
Nuclear Science & Engineering for Secondary Science Teachers

A 3-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 U.S. Department of Energy / American Nuclear Society Health Physics Society
Missouri University Research Reactor University of Missouri-Columbia*

June 4 –8, 2012

About the NE 7313 Class:

This one-week course is designed specifically for high school science teachers and will provide the basics of nuclear science, types of radiation (including radiation detection and protection), industrial applications of nuclear science, and nuclear power generation. This course will be of great value to instructors who wish to develop a deeper understanding of nuclear science and to implement this information in the classroom. Presentations will be technically-oriented at an introductory graduate level, and are structured for secondary teachers of physics, biology, chemistry, mathematics, and earth sciences. This is the 31st summer course on energy topics to be conducted by our faculty. Over 650 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.

Contributors to the class are Ameren/UE, the University of Missouri Research Reactor, the national American Nuclear Society, the U.S. Department of Energy, and the MU Student Section of the American Nuclear Society support the offering of this course.

Class Curriculum:

The curriculum will be presented at an introductory graduate level. As can be seen from the enclosed 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 focuses on 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 with radiation detectors are scheduled to illustrate radiation detection and analysis. Demonstrations of reactor control and neutron activation analysis will be presented. Tours during the course will include the Callaway Nuclear Plant Visitors Center, the University of Missouri's Research Reactor Facility, and MU's nuclear medicine therapy and diagnostic facility.

Credit, Housing, and Cost Waiver:

Costs of attending this program will be paid for each participant by the course sponsors. This includes housing and daily meals from Monday through Friday (*if the*

participant chooses to stay in the dormitory room provided), text materials, tuition and fees for the graduate credit, and parking. Participants will pay the MU Graduate School application fee (\$50) to enroll at MU for the 3 hours of credit. Participants not commuting daily to the course will be encouraged to stay in University housing reserved for this course. Participants residing at other than University housing will assume responsibility for arranging and financing their own accommodations.

Three hours of graduate credit from MU (*nuclear engineering*) will be offered for course participation (*requirements of which include the completion of a teaching unit on nuclear science related to 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.

Selection Criteria and Number of Participants:

Up to 30 participants will be selected from applications received on a "first come, first served" basis. Costs of attending the course will be paid by the sponsoring organizations, as described 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 bachelors 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 questions about the Summer 2012 Nuclear Science & Engineering
for Secondary Science Teachers course, please contact:***

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