

# An Analysis of Security Coverage in ABET Accredited Software Engineering and Computer Science Programs

**SOFTWARE**



**UNIVERSITY**

**ENGINEERING**

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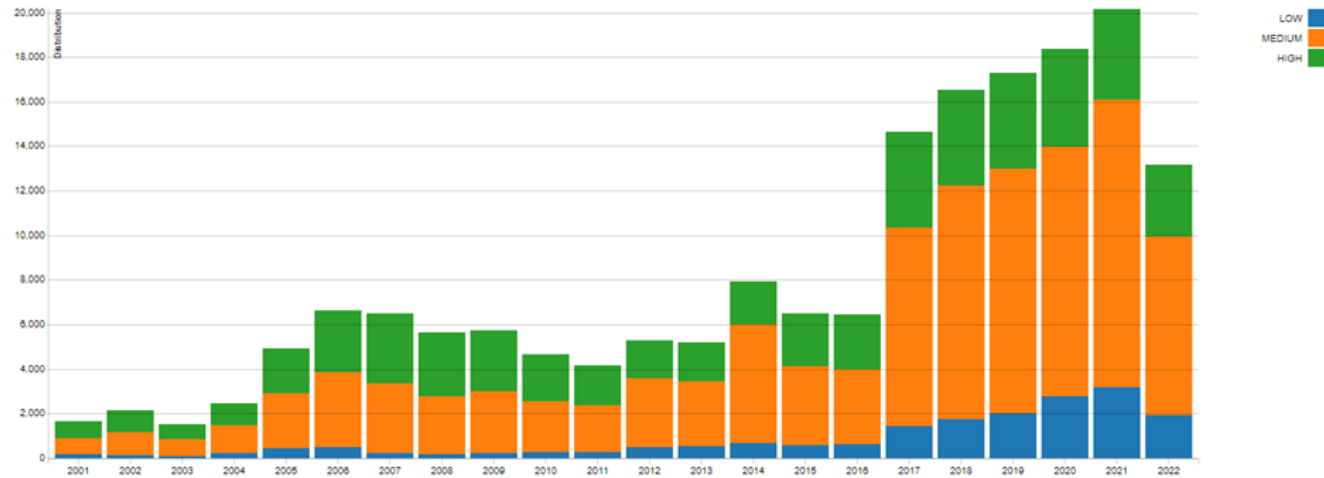


# Overview

- Why this study?
- ABET Criteria
- Study Approach
  - SE Programs
  - CS Programs
- Findings



# CVSS Severity over time



Systematically addressing the problem of security begins with educating software developers at scale. Given that the majority of breaches can be readily prevented using industry best practices, a small amount of knowledge can go a long way. Universities are partly to blame for this lack of preparation. Just one of the U.S.'s top 24 undergraduate programs in computer science lists a security course as a core requirement (I checked). That one exception: UC San Diego. At the other 23 schools, students can obtain a degree without taking a single class in security, and go on to write code that affects the devices on which we increasingly rely.

**Harvard Business Review,  
(August 27, 2019)**

**Every Computer Science  
Degree Should Require a  
Course in Cybersecurity\***



**Security Coverage in ABET Accredited Software  
Engineering and Computer Science Programs**

\*<https://hbr.org/2019/08/every-computer-science-degree-should-require-a-course-in-cybersecurity>



## Criterion 5. Curriculum

The program's requirements must be consistent with its program educational objectives and designed in such a way that each of the student outcomes can be attained. The curriculum must combine technical, professional, and general education components to prepare students for a career, further study, and lifelong professional development in the computing discipline associated with the program.

The curriculum requirements specify topics, but do not prescribe specific courses. The program must include mathematics appropriate to the discipline and at least 30 semester credit hours (or equivalent) of up-to-date coverage of fundamental and advanced computing topics that provide both breadth and depth. The computing topics must include:

1. Techniques, skills, and tools necessary for computing practice.
2. Principles and practices for secure computing.
3. Local and global impacts of computing solutions on individuals, organizations, and society.

## – Software and Similarly Named Engineering Programs

**Lead Society: CSAB**

**Cooperating Society: Institute of Electrical and Electronics Engineers**

These program criteria apply to engineering programs that include "software" or similar modifiers in their titles.

### 1. Curriculum

The curriculum must provide both breadth and depth across the range of engineering and computer science topics implied by the title and objectives of the program.

The curriculum must include computing fundamentals, software design and construction, requirements analysis, security, verification, and validation; software engineering processes and tools appropriate for the development of complex software systems; and discrete mathematics, probability, and statistics, with applications appropriate to software engineering.

### 2. Faculty

The program must demonstrate that faculty members teaching core software engineering topics have an understanding of professional practice in software engineering and maintain currency in their areas of professional or scholarly specialization.

