ENVIRONMENTAL SCIENCE MERIT BADGE

REQUIREMENTS WITH SUGGESTED STUDY PREPARATION NOTES

Note: This merit badge requires a lot of explanation and discussion in order to complete most requirements. This class is structured to offer explanation and discussion time for Scouts in a small group setting to offer both learning and earning opportunity. Scouts MUST come to the class with preparation work in order to successfully complete these requirements. It will be virtually impossible for Scouts who do not have preparation work done to successfully partake in the group discussions or provide acceptable explanation if they do not have prior knowledge of the requirements and answers prior to the class.

I have marked the requirements we will be covering in BOLD and with an asterisk (*), and details below. Items in ITALICIZED RED are details for the participant to do.

***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.**

This requirement will be covered in class through group discussion facilitated by the counselor.

Scouts should review the merit badge pamphlet prior to the class and make any notes that might aid them when asked to describe their findings. Active participation will be much easier if Scouts have notes to support their preparation for this requirement.

***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.**

Scouts should utilize a Merit Badge Workbook or other means of documenting their preparation.

It is highly recommended Scouts come to the class with these terms already defined so that they spend their time sharing and completing this requirement in a timely manner during the class instead of trying to write their answers out during the class. All definitions can easily be found in the Merit Badge Pamphlet or online.

***3. Do ONE activity from each of the seven following categories (using the activities in the merit badge pamphlet as the basis for planning and projects):**

Some of these will be covered in the class. Scouts must complete preparation work and bring their work to class in order to be considered for completion. Make sure you are prepared.

Scouts should to come to class prepared to share, discuss, explain, or demonstrate as noted in the requirement component areas.

REMEMBER - This is an Eagle-required merit badge and completion of these requirements is not solely reliant on being spoon-fed the information. Only Scouts who have prepared and put effort into this merit badge and its preparation will be signed off on the respective requirements and components

A. ECOLOGY

1. Conduct an experiment to find out how living things respond to changes in their environments. Discuss your observations with your counselor.

2. Conduct an experiment illustrating the greenhouse effect. Keep a journal of your data and observations. Discuss your conclusions with your counselor.

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

B. AIR POLLUTION

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.**

c. WATER POLLUTION

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.** ***Submit your 100 word report through the link on the website. Be certain to include scout name, course start date, Counselor, merit badge name, and the requirement number with your submission.

d. LAND POLLUTION

1. Conduct an experiment to illustrate soil erosion by water. Take photographs or make a drawing of the soil before and after your experiment, and make a poster showing your results. Present your poster to your counselor.

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

3. Photograph an area affected by erosion. Share your photographs with your counselor and discuss why the area has eroded and what might be done to help alleviate the erosion.** ***Submit photos through the website. Be certain to include scout name, course start date, Counselor, merit badge name, and the requirement number with your submission.

e. ENDANGERED SPECIES ***DO EITHER E1 OR E2 AT HOME AND SUBMIT YOUR 100 WORD REPORT Be certain to include scout name, course start date, Counselor, merit badge name, and the requirement number with your submission.***

***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 that 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.

f. POLLUTION PREVENTION, RESOURCE RECOVERY, and CONSERVATION

BEGIN F1 OR F2 AT HOME NO LATER THAN Saturday, 3/28/2020 TO BE COMPLETED BY END OF COURSE (FRIDAY, APRIL 3)

***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 seven 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.

g. POLLINATION

***1. Using photographs or illustrations, point out the differences between a drone and a worker bee. Discuss the stages of bee development (eggs, larvae, pupae). Explain the pollination process, and what propolis is and how it is used by honey bees. Tell how bees make honey and beeswax, and how both are harvested. Explain the part played in the life of the hive by the queen, the drones, and the workers.**

2. Present to your counselor a one-page report on how and why honey bees are used in pollinating food crops. In your report, discuss the problems faced by the bee population today, and the impact to humanity if there were no pollinators. Share your report with your troop or patrol or counselor.

3. Hive a swarm OR divide at least one colony of honey bees. Explain how a hive is constructed.

Before you choose requirement 3G(3), you will need to first find out whether you are allergic to bee stings. For help with locating a beekeeper in your state, visit www.beeculture.com and click on "Bee Resources," then "Find a Local Beekeeper."

h. INVASIVE SPECIES

RESEARCH AND COME PREPARED TO DISCUSS THE INVASIVE SPECIES IN YOUR AREA (PICS IF POSSIBLE)

***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.

***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.**

The counselor has recommended that Scouts attending the class consider doing 4B. Bring your work to class for discussion and sharing. You will not be able to complete this requirement without proof of work. We will discuss this on Thursday, giving you plenty of time to complete it before then. Submit a photo of the two study areas along with your journal notes for review. Be certain to include scout name, course start date, Counselor, merit badge name, and the requirement number with your submission.

***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.**

This Requirement will be covered in the class, however Scouts should review their Merit Badge Pamphlet prior to the class to familiarize themselves with the requirement and what completion will entail. Only Scout who are attentive, prepared, and actively participate in the class will have the opportunity of completing this requirement.

***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.**

Scouts should review this requirement and its components and be prepared to discuss. Each Scout will be asked to share their choice of career opportunities along with the education, training, and experience required for their choice.