



# Nuclear Energy Academic Roadmap

## *Synopsis*

### Authors

Dr. Olivia M. Blackmon, Sue Magidson, Dr. Sola Talabi

### Contributors

Lori Brady, Lisa Marshall, Christy Rasmussen, Uchenna Ezibe, Joe Fatheree



*Developed in partnership with:*



**The U.S. nuclear energy sector** has been grappling with significant workforce challenges, prompting key industry organizations such as the Nuclear Energy Institute, American Nuclear Society, and the Institute of Nuclear Power Operations to develop a Nuclear Energy Academic Roadmap (NEAR) as a critical priority. The roadmap will identify existing obstacles to advancing nuclear education and workforce development and it will propose solutions. To collect data for the NEAR, a workshop was organized to facilitate an in-depth dialogue among diverse academic institutions. The purpose of the workshop was to explore avenues for establishing or expanding nuclear energy programs within educational institutions.

## I. Goals and Objectives

The workshop aimed to address critical challenges through three interconnected goals:

1. Identify effective tactics to enhance career awareness and promote diverse career opportunities.
2. Evaluate financial support and resources needed to sustain or expand academic and training programs.
3. Develop curricula and resources to attract and prepare candidates for the workforce while exploring innovative curriculum ideas.

## II. Methodology

Four 90-minute workshops, facilitated by Oak Ridge Associated Universities (ORAU), were held in May 2024, with participants from K-12 institutions, technical and community colleges, and four-year universities. In all, 140 educational institutions were represented. Many of the participants were members of the newly formed Nuclear Energy Academic Alliance (NEAA) which was established in 2023 by ORAU to bring together nuclear engineering programs at all educational levels across the U.S. Participants engaged in virtual sessions that included a combination of semi-structured interviews and focus groups. The workshops used X-Leap, an online tool, to collect qualitative feedback through open-ended responses. Content was analyzed using a systematic and iterative approach to identify key themes and subthemes.

To assist with development of the roadmap, a framework has been developed that identifies four topical areas that will be addressed including:

- Enhancing Nuclear Career Awareness
- Supporting Pipeline Development
- Identifying Financial Support, Resources, and Programs
- Optimizing Academic Resources

The roadmap will include recommendations in each of these areas for the following groups: K-12, vocational-technical schools, 2-year academic institutions, 4-year academic institutions, advanced studies, and professional development.

## III. Next Steps

A follow-on workshop will be held with members of the NEAA in January 2025, to present findings and collect additional information before finalizing the NEAR. This synopsis has been developed that highlights the key messages and recommendations for each group within each topical area

Note that many recommendations include establishing collaborative networks and partnerships which can be accomplished by: 1) establishing forums to increase engagement among educators with industry and government agencies, 2) establishing networking opportunities at conferences and professional society meetings, and 3) creating advisory boards comprised of industry / government professionals and academic experts to provide guidance for program development and ensure curricula remain relevant to industry needs and standards.

# Key Messages, Issues, and Recommendations

## Enhance Career Awareness

This includes increasing knowledge of the industry, the types of jobs available, career pathways, and compensation.

### Why is this Important?

- We must increase our efforts to promote career awareness to encourage students to enter the nuclear energy workforce.
- It is important that we have the needed infrastructure in place to ensure career awareness activities are sustainable.

### What are the Primary Issues We Must Overcome?

- Resources (funding and dedicated staff) are needed to fund student engagement and establish the infrastructure needed to recruit effectively.
- Marketing and outreach materials must be tailored to attract diverse groups.
- Both established and innovative technologies are needed to reach audiences and attract interest.

### Recommendations

- 1 K-12  
 2 Vocational/Tech Schools  
 3 2-Year Academic Institutions  
 4 4-Year Academic Institutions  
 5 Advanced Studies  
 6 Professional Development

1. Increase the following efforts:
  - a. Educational outreach (e.g., tours, open houses, career fairs) 1 2 3 4
  - b. Experiential learning opportunities 1 2 3 4 5 6
  - c. Digital marketing / communication strategies 1 2 3 4 5 6
  - d. Career services and support 2 3 4 5 6
2. Foster partnerships among educational institutions, industry, and government to create a unified message about nuclear energy careers. 1 2 3 4
3. Integrate nuclear energy awareness into broader STEM education initiatives. 1 2 3 4
4. Emphasize the role of nuclear energy in addressing global challenges, such as climate change. 1 2 3 4
5. Develop strategies to combat misconceptions and negative perceptions about nuclear energy careers. 1 2 3 4
6. Establish programs for veterans highlighting their experience and background as an advantage in civilian nuclear careers. 4 5 6

## Pipeline Development

This includes increasing the number and diversity of personnel joining the workforce, creating multiple career entry points, and helping advance personnel through different stages of their career.

