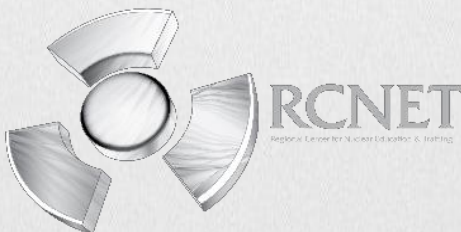


Nuclear Mavericks

RCNET STEM Textbook

Section One	Lesson Plan
Section Two	Module PPT
Section Three	Presentation Rubric Discussion Rubric
Section Four	Supplement Material



RCNET Nuclear Mavericks Module

Topic

By incorporating the Nuclear Mavericks textbook into program, students will become familiar with and have a better understanding of pride and ownership in a STEM field and be able to apply lesson learned and takeaways to their own training.

Module Introduction / Brief Lesson Description

This module outlines two types of delivery methods for the textbook: in-class discussions and supplemental reading.

Learning Objectives / Outcomes

Upon completion of this module, students will be able to:

- | | |
|---|---|
| 1 | Identify human performance factors that contribute to successful careers in STEM fields. |
| 2 | Identify the attributes of ownership and responsibility required to safely navigate within a STEM industry. |
| 3 | Associate internship and classroom training with real world experiences in STEM industries. |
| 4 | Discuss outcomes of performance and soft skill applications that lead to STEM industry career progression. |
| 5 | Apply lessons learned and takeaways to in-situ training. |

Procedure for Using the RCNET Module

This module was designed to be taught as outlined below. However, the teacher may modify this curriculum, as needed, to fit into specific program allowances.

<i>Prior to Starting:</i>	Review module material included in this packet	
	Review text book, <i>Nuclear Mavericks</i> , including the Lessons Learned sections at the end of each chapter.	
	Print class set of RCNET Nuclear Mavericks Handout (if using) provided in this packet.	
	Print class set of RCNET Discussion or Presentation Rubric (if using) provided in this packet.	
<i>Individual Chapter Discussions</i>	1	Introduce the chapter. Ask questions to generate an open discussion.
	2	Review the Lesson Learned section to generate class discussion.
	3	Assign reading to student and determine due date and presentation format.
	4	If using the RCNET Presentation or Discussion Rubrics, provide copies to students for review prior to starting the assignment.
	5	Review topic and lessons learned. Use Lessons Learned to generate open discussion, comparing differences from initial discussion.

<i>Whole Book Student-Led Discussion Groups</i>	1	Introduce the topic. Ask questions to generate an open discussion.
	2	Review Lesson Learned sections to generate class discussion.
	3	Assign readings by chapter to student groups, determine due dates and presentation format.
	4	If using the RCNET Presentation or Discussion Rubrics, provide copies to students for review prior to starting the assignment.
	5	Have student present topic and lessons learned to the entire class. Students should focus on why the lesson learned are important, how the maverick in their chapter made an impact in the industry and how they can apply the takeaways to current industry norms.

List of Materials

<i>Required:</i>	RCNET <i>Nuclear Mavericks</i> Textbook
<i>Optional:</i>	RCNET Nuclear Mavericks Presentation
	RCNET Presentation Rubric
	RCNET Discussion Rubric

Lesson Plan & Scope of Work

<i>Class Discussions - Small Group</i>	
Step 1	Students should be divided into small groups. Each group should be assigned one chapter from the textbook. For smaller classes, two chapters may be assigned with matching, subsequent or alternate due dates.
Step 2	Determine due dates for each group. Chapters can be rearranged to align with topics and learning outcomes previously determined for the course.
Step 3	<p>Students should be instructed to prepare a 10-15 minute presentation regarding the Nuclear Maverick featured in their assigned chapter. Presenters are left to the discretion of the teacher, but can be one of the following formats:</p> <p>A. Oral Presentation B. Written Essay presented to class C. Power Point Presentation</p> <p>Students should be instructed to focus on material that is relevant to the lessons learned and takeaways of their assigned chapters. Students should also develop their own lessons learned from the chapter and include them in their presentation. Specific questions for students to answer include:</p> <p>A. Why do you think this Maverick was chosen to be featured? B. What industry was this Maverick working in? C. What surprised you about this Maverick/Field/Experience? D. What were the lesson learned from this chapter? E. How can you apply the lessons learned to your training and education?</p>
Step 4	If presentation is to be counted as a grade, students can be scored with the attached Presentation rubric.

