.

3a. Ecology

(3) Discuss what is an ecosystem. Tell how it is maintained in nature and how it survives.

3d. Land Pollution

(2) Perform an experiment to determine the effect of an oil spill on land. Discuss your conclusions with your counselor.

ENVIRONMENTAL SCIENCE MERIT BADGE

Environmental Impact Assessment

(For Requirement 5)

What would a civil engineer/project manager have to consider about whether or not to build a project? Fill out this form for a real or made-up project to get an idea. Here are some project suggestions to evaluate: a bike path through the woods to your school or neighborhood pool, or a bridge across your local creek, or a new bridge across the Potomac River or build a new building. Or anything else that interests you. This is a BUILDING PROJECT, NOT A PROJECT TO HELP THE ENVIRONMENT. You are weighing the good/bad things about the project and whether or not to build.

Project Description:

Describe the project, include type of project and why it is needed

Site Description:

Generally describe the site: Is it forested? A field? A wetland?

Fitting Into the Community:

How does the project fit into the community?

Impacts:

How will the project likely affect the environment? e.g., erosion, disturbance to ecosystems, disturbance to habitats, Are there any negative effects that cannot be avoided? What changes are permanent?

Alternatives: (Remember, no build is always one alternative)

Are there other alternative projects or sites that if used instead would preserve the environment?

Cost/Benefits:

Consider the short- and long-term benefits vs the short and long term costs to the environment.

Additional Studies;

What information is missing or what additional studies need to be done? (like an archeological study looking for colonial or Native American evidence)

Recommendations:

Should the project either go ahead or be stopped or redesigned. Why?

Work completed after the program:

Once the prework and class work are completed, all elements of the merit badge will be complete. If your scout needs blue card sign-off after the class date, please call (703) 246-5931 to arrange a time to meet with a merit badge counselor. Digital photographs of your scout doing the element and a picture of the completed requirement will be sufficient evidence, unless otherwise stated.

We're looking forward to working with your scout!

Lake Fairfax Park

(703) 246-5931

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<https://www.fairfaxcounty.gov/parks/lake-fairfax/scouts>