### Why is this Important?

- STEM programs at the K-12 level should be emphasized to increase the readiness for students to explore nuclear engineering and other related technical fields.
- A sufficient number and type of educational / training programs are needed to ensure we have enough skilled and qualified personnel to support the nuclear power industry.
- We must create a diverse workforce by ensuring equitable pathways for career advancement within the nuclear industry.

### What are the Primary Issues We Must Overcome?

- Assistance with scholarships, internships, and career pathway programs is needed.
- Education and training opportunities should be made available to all students interested in the various nuclear career pathways.
- Programs are needed to address the challenge of developing a leadership pipeline and ensuring that the next generation is ready to step up.

### Recommendations

1 K-12  
 2 Vocational/Tech Schools  
 3 2-Year Academic Institutions  
 4 4-Year Academic Institutions  
 5 Advanced Studies  
 6 Professional Development

1. Strengthen partnerships among vocational / tech schools, 2-year and 4-year colleges / universities, and nuclear industries and organizations to share resources and information. 2 3 4
2. Develop or enhance degree programs (A.A., B.S., M.S., PhD) and offer mid-career certificate and credential programs. 4 5 6
3. Strengthen mentorship, internship, and co-op programs and involve industry / government professionals in student capstone projects. 3 4 5
4. Target outreach materials and campaigns specifically designed for under-represented groups, highlighting role models and professionals from diverse backgrounds. 1 2 3 4
5. Highlight diversity within the nuclear energy industry through career profiles and guest speakers. 1 2 3 4
6. Develop a comprehensive, multi-channel outreach strategy to reach diverse student populations. 1 2 3 4

## Identify Financial Support, Resources and Programs

In addition to financial support this includes career counseling, mentorship programs, internship programs, co-op programs, wrap-around services, etc.

### Why is this Important?

- Additional funding and experiential learning opportunities are needed for students to ensure they have the knowledge and skills to enter the nuclear workforce.
- Additional educators are needed to meet the growing demand, and they must have the knowledge, skills, and equipment required for this evolving and dynamic industry.
- Additional funding opportunities are needed to support critical research and development activities.

### What are the Primary Issues We Must Overcome?

- Funding challenges that limit nuclear program expansion include:
  - A lack of funding availability (especially among smaller colleges / universities and those in rural areas).
  - Limited or restrictive funding models (e.g., a reluctance to fund research and openly share results through publication, restrictions on student residency status).
  - Inadequate funding from government and industry grants to support students and research.

### Recommendations

1 K-12  
 2 Vocational/Tech Schools  
 3 2-Year Academic Institutions  
 4 4-Year Academic Institutions  
 5 Advanced Studies  
 6 Professional Development

1. Develop a centralized source for funding information including scholarships, grants, and internship opportunities specific to nuclear energy education. 3 4 5
2. Create a nuclear energy Department of Labor certified pre-apprenticeship and apprenticeship programs. 1 2 3 4 5 6
3. Expand visiting faculty opportunities with industry and government partners. 1 2 3 4 5 6
4. Effectively engage with industry and government to identify avenues for dedicated nuclear energy support such as ensuring a more consistent availability of externships (for educators) and providing financial support. 3 4 5
5. Expand student funding sources such as internships, scholarships, fellowships, stipends and grant programs to provide financial support and encourage more students to pursue nuclear science and engineering programs. 3 4 5
6. Develop a strategic long-term plan to ensure sustainability of funding programs. 3 4 5

## Identify Opportunities to Optimize Academic Resources

This includes identifying opportunities to develop resources and share them across academic and training institutions, establishing a framework for designing education programs that can be adapted at different educational levels, and developing guidelines for curriculum development.

### Why is this Important?

- Long-term collaborative partnerships are needed to facilitate the sharing of resources, information, and opportunities to meet the changing demands of the industry.
- There are benefits of having national academic guidelines for nuclear energy programs, as long as they allow for flexibility, innovation, and the ability to cater to the needs of individual academic institutions and industry.

### What are the Primary Issues We Must Overcome?

- Creating a sustainable pipeline of students and professionals in the nuclear energy sector requires a national solution.
- Strategies are needed to share academic resources across academic institutions, adapt education programs at different educational levels, and integrate new and updated curriculum.

### Recommendations

1 K-12  
 2 Vocational/Tech Schools  
 3 2-Year Academic Institutions  
 4 4-Year Academic Institutions  
 5 Advanced Studies  
 6 Professional Development

1. Establish a consortium of academic institutions to jointly develop and share online courses and laboratory simulations. 1 2 3 4 5 6
2. Create a national repository of open educational resources for nuclear energy education, allowing institutions to share and adapt curriculum materials. 1 2 3 4 5 6
3. Implement a standardized skills and competencies framework that aligns with industry needs, ensuring consistency across educational / training programs while maintaining flexibility. 1 2 3 4 5 6
4. Develop curriculum guidelines based on information obtained from industry and government professionals. 1 2 3 4 5
5. Create a culture of continuous learning and adaptability to address the evolving nature of the nuclear energy field. 1 2 3 4 5 6