<i>Class Discussions - Whole Group</i>	
Step 1	Schedule and assign chapter readings to align with topics and learning outcomes previously determined for the course.
Step 2	Determine due dates for each chapters can be rearranged or assigned as outlined in the textbook.
Step 3	<p>Students should be instructed to engage in a class discussion regarding the Nuclear Maverick featured in the assigned chapter and to focus on material that is relevant to the lessons learned and takeaways of the assigned chapters. Students should also develop their own lessons learned from the chapter and include them in the class discussion Specific questions for students to answer include:</p> <p>A. Why do you think this Maverick was chosen to be featured? B. What industry was this Maverick working in? C. What surprised you about this Maverick/Field/Experience? D. What were the lesson learned from this chapter? E. How can you apply the lessons learned to your training and education?</p>
Step 4	If discussion participation is to be counted as a grade, students can be scored with the attached Discussion rubric.
<i>Individual Assignments - Classroom & Internship</i>	
Step 1	Schedule and assign chapter readings to align with topics and learning outcomes previously determined for the course.
Step 2	Determine due dates for each chapter. Chapters can be rearranged or assigned as outlined in the textbook.
Step 3	<p>Students should be instructed to prepare a 10-15 minute presentation regarding the Nuclear Maverick featured in their assigned chapter. Presenters are left to the discretion of the teacher, but can be one of the following formats:</p> <p>A. Oral Presentation B. Written Essay presented to class C. Power Point Presentation</p> <p>Students should be instructed to focus on material that is relevant to the lessons learned and takeaways of their assigned chapters. Students should also develop their own lessons learned from the chapter and include them in their presentation. Specific questions for students to answer include:</p> <p>A. Why do you think this Maverick was chosen to be featured? B. What industry was this Maverick working in? C. What surprised you about this Maverick/Field/Experience? D. What were the lesson learned from this chapter? E. How can you apply the lessons learned to your training and education?</p>
Step 4	If presentation is to be counted as a grade, students can be scored with the attached Presentation rubric.

Lessons Learned and Takeaways.

Chapter 1

Safety First! The nuclear culture is one of safety. You must take all safety procedures seriously and understand their importance.

Procedure protocols have to be followed meticulously, as any mishaps could jeopardize the entire nuclear fleet.

Training is continuous. You will be challenged to learn new skills and procedures all the time.

Transparency and redundancy of systems are key to limiting the potential of a plant incident.

Chapter 2

Nuclear technicians earn great benefits in a short amount of time. The workload can be heavy and intense, because techs shoulder a lot of responsibility to make sure everyone is safe.

Communication is paramount. Technicians have to communicate effectively at all levels.

The accumulated knowledge of the retiring workers needs to be transferred to the new incoming workers.

Training is vital. Classroom settings have to be complemented with hands-on internships, simulations, and other affective domain training methods to ensure a well-rounded education.

Chapter 3

Technology and work processes are designed to ensure safety of those in the industry as well as the public.

Opportunities come from unexpected places. Be open to offers presented to you. It is important to enjoy the learning process, to be able to learn new skills and disciplines, and to be open to new ways of doing things as technology and methods evolve.

You cannot panic. You have to stay levelheaded, no matter the circumstances, to ensure no mistakes are made.

Chapter 4

Besides aptitude and academic prowess, psychological makeup is also taken into account since not all nuclear workers are suited to every job in the industry.

