

IEEE STANDARDS UNIVERSITY

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IEEE Standards Education Video Series



Curriculum Packet FACILITATOR'S GUIDE



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Overview

IEEE

IEEE, the world's largest technical professional organization, is dedicated to advancing technology for the benefit of humanity. Through its highly cited publications, conferences, technology standards, and activities, IEEE serves as the trusted voice for engineering and other technical professions around the globe. With a membership of more than 425,000 engineers and technical professionals across 160 countries, IEEE publishes over 30 percent of the world's literature in the electrical and electronics engineering and computer science fields, and has developed nearly 900 active industry standards. The organization annually sponsors more than 1,000 conferences worldwide.

The IEEE Standards Education Committee (SEC) is a joint committee of the IEEE Standards Association (SA) and the IEEE Educational Activities Board (EAB). Its mission is to:

- Promote the importance of standards in meeting technical, economic, environmental, and societal challenges
- Secure and disseminate learning materials and short courses on the application of standards in the design and development aspects of educational programs
- Actively promote the integration of standards into academic programs
- Lead other education initiatives planned jointly by IEEE-SA and EAB as needed

Introduction to Standards Video Series

In keeping with its mission, the IEEE SEC has developed a three-part educational video series addressing the important topic of technical standards. The videos—each approximately 15-21 minutes long—serve as “stand-ins” for guest lecturers. The primary target audience is undergraduate engineering students. Other possible groups are business and law students and professors.

While each video can stand alone, the three combined offer a succinct yet comprehensive overview of standards. If course structure and class time allow, it would be beneficial for students to view all of the videos.

Accompanying each video is a curriculum package that provides instructors with everything they need “out of the box” to use the videos to build students’ basic understanding of technical standards. This Facilitator’s Guide provides additional details about the videos and supporting curricular materials, as well as background information on the standards development process.

Video Synopses

Video 1: Standards Education: An Introduction (16 min.)

This video explores the history and evolution of standards, with a look at their role and benefits, the categories under which they fall, and their place in the global marketplace.

Video 2: Standards Education: Creating Global Standards (21 min.)

This video explores global standards development, including methodology and protocols. It emphasizes that global standards affect not only the ever-changing and expanding global marketplace, but also our daily lives.

Video 3: Standards Education: Strategic Standardization (16 min.)

This video delves into the important role that standards play in facilitating global trade, how product testing and conformity assessment help to protect consumers and ensure reliability, and the economic benefits of strategic standardization. The video also offers information about how to obtain standards.

Curriculum Content

Each video has a curriculum packet that includes:

- A summary of the video
- Descriptions of key topics presented in the video, coupled with time codes that identify relevant clips
- A slide presentation focused on main ideas and key takeaways, along with presenter notes that provide instructors with supporting details
- Pre-viewing discussion questions that encourage students to probe their understanding of and begin to explore technical standards
- Post-viewing discussion questions—based on video concepts—that invite students to strengthen their grasp of standards and can be coupled with a graphic organizer (in the addendum) that enables students to easily sort and reflect on primary video topics that instructors select or that students identify
- Post-viewing assessment questions (with answers for instructor reference) that check for student understanding of concepts presented in the video
- Learning activities—for individual or group work and/or course or independent learning projects—that can further student understanding of standards
- Case studies (for group research projects or independent learning tasks) that invite students to delve into, analyze, and address real-world standards-related practices, processes, and/or policies (more details in the curriculum guides)
- Readings that expand student awareness of the myriad elements of standardization (more details in the curriculum guides)
- Resources that provide additional standards information
- An addendum that includes a distribution-ready set of post-assessment assessment questions, a time-coded video script that students and instructors can reference to deepen their grasp of the content, and a glossary of terms

Preparation

It is recommended that instructors take the following steps prior to showing the videos in the classroom and engaging students in curricular tasks:

- 1. Review each curriculum packet. Decide which materials to use and prepare those accordingly. For example, if students are to complete the post-viewing assessment, be sure to photocopy it ahead of time. If students are to analyze a case study, provide them with relevant URLs or print and photocopy one or more for distribution.**
- 2. Watch each video (and read its corresponding script) to become familiar with the content. Select segments to emphasize, if desired.**
- 3. Make sure the projection and sound equipment work.**
- 4. Do a test run of the PowerPoint presentation to avoid technical malfunction. Read the presenter notes and modify slides where appropriate.**

Self-Study: About Standards

It is important for instructors to have a basic grasp of technical standards in order to discuss them and answer student questions. The following overview provides a solid foundation of standards and the development process.

