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Title: Development of Criticality Safety Pipeline Courses at Partnering Universities

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Development of Criticality Safety Pipeline Courses at Partnering Universities

Presented at American Nuclear Society Winter Meeting and Nuclear Technology Expo in Washington D.C.

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LANL NCSD Analyst

11/01/2017

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Overview

- Background Reasoning
- Program Elements
- Participating Universities
- Benefits of Program
- Conclusion

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Need For Criticality Safety Analysts

- Rapid Attrition of Experts
- Staffing Shortages Since 2012
- Expanding Workload
- Qualification Challenges

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Qualification Challenges

- Average Qualification Time
 - Facility Specialist: 6-12 Months
 - Calculation Specialist: 6-12 Months
 - Qualified: 18-24 Months
- Average Q Clearance – ~18 months
 - Limits Scope of Work for Analyst

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Current Student Opportunities

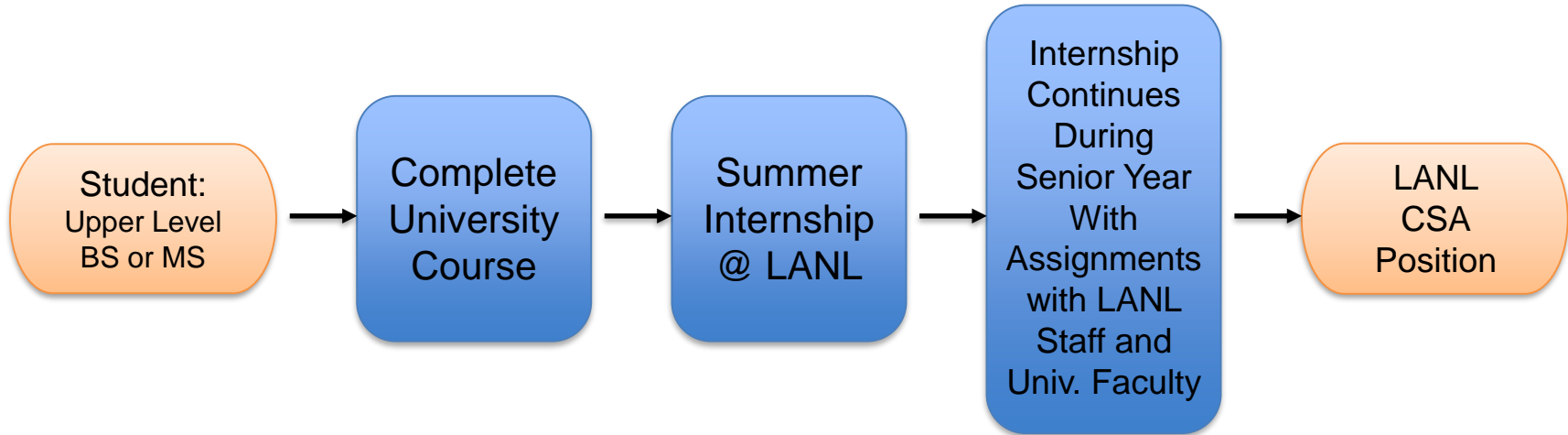
- Idaho State University²
 - Course that includes principles in NCS
 - NE4446, *Nuclear Fuel Cycle Systems*
- University of Tennessee³
 - Periodically offers two NCS courses
 - NE421, *Introduction to Criticality Safety*
 - NE543, *Special Topics in Nuclear Criticality Safety*
- University of Idaho- Idaho Falls⁴
 - Offers a Graduate Certificate

2 - <http://coursecat.isu.edu/undergraduate/allcourses/ne/>

3 - <http://web.utk.edu/~rpevey/>

4 - <https://www.uidaho.edu/idahofalls/academic-programs/engr/ne-cert> UNCLASSIFIED

NCS Pipeline Program



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Coursework

- Targets Junior and Senior Undergraduates
- Features
 - Criticality Safety Subjects
 - Guest Lectures from LANL Staff
 - NCS Evaluation Project
- Tailored to Participating Universities

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Supporting Universities

- Texas A&M University
 - Nuclear Engineering Department
 - Dr. Pavel Tsvetkov, Associate Professor
 - Dr. Sunil Chirayath, Associate Professor
- New Mexico State University
 - Chemical Engineering Department
 - Dr. David Rockstraw, Department Head
- Potential University Partnerships
 - University of California, Berkeley
 - University of Wisconsin-Madison
 - University of New Mexico



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University Coursework – Texas A&M

- Taught by Texas A&M Professors
- Spans Two Semesters
- Focus on Teaching MCNP KCODE
- Lessons on Hand Calculations
- Coverage of Fuel Cycle
- Less Emphasis on Nuclear Engineering Concepts
- Current Enrollment: 15

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University Coursework – NMSU

- Facilitated Completely Online
 - LANL NCS Staff Weekly Roundtable
 - LANL Intern Teaching Assistant
- One Semester
- Focus on Nuclear Engineering Fundamentals
- Introduction to MCNP
- Current Enrollment: 19

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Summer Internship

- Targeting Successful Students from Universities
- Mentored by NCS Division Staff
- Projects Focus on Criticality Safety Evaluations
- Student Training
 - LANL Intensive Training, 1 Week
 - UNM Short Course, 1 Week
 - UNM Evaluation Workshop, 1 Week
 - Possible Future DOE NCSP Hands on Training Course

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Following Summer Internship

- Offered Continued “Casual Status” With LANL
- Perform Work Remotely
- Visit Lab When Necessary
- Continue Qualification Process
- Begin Security Clearance Investigation
- Students May Be Hired as Full Time LANL Employees Upon Graduation

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Participant Benefits

- Students:
 - Exposure to Lab Environment and Staff
 - Resume Building and Professional Development
 - Career Opportunities
- Universities:
 - Low Cost Elective Course
 - Increased Partnership with National Laboratory
 - Opportunity to Employ Students

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Benefits

- LANL:
 - Reduced Training Time/Cost
 - Increase Full Time Employee Retention
 - Access to Larger Recruiting Pools
- DOE:
 - Prototype Educational Resource
 - Potential Expansion to Additional Sites/Universities

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Conclusion

- NCS Pipeline Program Created Based on the Negative Impact of Attrition on NCS
- Intended Result is the Efficient Cultivation of New NCS Resources
- The Program is Capable of being Replicated and Serving as Model for Similar Programs and Disciplines
- LANL is Continuously Improving the Program Based on Participant Feedback

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- Professors
 - Dr. Pavel Tsvetkov, Texas A&M University
 - Dr. Sunil Chirayath, Texas A&M University
 - Dr. David Rockstraw, New Mexico State University

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QUESTIONS?

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