The nuclear industry is constantly using new state-of-the-art tools to help improve accuracy and efficiency.

Training in the industry is not easy and will challenge you.

Chapter 5

Honesty and integrity are paramount. No matter your role, present your results and findings honestly, without embellishment. Never change or falsify information, even if it seems to be advantageous to you or your project.

Make sure you understand the mission of the job you and your team are charged with.

Know what you are trying to achieve and what is expected of you. And, if you aren't sure, ask questions.

You will be appreciated and acknowledged for good work. The nuclear industry is built on team efforts and collaboration.

Chapter 6

Attention to detail is paramount. You will encounter obstacles in your job, but you have to make sure you complete the job accurately before moving on.

Persistence is crucial, no matter what one chooses to do in life. If you want or believe in something, stay focused and try a different avenue if you hit a roadblock.

You don't often get thanks for the results of the final application of your work. You have to find personal satisfaction in your work, while understanding the larger impact.

Chapter 7

There are many challenges in nuclear jobs. You can't take them lightly because other people's safety relies on your willingness to learn and meet those challenges head-on.

You can't trade off profit for safety when people's lives are at stake.

Be confident in your training. You must be willing to make hard decisions based on careful testing and consideration.

Do not take for granted that things work as they were intended. Even the most durable parts can break.

Chapter 8

Redundancies in procedures are largely responsible for the nuclear power industry's remarkable safety record.

The public's perception of human error in the nuclear power industry is of paramount importance to the growth of the nuclear energy industry.

The nuclear energy industry has stringent oversight for multiple agencies to ensure high universal quality and safety standards.

Training is fundamental to excellence in human performance.

Chapter 9

There is a high risk of failure in nuclear science since a lot of the work is unprecedented.

Prior experiences can impact your career path.

Open communications is important. Not everyone sees a problem the same way.

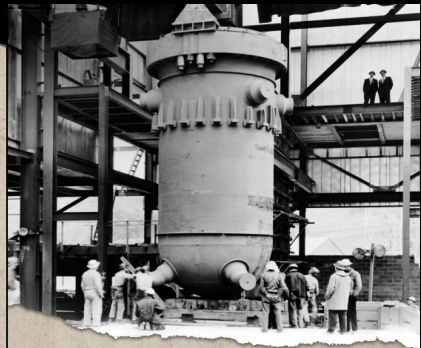
Research and understand your career choice. The easiest path is not often the most fulfilling.

References

Nuclear Mavericks

Assessments

	RCNET Presentation Rubric
	RCNET Discussion Rubric
Supplemental & Enrichment Material	
	RCNET Academic Crosswalk, available on www.GoNuke.org
	RCNET Human Performance Video, available on www.GoNuke.org
	PBS Special - <i>Uranium: Twisting the Dragon's Tail Video</i> , available on Amazon.com: https://amzn.com/B012VP8ON6



Nuclear Mavericks
A Biographical Compilation of the Men & Women
Who Shaped the Nuclear Workforce

NSF RCNET
Regional Center for
Nuclear Education & Training

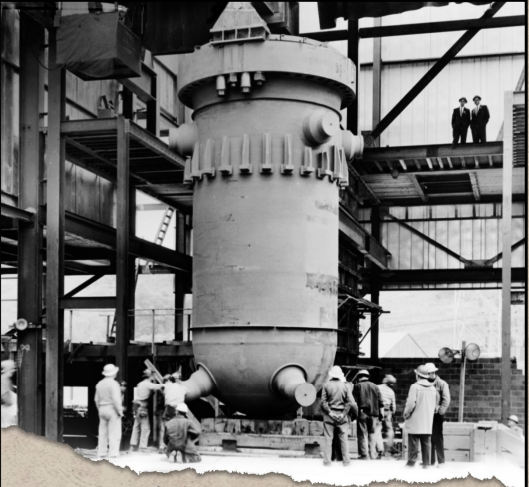
*Nuclear
Mavericks*

RCNET STEM Textbook

1

Nuclear Mavericks describes the trials and tribulations of 9 nuclear pioneers but can be used in all STEM introductory courses to impart a sense of historical pride and ownership.

