Abstract

The Southwest Surety Institute was formed in June 1996 by Arizona State University (ASU), New Mexico Institute of Mining and Technology (NM Tech), New Mexico State University (NMSU), and Sandia National Laboratories (SNL) to provide educational programs in Security Engineering, and to conduct research and development in security technologies. This is the first science-based program of its kind in the United States, focused on educating Security Engineers to help government and industry address their security needs.

Each member brings a unique educational capability to the Institute. NM Tech has a formidable explosives testing and evaluation facility. ASU is developing a Masters program in Security Engineering at their School of Technology located on a new campus in Mesa, Arizona. NMSU provides a Security Technology minor, merging programs in Criminal Justice and Engineering Technology. The Sandia National Laboratories security system design and evaluation process forms the basis for the Security Engineering curricula. In an effort to leverage the special capabilities of each university, distance education will be used to share courses among Institute members and eventually with other sites across the country.

Introduction

Since 1978, Sandia National Laboratories (SNL), under the joint sponsorship of the US Department of State, the International Atomic Energy Agency, and the US Department of Energy (DOE), has offered a three week International Training Course in Physical Security to member states of the IAEA in support of nonproliferation treaties. The intent of this training is to introduce attendees to the physical protection methodology used in the US to protect nuclear materials. Over the past 25 years, over 400 students from 58 countries have participated in this training and implemented the methodology in their home states. Modified versions of this course have been presented in the Former Soviet Union, Czechoslovakia, Brazil and China. A one week version of the course is also available within DOE on a periodic basis or by request. The periodic course offerings and limited attendance make it difficult for US sites to obtain the education and training needed to implement and maintain adequate security systems. In addition, this method requires the availability of Sandia personnel and a sponsor willing to subsidize course costs. These disadvantages are minimized through the educational programs in security engineering now offered by the Southwest Surety Institute.

Background

With the emergence of new threats to national security including weapons of mass destruction, and domestic and foreign terrorism, (1) and the increasing concern over nuclear smuggling,
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dismantlement, and proliferation of fissile material (2,3,4,5), the protection afforded to critical assets has become a major concern (6, 7, 8). At the same time, the US Department of Energy has undertaken a complex-wide review of all sites to ascertain the state of security for nuclear assets (9). This combination of events indicates that the protection of nuclear assets will require significant attention for some years to come. To assist in meeting this continuing need, new programs in security education have been created at several US universities to provide the skilled workforce necessary to design and implement high security systems for critical assets, including nuclear facilities.

The Southwest Surety Institute was formed in June 1996 by Arizona State University (ASU), New Mexico Institute of Mining and Technology (NM Tech), New Mexico State University (NMSU), and Sandia National Laboratories (SNL) to provide educational programs in security engineering, and to conduct research and development in security technologies. These founding members were joined by Louisiana State University (LSU) in January, 1998. Programs in security engineering have been established at each university to provide unique, science-based curricula to students. Graduates of these programs will be able to apply their skills to protection of a range of targets such as critical infrastructures, government buildings, private industry, and other high value or high consequence assets.

![Figure 1 - Sandia Design and Evaluation Process Outline](image)

All of the university programs are based on the SNL developed design and evaluation approach for physical security, and emphasize the use of performance measures to evaluate the effectiveness of the designed security system. This approach is summarized in Figure 1. Incorporated into this approach is the application of proven security principles such as detection before delay, protection-
in-depth, use of complementary sensors, and balanced protection. In addition to providing an integrated approach to the design and implementation of a physical protection system, these programs will also enhance communication between sites by standardizing on approach, definitions, and performance measures.

**University programs**

Arizona State University - East offers a Masters program in Security Engineering Technology which will begin in the fall of 1998 at their School of Technology, located on a new campus in Mesa, Arizona. The degree is open to graduates of appropriate programs in engineering and engineering technology, as well as graduates of traditional criminal justice programs who have an acceptable technical background. This includes graduates of the programs at schools belonging to the Southwest Surety Institute. The program is designed to be completed in three semesters and one summer. Students will begin the course of study in the Fall, with a target graduation by the end of the following summer. The program will include nine courses and an applied project, resulting in a total of 32 semester credit hours. The details of the courses and program of study are shown in Table 1.

<table>
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<tr>
<th>Fall Semester</th>
<th>Winter Session</th>
<th>Spring Semester</th>
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<tr>
<td>MET 510 Research Meth</td>
<td>SET 594 Applied Project</td>
<td>SET 500 Security Law/Regulation</td>
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<td>MET 540 Econ Anal of Eng Sys</td>
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**Summer Session**

| SET 581 Computer Fraud       |
| SET 594 Applied Project      |

**Table 1- Masters Program in Security Engineering Technology at ASU**

In addition to the program described above, there will be a need to provide a set of normalization courses for those interested and otherwise qualified baccalaureate degree students with backgrounds that are lacking the technical basis necessary for the proposed program of study. It is possible for a motivated and mature student to obtain this framework in two semesters, if the student has a reasonable background in science and mathematics, such as provided by a typical liberal arts education. The normalization sequence may be completed at any member institution of the Southwest Surety Institute. These normalization courses may be taken at the students' current university or at ASU. This structure will support the use of a starting class every Fall at ASU, with graduation from the program at the end of the following summer, assuming the student attends full time.