# ABET Criterion

Security Coverage in ABET Accredited Software Engineering and  
Computer Science Programs

# Coverage Approaches

- Dedicated Course(s) for Security
  - Security concepts are principally covered in a course which focuses on security
  - May be shared with other programs, may be specific to program, etc.
  - May also be accomplished by having a selective set of electives which all contain aspects of security
- Topics defined in courses
  - One or more security topics are embodied in one or more courses
  - Typically, found by searching for keyword security in catalog entries
- Unknown
  - Evidence could not be found in catalog descriptions, outcomes, or course titles for security coverage in publically available materials

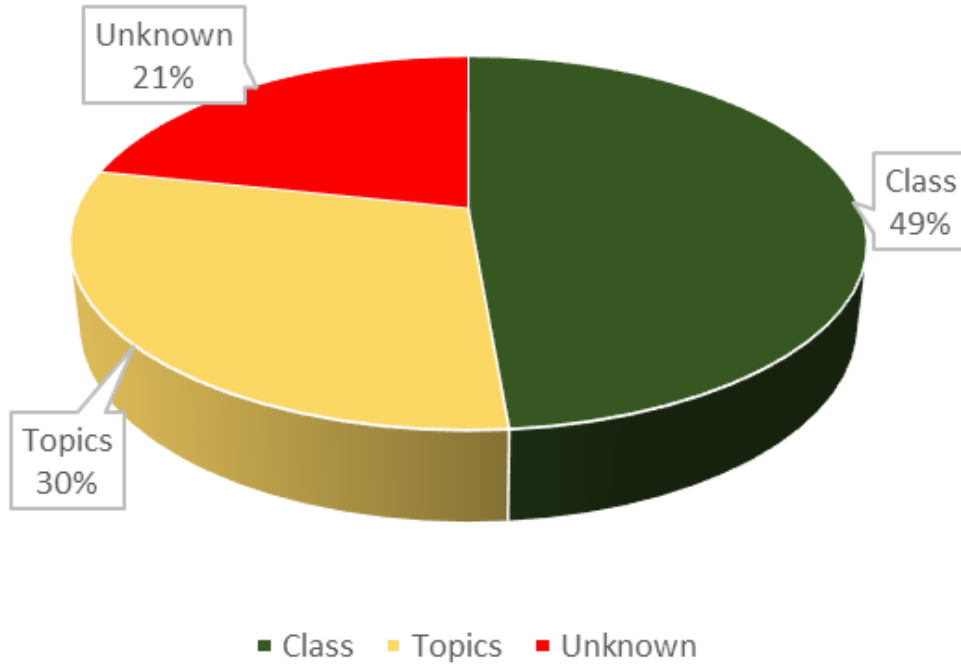


# Study

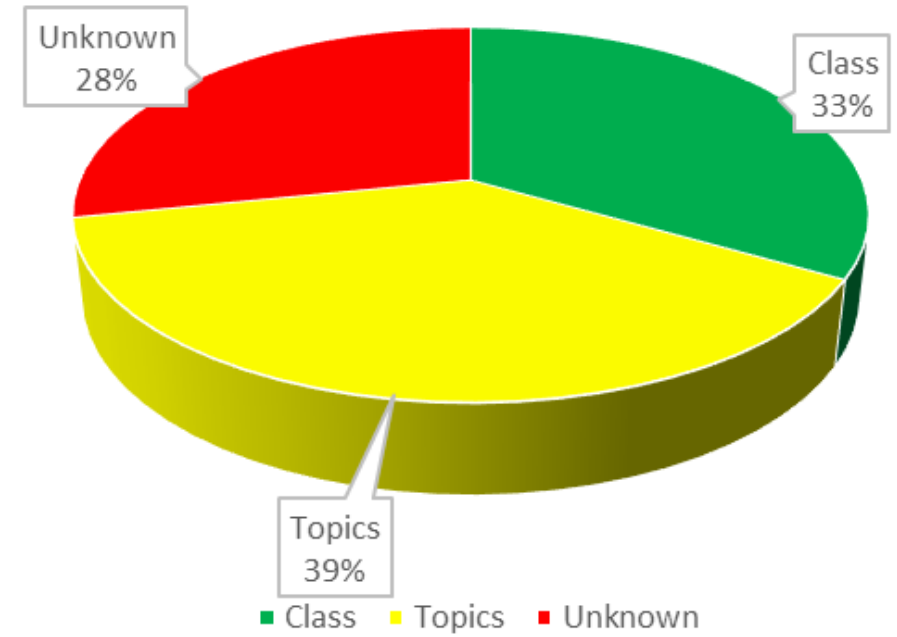
- Reviewed
  - All 37 ABET Accredited Domestic Software Engineering Programs
  - 39 of the 359 ABET Accredited Domestic Computer Science Programs
    - Somewhat “Randomly” selected
- Identified required courses and topics related to security
  - Did not consider electives that may cover security topics
- Note:
  - Approach is somewhat limited, in that it was only done with publicly available materials
  - May be presenting a pessimistic view of the situation
    - Catalog entries may not be entirely current
    - Electives in security may be popular electives
  - However, has implication to transfer credit evaluation(s) and other consistency related issues



ABET SE Program Security Coverage



ABET Computer Science Security Coverage



# High Level Findings

Security Coverage in ABET Accredited Software Engineering and Computer Science Programs



# Findings

- Security component is slightly less developed and consistent than other areas of the programs.
  - For considerable number of programs, it is not possible to identify the topics related to security covered within the program from the course catalog entries.
- Not entirely surprising
  - Newest core area to be required within the criteria
  - Importance has grown significantly in the last decade.
- Is a concern that should be reviewed by the discipline.

# Future Direction

- Upcoming paper at ASEE with more depth on the Software Engineering Findings
  - Schilling, W. W., & Dennis, B. (2023, June), The State of the Practice Integrating Security in ABET Accredited Software Engineering Programs To be presented at 2023 ASEE Annual Conference & Exposition, Baltimore, MD.
- Continuing to expand and analyze CS data set