What are Standards?

Standards are published documents that establish specifications and procedures designed to maximize the reliability of the materials, products, methods, and/or services people use every day. Standards help to maximize product functionality and compatibility, facilitate interoperability, and support consumer safety and public health.

Standards form the fundamental building blocks for product development by establishing consistent protocols that can be universally understood and adopted. This helps fuel compatibility and interoperability, simplifies product development, and speeds time-to-market. Standards also make it easier to understand and compare competing products. Standards fuel international trade as they are globally adopted and applied in many markets.

It is through the use of standards that the requirements of interconnectivity and interoperability can be assured. It is through the application of standards that the credibility of new products and new markets can be verified. In summary, standards fuel the development and implementation of technologies that influence and transform the way we live, work, and communicate.

Standards Development Process

Standards unfold within a particular framework. IEEE explains its standard development process through a six-stage lifecycle, representative of typical steps across standards development organizations. The following briefly describes this process, followed by links that present additional details about standards development.



Figure 1: IEEE Standards Development Lifecycle

I. Initiating the Project

Standards projects are started when there is a need for a project idea or concept to be standardized. This is known as a project authorization request (PAR). One person alone does not develop standards; group collaboration and consensus are required. This is where the sponsor comes into the picture. The sponsor is the organization that assumes responsibility for a particular standard. The sponsor provides technical oversight for the standard and also determines the scope and nature of the technical content.

II. Mobilizing the Working Group

Working groups work to create and write the standard, and make technical decisions in the process of developing standards. These groups are open to anyone to participate, strive for broad representation of all interested parties, and encourage global participation. Working group members are comprised of individuals for individual standards projects or representatives from entities (such as corporations, government agencies, or academic institutions) for corporate standards projects. All participating in working groups have technical expertise, knowledge, and a dedicated interest in the technology being standardized.

III. Drafting the Standard

The first milestone for many working groups is finishing their first complete draft. One of the ways to start is to break the document down into segments or sections. First, a scope and purpose are prepared. Next, an outline is created. Often, this outline will also serve as the structure for the standard. The subjects in the outline will become the clauses and subclauses in the document. This outline should be thoroughly reviewed against source materials and working group ideas to ensure that it is conclusive. Then the working group works to fill in the outline.

IV. Balloting the Standard

The ballot process is as much a part of the standards-writing process as is the working group that develops the standard, because votes and comments made during the ballot are used not only to approve or disapprove the standard, but to ensure that stakeholders who were not able to participate can also have input into the standard.

Balloters usually fall into one of several interest categories (e.g. producers, users). No interest category can comprise over one-third of the balloting group. The goal in balloting is to gain the greatest consensus. A standard will pass if at least 75 percent of all ballots from a balloting group are returned and if 75 percent of these bear a "yes" vote. If ballot returns of 30 percent are abstentions, the ballot fails.

Ballots usually last 30 to 60 days. Balloters can approve, disapprove, or abstain. They can also approve or disapprove with comment. Anyone can appeal actions and decisions made during the process at any time. The ballot resolution group responds to all comments, whether submitted by those within or outside of

the balloting group. Editorial comments are often straightforward; changes to the standard based on technical comments are recirculated.

V. Gaining Final Approval

The standards board approves or disapproves standards based on the recommendation of the standards review committee, which ensures working groups follow all procedures and guiding principles in drafting and balloting a standard. After approval, the standard is edited, given a final review by the members of the working group, and published.

VI. Maintaining the Standard

Sometimes a standard may need a technical or editorial correction to be made, which the sponsoring standards organization can help to correct. A technical error, once corrected (via a corrigenda), goes through a consensus ballot; a semantic error does not require these steps. A standard has a validity period of ten years from the date of board approval. At the end of this period, one of two things has to happen: revision or withdrawal. If no action is taken, the standard will be moved to inactive-reserved status.