NM Tech and LSU have enhanced their existing resources and capabilities to develop a counter-terrorism education program. NM Tech operates the Energetic Materials Research and Testing Center (EMRTC), which has counterterrorism research facilities and programs already in place.
LSU trains approximately 15,000 first responders each year, through its Anti-Terrorist Training Assistance Program and Fire and Emergency Training Institute. The two universities have recently joined together to provide training to international law enforcement agencies, conducted cooperatively at both schools. The Academy for Counterterrorism Education (ACE) was developed in response to the growing threat of terrorist acts on US military forces and civilian populations. Terrorist bombings such as the Khobar Towers in Saudi Arabia and in Oklahoma City demonstrate this alarming threat. While the US is spending millions of dollars on counterterrorism and force protection technology, state and local first responders are unprepared to deal with large explosives devices and weapons of mass destruction. Federal, military, National Guard, state and local police, fire, medical, and other first responders need training to prevent, detect, and respond to terrorist attacks.

To provide training to these first responders, ACE will conduct a series of short courses and seminars at NM Tech, LSU, and selected locations throughout the US. Planned courses of instruction include Emergency Response Managers and Commanders Seminar (3 days), Chem/Bio/Explosives Responder Trainers (5 days) and a Large Explosive Device Post-Blast Analysis Course (5 days). Other planned educational support activities include "take-home" training and specialized equipment packages, an on-line distance education resource center, and graduate assistance and internships to expand the domestic base of expertise. For current updates on ACE, visit their homepage at www.ermtc.nmt.edu/ace/.

Individually, both NM Tech and LSU are also developing programs incorporating security engineering curricula. NM Tech is implementing an option (minor) program that will include courses in shock physics, explosives chemistry, explosives engineering, and security technology. In addition, students enrolled in doctoral programs in science and engineering may add these courses to their program of study and increase their knowledge of security concepts. In support of the Southwest Surety Institute educational goals and to exploit the unique capabilities offered by NM Tech, Explosives Surety is currently offered via distance learning to NMSU and SNL; the course is expected to be offered at ASU as part of the MS program.

LSU will offer a one week course entitled Design and Evaluation Process for Physical Security Systems in August of 1998 and will develop additional courses to supplement this program over time. The one week course, taught by experts from Sandia National Laboratories, will be repeated twice each year in the Baton Rouge area as part of the LSU continuing education program. These offerings allow access to the education and training programs of the Institute for those interested in continuing professional education or refresher training, such as members of law enforcement or industrial security managers.

NMSU is offering a minor in security technology that merges existing courses from the department of Criminal Justice with new courses created in the Engineering Technology department. This program is currently open only to students already enrolled at NMSU, however, a supplemental major program is planned to begin within the next five years.
Benefits/Future Plans

The major benefits of these programs will be to increase access of US nuclear sites to educational programs offering courses in performance-based security systems and to create a pool of educated security professionals who will be able to design, test, and evaluate security technologies and systems. As the universities develop their programs and expand, distance education will play a growing role in course delivery to locations beyond the local university area. This should facilitate access to the various courses and programs and reduce the cost of training to each site. University courses will be available on predictable schedules and will better accommodate the time constraints of professionals already working in the area of physical security at these sites.

In addition to the opportunities offered for continuing professional education, there is also the possibility to either recruit new security staff from these programs or to send on-roll employees through any of the programs as a part of their job assignment. Hiring graduates of these programs should reduce costs by providing a group of individuals who already understand security principles and applications, thereby reducing the need for on-the-job training.

Other benefits of these programs include standardization of approach and definitions, an increase in on-site capability to resolve security issues within regulatory guidelines, and better investment decisions regarding security upgrades by comparing increased system effectiveness to cost.

Member institutions will also be conducting research and development on security technologies, so courses will continually be updated with emerging or promising developments in security applications. In addition, the Southwest Surety Institute plans on establishing a certification program for other universities in order to establish and maintain appropriate professional standards for security professionals working on high security systems. For additional information on the Southwest Surety Institute, visit their Web page at www.emrtc.nmt.edu/ssi/.

Conclusion

The Southwest Surety Institute was formed in 1996 to provide educational programs in security engineering to students at ASU, LSU, NM Tech and NMSU. These unique science-based programs will expand on the course material already available to parts of the national and international nuclear community through Sandia National Laboratories. Graduates of these programs will have a grounding in security principles, practice in component evaluation and system design, and familiarity with commonly used analysis tools within DOE.

Through the use of distance learning, facilities across the country will have access to the same technology and teaching that has previously only been available at prescribed times to limited audiences. This increased access allows opportunities for refresher training, recruitment, and site sponsorship of existing security staff in the various education programs in order to better meet the nuclear regulatory requirements of the US government. In addition, costs can be reduced by providing more training on-site and by reducing the amount of on-the-job training required for graduates of these programs.
Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy under Contract DE-AC04-94AL85000.

References:
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