
Nuclear Science & Engineering for Secondary Science Teachers

http://www.murr.missouri.edu/et_secondaryst.php

A 3-Credit Hour Faculty Development Course on the University of Missouri-Columbia Campus

Sponsored by:

*MU Student Section of the American Nuclear Society / MU Chapter of the Health Physics Society
MU Student Chapter of the Institute for Nuclear Materials Management
AmerenUE Callaway Plant American Nuclear Society Health Physics Society
Missouri University Research Reactor University of Missouri-Columbia*

June 11 - 15, 2018

About the NE 7313 Class:

The University of Missouri-Columbia's NE 7313: Nuclear Science & Engineering for Secondary Science Teachers — a week-long, three-credit-hour course on the MU campus — is designed for STEM instructors who wish to develop a deeper understanding of nuclear science and to bring this information to their classrooms. The class provides the basics of nuclear science, types of radiation (*including radiation detection and protection*), industrial applications of nuclear science, and current and future nuclear power generation technologies (*including Small Modular Reactors*). Presentations will be technically oriented at an introductory graduate level, and are structured for secondary teachers of physics, biology, chemistry, mathematics, earth sciences, and related subjects. **Costs for participation in this class are paid by course sponsors (please see “Credit, Housing, and Education Cost Waivers” section, below).**

Over 750 teachers have attended our past classes, representing over 250 schools across Missouri and the Midwest. The course instructor and guest speakers are subject experts on nuclear science and its engineering applications, and current topics in nuclear energy. They have worked extensively with regional high schools and community groups in educational projects.

Contributing organizations that provide information and other resources used in this course include: Ameren/UE, University of Missouri Research Reactor, American Nuclear Society, and the Health Physics Society.

Class Curriculum:

The curriculum targets the **Next Generation Science Standards Disciplinary Core Ideas** in the **Physical Sciences, PS.1: Matter and Its Interactions** (including HS-PS1-8), and will be presented at an introductory graduate level. As can be seen from the preliminary course schedule, topics in the first two days of the class cover fundamental aspects of nuclear phenomena include: atomic and nuclear physics, radioactive decay, nuclear reactions, types of radiation, radiation detection and units, and interactions of radiation with matter. The second half of the course will be devoted to engineering applications of nuclear science: agricultural, industrial, medical, and research applications, as well as nuclear energy systems: light water fission reactors (reactor principles and thermodynamics, reactor control, safety), nuclear waste transportation and disposal, and a brief review of fusion systems (principles and current status of research) and proposed advanced fission reactor designs.

Basic hands-on laboratory experiments are scheduled to illustrate radiation detection and analysis using several types of radiation detectors. [*Note: Teachers completing this class will be eligible to borrow MURR's GM kits for use in their home school classrooms.*] The class also

includes demonstrations of reactor control and materials analysis methods, including Neutron Activation Analysis and X-Ray Fluorescence. Tours during the course will include the Callaway Nuclear Center, the University of Missouri's Research Reactor Facility, and MU's Nuclear Medicine therapy and diagnostic clinics.

Credit, Housing, and Education Cost Waivers:

Three hours of graduate credit from MU will be offered for teachers taking this class. The grading requirements are: class participation, and the development / submission of a teaching unit on nuclear science for use in the participant's home school classroom in the subject that the participant regularly teaches. Credit is not applicable to a graduate degree in Engineering at MU, but may apply to other graduate degrees in education or science. Please consult your home university or department concerning the application of credit for hours relevant to physics, thermodynamics, chemistry, and other physical and biological sciences. Applications for enrollment at MU will be sent to those persons selected for participation in the course.

The **tuition and fees for the three hours of graduate credit will be paid** for teachers selected to participate in the NE 7313 class. Participants will be required to pay a Graduate School application fee (approx. \$65) to enroll at MU for the 3 hours of credit. [**Note:** Teachers who will be enrolled in additional credit at MU during the Summer 2018 term should contact us.]

Participants not commuting on a daily basis to the course will be encouraged to stay in University housing, **the cost of which will be paid by course sponsors**. Breakfast will be provided for persons staying in University housing. Lunch will be provided each day for all students. Participants residing at other than University housing will assume responsibility for arranging and financing their own accommodations. **Costs for parking, textbook materials, and lunch** will be provided for all class participants.

Selection Criteria and Number of Participants:

Up to 25 participants will be selected from applications received on a "first come, first served" basis. Applications for enrollment at MU will be sent to those persons selected for participation in the course. Costs of attending the course will be paid by the sponsoring organizations, as noted above in the **Credit, Housing, and Cost Waiver** section of this brochure. Participants must be secondary school science teachers with at least two years of teaching experience, earned a bachelor's degree from an accredited institution, and be currently engaged in teaching. In selecting individuals for participation, MU will not discriminate on the grounds of race, creed, sex, color, age, handicap, or national origin.

Course Faculty:

The primary instructor and facilitator for the Nuclear Science & Engineering for Secondary Science Teachers course is Dr. William H. Miller, whose teaching and technical areas of interest are given below. Guest speakers from various agencies/organizations and professionals at the Missouri University Research Reactor, and the Missouri Chapter of the American Nuclear Society will provide additional course lectures on specialized topics.

William H. Miller (Course Director) - PhD, University of Missouri, 1976; Professional Engineer (Missouri); Certified Health Physicist. Professor Emeritus of Nuclear Engineering. Areas of specialization: nuclear instrumentation development; public information on energy systems and energy education; sustainable energy systems and resources; non-destructive testing using nuclear techniques.

***For an application form and a preliminary schedule for the
Summer 2018 NE 7313 course, please contact:***

*Dr. William H. Miller, University of Missouri-Columbia Research Reactor
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Or visit the class web site:

http://www.murr.missouri.edu/et_secondaryst.php