

# Nuclear Science Merit Badge



## Expectations, Criteria & Timeline Handout

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Merit Badge Counselor:  
Robert Bryan  
Assistant District Commissioner  
Hilliard Area Troops  
West District Simon Kenton Council

[Wood Badge](#)   [Green Bar](#)   [Powder Horn](#)  
[Order of the Arrow](#)  
[Scouts BSA National Camping School](#)  
[NRA – Rifle & Range Safety Officer](#)

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bryansofhilliard@outlook.com

2022 Daniel  
Boone  
Council

Virtual Merit  
Badge Event

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# COVER LETTER

January 1, 2022

On behalf of the professional and volunteer staff of the Daniel Boone Council, I would like to express sincere thanks for your selecting the Nuclear Science Merit Badge as part of the Council's ongoing education and advancement support process. All merit badges provide Troop and Crew members a continuing path to learn potential future educational and vocational opportunities. Please remember it is not an expectation you be a "rocket scientist" to participate in this badge and no one expects you to be a physicist. Much of this badge entails your ability to grasp concepts and apply fundamental knowledge. Some items presented in the Nuclear Science Merit Badge Handbook may be entirely new to you, but you will need a basic understanding of them. It is critical you read the book cover-to-cover as soon as possible.

The Nuclear Science Merit Badge and its predecessor, the Atomic Energy Merit Badge have been available to Scouts since 1963. In its current state, the Nuclear Science Merit Badge does not require advanced math or chemistry courses. Even without those specific academic requirements, this merit badge is challenging to younger Scouts. It requires the ability to visualize concepts which have proven difficult for younger individuals to master. That is why the Council and I agreed to make this class available solely to older Scouts **age 15 and older.**

I have been offering this specific merit badge since 2008. Prior to my "Scouting Life" I served on board several nuclear submarines. I believe my life experience and training brings a unique perspective to this merit badge. Over the years I have observed the true importance of offering this course in a systematic process which builds layers of knowledge upon each other. Clarity and mutually understood guidelines are important, especially in the world of cyber-based learning. This package will inform you of my expectations as a Merit Badge Counselor, in class and homework assignments and the sequence we will use to go through the curriculum as a group and individually.



If you have questions regarding any information presented in this document, please do not hesitate to contact me at [bryansofhilliard@outlook.com](mailto:bryansofhilliard@outlook.com). Please note the Youth Protection Requirements outlined on Page 5 of this document when contacting me via email.

I look forward to seeing each of you at Session 1.

Yours in Scouting,

A handwritten signature in black ink that reads "Robert Bryan".

# MERIT BADGE COMPLETION TIMELINE

Date	Requirement(s)	Comment(s)
Session 1	1.a through 1.d, 2.a, 3.b	All conducted in class (Zoom) session
Session 2	4.c, 6.a, 7, 8	All conducted in class (Zoom) session
Session 3	2.b, 4.d, 5.c	2.b will be conducted in class (Zoom) session. 4.d and 5.c will be submitted via email no later than the deadline indicated later in this document.

## MERIT BADGE COUNSELOR EXPECTATIONS

### Scouts, BSA Literature

- All participants are expected to read the applicable Scouts, BSA merit badge handbook prior to the first session. Memorization is not required. The goal is to provide participants base knowledge they will need to participate and as a starting threshold.
- “Off the cuff” or ad hoc responses to questions will be interpreted as the Scout being unprepared for class and potentially jeopardize grading requirements as complete. This is a determination at the sole discretion of the Merit Badge Counselor.

### Attendance

- Overall, attendance and participation in all three virtual merit badge classes are critical factors to successful completion of the Nuclear Science Merit Badge. Information, both written and verbal will be distributed at each session. Participants can expect random selection as respondents to present their answers or interpretations to the entire class. That said, I also recognize life is filled with challenges and changes. I will consider waiver of attendance for one of the first two sessions provided I receive at least 24-hour advance notice. Such waivers will be at the sole discretion of the Merit Badge Counselor.

## Uniforms

- This is an event sponsored by the Daniel Boone Council and sanctioned by Scouts, BSA. Nuclear Science Merit Badge participants will be in a full Class “A” (Field Activity) Uniform for all group and individual Zoom calls (if needed).