To order books for your school, visit GoNuke.org



Nuclear Mavericks
A Biographical Compilation of the Men & Women
Who Shaped the Nuclear Workforce

NSF RCNET
Regional Center for
Nuclear Education & Training

2

Chapter One

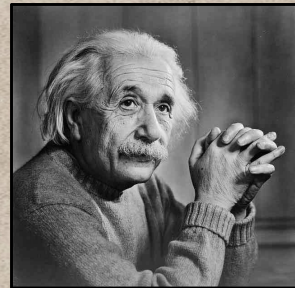
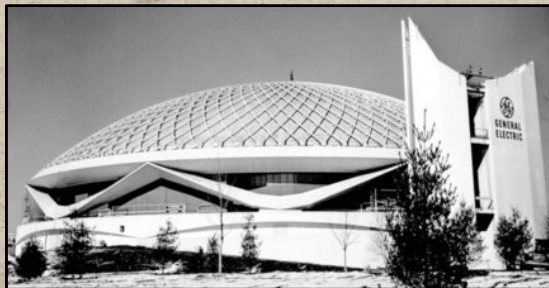


Learning Objectives

Upon completing this module, students will be able to:

- Identify human performance factors that contribute to successful careers in STEM fields.
- Identify the attributes of ownership and responsibility required to safely navigate within a STEM industry.
- Associate internship and classroom training with real world experiences in STEM industries.
- Discuss outcomes of performance and soft skill applications that lead to STEM industry career progression.
- Apply lessons learned and takeaways to in-situ training.

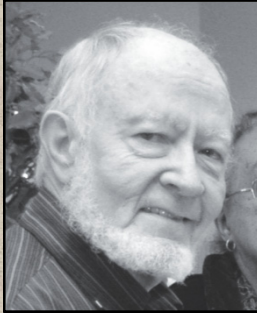
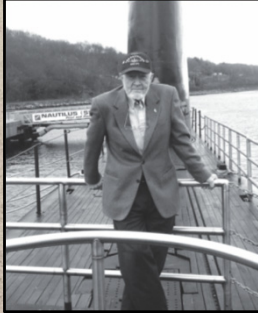
A Brief History of the Nuclear Industry



Chapter Two



Virgil Cox



“Nuclear power plants are great places to work. That sounds ridiculous, but they are. You are absolutely, 100 percent safe at a nuclear power plant”

5

Chapter One



Takeaways

- Safety first! The nuclear culture is one of safety. You must take all the safety procedures seriously and understand their importance.
- Procedure protocols have to be followed meticulously, as any mishaps could jeopardize the entire nuclear fleet.
- Training is continuous. You will be challenged to learn new skills and procedures all the time.
- Transparency and redundancy of systems are key to limiting the potential of a plant incident.

6

Chapter Two



Stacey Smith Presnell



"We must educate the next generation, first in the classroom, and then by bringing them into the power plant for on-the-job training. It's so important that we can have that knowledge transfer from the older generation."

Chapter Two



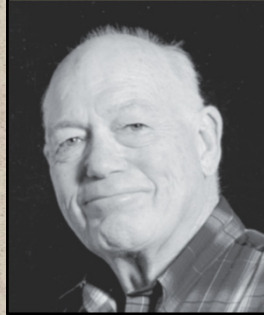
Takeaways

- Nuclear technicians earn great benefits in a short amount of time. The workload can be heavy and intense, because techs shoulder a lot of responsibility to make sure everyone is safe.
- Communication is paramount. Technicians have to communicate effectively at all levels.
- The accumulated knowledge of the retiring workers needs to be transferred to the new incoming workers.
- Training is vital. Classroom settings have to be complemented with hands-on internships, simulations, and other affective domain training methods to ensure a well-rounded education.