For a full overview of the standards development process, visit:

The Standards Development Lifecycle

<https://standards.ieee.org/develop>

and Standards Development Process

<https://standards.ieee.org/develop/process.html>

Resources

IEEE

IEEE: An International Standards Developer

<http://standards.ieee.org/develop/intl/ieeewto.pdf>

Discusses IEEE's adherence to World Trade Organization's principles for international standardization
(Audience: instructor and student)

IEEE Standards Association

<http://standards.ieee.org/>

Leading consensus building organization that nurtures, develops, and advances global technologies
(Audience: instructor and student)

Technology Standards and Resources

<http://standards.ieee.org/findstds/index.html>

Site to find published standards and other materials

(Audience: student)

IEEE Standards University

<http://standardsuniversity.org/>

Offers online educational courses and workshops, a library and e-magazine, and videos

(Audience: instructor and student)

Articles

Bracy, J. (2016, Sept) **Creating Standards for Privacy Engineers: It Ain't Easy!** *The Privacy Advisor*.

<https://iapp.org/news/a/creating-standards-for-privacy-engineers-it-aint-easy/>

Explores standards around privacy engineering

(Audience: student)

Ross, K. (2010, Oct) **Compliance with Product Safety Standards as a Defense to Product Liability Litigation.** *In Compliance*. Pages 36-40.

<http://incompliancemag.com/article/compliance-with-product-safety-standards-as-a-defense-to-product-liability-litigation/>

(Audience: instructor)

Strauss, J. **Enhancing Your Role as Standards Professional**

http://www.astm.org/studentmember/Standards_Professional.html

Describes what being a standards professional entails

(Audience: student)

Books and Journals

Bartleson, K. (2010) ***The Ten Commandments for Effective Standards: Practical Insights for Creating Technical Standards***. Cupertino, CA: Happy About (Synopsis Press affiliate)

<http://www.synopsys.com/Company/SynopsysPress/TenCommandments/Pages/default.aspx>

Focuses on technical standards and the climate in which standards are created, as well as offers ways to improve the standardization process.

(Audience: instructor)

InCompliance

<http://incompliancemag.com>

Source of news, information, and resources for electrical engineering professionals, and includes standards updates.

(Audience: instructor and student)

Schneiderman, R. (2015) ***Modern Standardization***. Hoboken, NJ: Wiley.

<http://www.wiley.com/WileyCDA/WileyTitle/productCd-1118678591.html>

Provides “real-world” insight into the role standards play in the technical, political, and economic arenas of engineering

(Audience: instructor)

Standards Sources

Sites for locating a range of standards across industries and standards organizations; useful to instructors and students.

China National Institute of Standardization

<http://en.cnis.gov.cn/>

European Standards Organizations

<http://www.cenelec.eu/aboutcenelec/whoweare/europeanstandardsorganizations/index.html>

How to Find Standards

<http://gsi.nist.gov/global/index.cfm/L1-5/L2-44/A-171>

The Engineering Toolbox: National Standards Organizations (worldwide)

http://www.engineeringtoolbox.com/national-standards-d_764.html

Standards on Campus (offers a fee-based service)

http://www.astm.org/studentmember/Access_by_Course.html

Standards Portal

http://www.standardsportal.org/usa_en/resources/sdo.aspx

Technical Standards

<http://guides.library.cornell.edu/c.php?g=32614&p=207398>

Videos

Bartleson, Karen. **Ignite! Session: Karen Bartleson**. 2014's Sections Congress "Ignite! IEEE.tv. *IEEE.tv*. 28 March 2015.

<https://ieeetv.ieee.org/ieeetv-specials/ignite-session-karen-bartleson>

Discusses impact of international standards

(Audience: instructor and student)

Global Impact of Standards. IEEE Standards Education Committee. *IEEE Standards University*. 2 Dec 2014.

<http://www.standardsuniversity.org/video/global-impact-of-standards/>

2014 IEEE-SA Standards Board discusses global impact of technical standards on worldwide industry and society

(Audience: instructor and student)

Mills, Steve. **Standards Education, 1 of 3**. IEEE Standards University. *IEEE Standards University*. 3 Dec 2014.

<http://www.standardsuniversity.org/video/steve-mills-standards-education-1-of-3/>

Discusses fundamental dynamics of standards, as well as standards' impact on innovation

(Audience: instructor and student)

Post-Viewing Discussion Questions Graphic Organizer

Instructions: As you watch the video, jot down notes that correspond with each of the listed topics. This will help you to provide informed responses to discussion questions.