## Use of Electronics

- All Nuclear Science Merit Badge participants will be on screen and viewable by all parties involved. The use of cameras mounted in or connected to laptop/desktop computers or tablets is optimal. Screen ratio and clarity associated with cellular phones has historically proven to be inadequate; especially when the participant is tasked with an on-screen presentation for Requirement 2.b.
- The use of cellular phones will be considered at sole discretion of the Merit Badge Counselor provided a request is received at least 24 hours in advance of the applicable Zoom session.

## Courtesy and Respect

- Several aspects of the Scout Law directly address courtesy and respect. All Nuclear Science Merit Badge participants are expected to apply all 12 Points of the Scout Law. Participants must remember other attendees have varying levels of education, experience, and development. Disparaging, disrespectful, and abusive comments or actions directed at or about any participant will result in immediate removal from the Zoom call.

## Group and Individual Communication (Youth Protection Requirements)

- **ZOOM CALLS** - Maintaining the safety and privacy of all participants is paramount. Scouts, BSA Youth Protection Requirements will be utilized in group and individual settings. The Merit Badge Counselor will provide 2-Deep Leadership for group Zoom calls. The Merit Badge Counselor will require the participant to ensure their parent or other adult over the age of twenty-one is present for individual Zoom calls. Failure to obtain and ensure the continued presence of a participant’s adult attendee will result in immediate termination of the Zoom call.
- **EMAILS** – All Nuclear Science Merit Badge participants shall provide (via email) the name and email address for their parent, legal guardian, Troop Scoutmaster or Crew Advisor prior to the first Zoom call. After that point, any emails not including that addressee will not be answered. The Merit Badge Counselor will apply the same YPT principle as well. I will include the previously listed adult on all my responses.

# EVALUATION CRITERIA

## Evidence of Completed Blue Card Requirements

- Evaluation of satisfactory completion of merit badge requirements will be based primarily on two factors.
  - The clarity and accuracy of verbal statements made by participants during scheduled classes. I will be calling on participants randomly to make verbal statements documenting their understanding of merit badge requirements. Every participant is expected to read the entire merit badge handbook and should be prepared to provide a verbal response to any request to present. Ad hoc or off-the-cuff (spontaneous and unprepared) verbal responses will receive lower evaluation marks. This determination is based solely on the view of the Merit Badge Counselor.
  - With exception of the “final exam” (Requirement 2.b) indicated later in this section, all participants are expected to submit written responses to all requirements at the end of the third and final session. Written responses may be legibly handwritten or typed. They are to be emailed to me no later than noon on the Saturday immediately following the third and final class session. Merit badge guidelines prohibit me from requiring those answers be on the specific merit badge worksheet. However, this is still strongly recommended. If submitted other than on the worksheet, each response must have a number corresponding to a specific requirement. It will not be necessary to re-type or re-write the requirement text as long as the associated requirement number is presented.

## Homework

- The following merit badge requirements will not be covered while in class and are considered homework. Being designated as homework does not remove the requirement for participants to provide written summary responses as outlined above.
  - **4.D - VISIT A PLACE WHERE RADIOISOTOPES ARE BEING USED.** Using a drawing, explain how and why they are used.
  - **5.C - VISIT A PLACE WHERE X-RAYS ARE USED.** Draw a floor plan of this room. Show where the unit, the unit operator, and the patient would be when the X-ray unit is operated. Explain the precautions taken and the importance of those precautions.

## The “Final Exam”

- Completion of Requirements 2.b (Choose an element from the periodic table. Construct 3-D models for the atoms of three isotopes of this element, showing neutrons, protons, and electrons. Use the three models to explain the difference between atomic number and mass number and the difference between the atom and nuclear and quark structures of isotopes) shall be considered the final exam demonstrated by participants at the third and final class session. I will create Zoom “breakout rooms” in the final class session and assign participants to a specific room and partner(s).
- Each participant will begin by building a Carbon 12 molecule. Students will each modify this molecule into Carbon 13 and again to Carbon 14. Participants are expected not just to build/modify this molecule. They must also be prepared to explain the changes at each step in the process, their impact on atomic number, mass and what constitutes stability and characteristics of a radioisotope.