Chapter Three



John Taschner



"One of the things we found out later on, that we didn't know during the Cuban Missile Crisis, was that the Soviets had sent four diesel submarines to Cuba, and they were armed with nuclear torpedoes. It's a good thing we didn't know about that."

Chapter Three



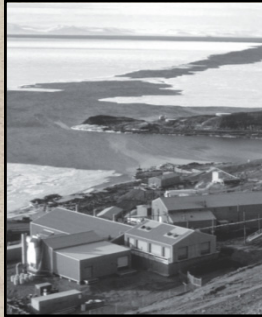
Takeaways

- Technology and work processes are designed to ensure safety for those in the industry as well as the public.
- Opportunities come from unexpected places. Be open to offers presented to you. It is important to enjoy the learning process, to be able to learn new skills and disciplines, and to be open to new ways of doing things as technology and methods evolve.
- You cannot panic. You have to stay levelheaded, no matter the circumstances, to ensure no mistakes are made.

Chapter Four



Hayden Mercer



"I firmly believe that, over the decades, the proactive nature of the nuclear industry has put us in a position to be able to make good, sound judgments about how we want to do business and how we want to operate our facilities. We've learned a lot along the way."

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Chapter Four



Takeaways

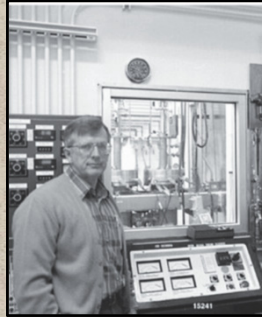
- Technology and work processes are designed to ensure safety for those in the industry as well as the public.
- Opportunities come from unexpected places. Be open to offers presented to you. It is important to enjoy the learning process, to be able to learn new skills and disciplines, and to be open to new ways of doing things as technology and methods evolve.
- You cannot panic. You have to stay levelheaded, no matter the circumstances, to ensure no mistakes are made.

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Chapter Five



Leon Walters, PhD



"It takes a huge team effort to get all the pieces together. Some are young and bright people; some are older experienced people who can pass down their knowledge. It's a huge puzzle to manage something like this, and I would say the toughest part is getting the right kind of people with the right initiative to fit in with the personality of the group, where everyone is working in harmony on a common goal."

Chapter Five



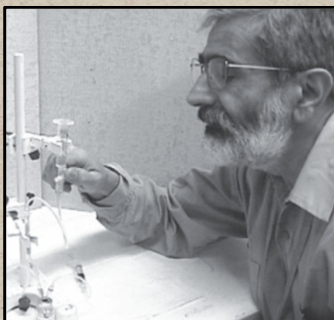
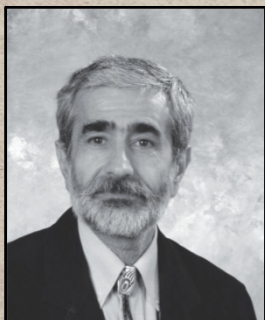
Takeaways

- Honesty and integrity are paramount. No matter your role, present your results and findings honestly, without embellishment. Never change or falsify information, even if it seems to be advantageous to you or your project.
- Make sure you understand the mission of the job you and your team are charged with.
- Know what you are trying to achieve and what is expected of you. And, if you aren't sure, ask questions.
- You will be appreciated and acknowledged for good work. The nuclear industry is built on team efforts and collaboration.

Chapter Six



Saed Mirzadeh, PhD



“The age of science—when we chemists or physicists or scientists go to the basement of the chemistry department, are happy with the results, and just publish our papers—well, that age is over. Anybody who thinks it’s still that way is just naïve. Nowadays, you have to sell your product.”

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Chapter Six



Takeaways

- Attention to detail is paramount. You will encounter obstacles in your job, but you have to make sure you complete the job accurately before moving on.
- Persistence is crucial, no matter what one chooses to do in life. If you want or believe in something, stay focused and try a different avenue if you hit a roadblock.
- You don’t often get thanks for the results of the final application of your work. You have to find personal satisfaction in your work, while understanding the larger impact.

