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Integrating Nonproliferation and Safeguards into the Mandatory Curricula of Undergraduate STEM Programs

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The majority of undergraduate science, technology, engineering, and mathematics (STEM) university programs worldwide lack recurring mandatory course content related to nonproliferation and safeguards. To address this educational gap, a set of Integral Nonproliferation Introductory Teaching and Learning (INITIAL) classroom and laboratory modules have been developed. The INITIAL modules are intended to introduce sustainable safeguards content into mandatory curricula of STEM undergraduate programs in order to highlight the fact that nonproliferation topics (e.g. international safeguards verification) directly rely on many of the fundamental and applied technical topics undergraduates are currently studying. The INITIAL class module is a one-lecture primer (slides and problem sets) that allows for simple integration into mandatory introductory undergraduate STEM courses. The INITIAL laboratory (neutron, gamma, and reactor) modules are a more technically advanced safeguards-based experimental addition that can be integrated into upper-level undergraduate mandatory laboratory courses that utilize equipment or facilities commonly available to STEM university programs e.g. basic radiation sources, detector systems, or in some cases research reactors.

Since 2015, over 30 INITIAL implementations by early career safeguards researchers (recently expanded to various US national laboratories) have occurred, providing sustainable academic course content for university programs that have no mandatory course content in this topical area. According to compiled surveys, many of the students that were exposed to INITIAL reported that they are more likely to pursue careers in safeguards post-INITIAL lecture or lab. The universities continue to deliver INITIAL content long after the first engagement, reaching over 1000 (otherwise unexposed) students. Thus, INITIAL module implementation is actively addressing the challenges of reaching and recruiting. Because the modules are fully customizable to the academic background of the audience, the INITIAL framework can be tailored for implementation abroad. This creates an effective knowledge transfer framework that is designed to continue long after the first engagement.

Which "Key Question" does your Abstract address?

CHA1.4

Topics

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