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Chapter Seven



Michael Turnbow



"I never did a single day of industrial engineering; but all my training in industrial engineering—the math, the science, and even the coursework—have applied in one way or another to everything I do every day."

Chapter Seven



Takeaways

- There are many challenges in nuclear jobs. You can't take them lightly because other people's safety relies on your willingness to learn and meet those challenges head-on.
- You can't trade off profit for safety when people's lives are at stake.
- Be confident in your training. You must be willing to make hard decisions based on careful testing and consideration.
- Do not take for granted that things work as they were intended. Even the most durable parts can break.

Chapter Eight



Cheri D. Collins



“After training, the employee returns to his job and goes into the field to perform a task, and in so doing so, discovers his training was deficient. If there is no mechanism to plow that knowledge back into the training material, then the knowledge dies with that person, and the training program continues to teach a deficient methodology to other students.”

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Chapter Eight



Takeaways

- Redundancies in procedures are largely responsible for the nuclear power industry's remarkable safety record.
- The public's perception of human error in the nuclear power industry is of paramount importance to the growth of the nuclear energy industry.
- The nuclear energy industry has stringent oversight from multiple agencies to ensure high universal quality and safety standards.
- Training is fundamental to excellence in human performance.

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Chapter Nine



Robert Singletery, PhD



"The nuclear engineering community—in fact, the entire nuclear industry—is small. People move around but often come back into your life at the most unexpected times.

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Chapter Nine



Takeaways

- There is a high risk of failure in nuclear science since a lot of the work is unprecedented.
- Prior experiences can impact your career path.
- Open communication is important. Not everyone sees a problem the same way.
- Research and understand your career choice. The easiest path is not often the most fulfilling.

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RCNET Discussion Rubric

Name _____

Date: _____

Criteria	1 - Needs Improvement	2 - Fair	3 - Good	4 - Excellent	Your Score
Listening	Shows lack of interest or disrespect for others.	Frequently displays lack of interest in others, may be disrespectful at times.	Listens to peers and instructor, but may occasionally lose interest in topic or be disrespectful at times.	Actively and respectfully listens to peers and instructor.	1
					2
					3
					4
Preparation	Exhibits little evidence of having read or thought about assignment.	Shows evidence of superficial preparation and little knowledge about assignment topic.	Shows evidence of being somewhat prepared with some knowledge about assignment topic.	Shows evidence of being fully prepared for and knowledgeable about assignment topic.	1
					2
					3
					4
Quality of Contributions	Participation reflects little understanding of the assigned reading or purpose of the presentation.	Participation is sometimes irrelevant, and does not reflect understanding of the assignment.	Participation is somewhat relevant and reflects some understanding of the assignment.	Participation is relevant and reflects understanding of assigned reading.	1
					2
					3
					4
Impact on Seminar	Comments do not advance the conversation or are actively harmful.	Comments sometimes advance the conversation but sometimes do little to move it forward.	Comments mostly advance the conversation but may be off topic.	Comments frequently help move seminar conversation forward.	1
					2
					3
					4
Frequency of participation	Seldom participates and is generally not engaged.	Sometimes participates but at other times is "tuned out".	Mostly participates, but may disengage frequently.	Actively participates at appropriate times.	1
					2
					3
					4

Total Score: _____

Out of a possible: 20

RCNET Presentation Rubric

Name _____

Date: _____

Criteria	1 - Needs Improvement	2 - Fair	3 - Good	4 - Excellent	Your Score
Preparation	Exhibits little evidence of having read or thought about assignment.	Arrives with some materials and show evidence of superficial preparation for assignment.	Arrives with most materials and show evidence of being somewhat prepared for assignment.	Arrives fully prepared with completed assignment, notes, observations and materials.	1
					2
					3
					4
Clarity	Does not have grasp of information and cannot answer questions about subject. Does not clearly define subject and purpose; provides weak or no support of subject; gives insufficient support for ideas or conclusions.	Attempts to define purpose and subject; provides weak examples, facts, and/or statistics, which do not adequately support the subject; includes very thin evidence or data.	Has somewhat clear purpose and subject; some examples, facts, and/or statistics that support the subject; includes some data or evidence that supports conclusions.	Provides clear purpose and subject; pertinent examples, facts and/or statistics; supports conclusions/ideas with evidence.	1
					2
					3
					4
Quality of Contributions	Presentation reflects little understanding of the assigned reading or purpose of the presentation.	Presentation is sometimes irrelevant, and does not reflect understanding of the assignment.	Presentation is somewhat relevant and reflects some understanding of the assignment.	Presentation is relevant and reflects understanding of assigned reading.	1
					2
					3
					4
Organization	No apparent logical order of presentation, unclear focus.	Content is loosely connected, transition lack clarity.	Sequence of information is well organized for the most part, but more clarity with transitions is needed.	Development of thesis is clear through use of specific and appropriate examples; transitions are clear and create a succinct and even flow.	1
					2
					3
					4
Content	Thesis is unclear and information appears randomly chosen.	Thesis is clear, but supporting information is disconnected.	Information relates to a clear thesis; many relevant points, but they are somewhat unstructured.	Exceptional use of material that clearly relates to a focused thesis; abundance of various supported materials.	1
					2
					3
					4

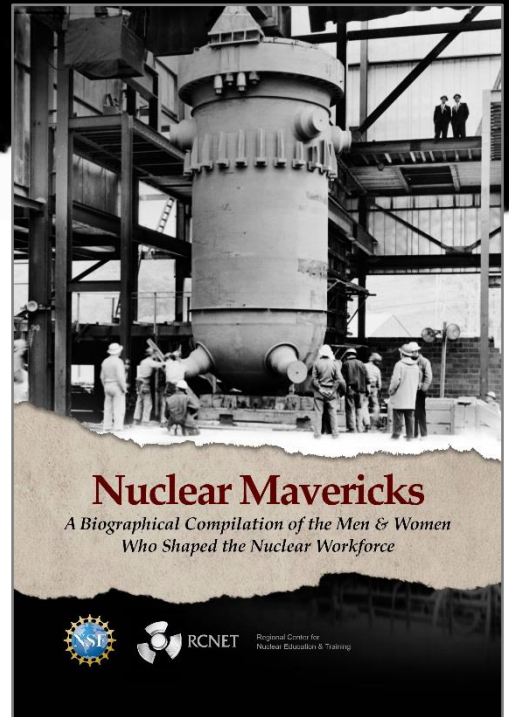
Total Score: _____

Out of a possible: **20**

Thank you for ordering *Nuclear Mavericks!*

Nuclear Mavericks starts with a brief history of the nuclear industry and then features the career experiences of nine nuclear pioneers in the fields of medicine, energy, environmental management, and manufacturing.

The textbook can be used in any introductory STEM course to impart a sense of ownership and pride in the upcoming generation of STEM workers.



Below, we have compiled a short list of ways to implement the textbook into your existing class or program.

Ownership & Responsibility - Each firsthand experience can be used to demonstrate ownership and responsibility in STEM industries.

Internships - Assign chapters as supplemental reading during internships to help students associate their training with real world experiences in the field.

Student-Led Discussions - Assign chapters to groups and allow students to lead weekly discussions about each contributor's take-aways.

Lesson Delivery - The book can serve as an introduction to in-situ work in a STEM field or divided by chapter to meet specific learning outcomes.

RCNET would like your feedback! Once you have time to review the textbook, we will send out a short survey to gather your reaction. We thank you, in advance, for your participation.



Questions? Contact RCNET
(772) 462.7172 | RCNET@gonuke.org