

## Selection Criteria

### *Premier Award for Excellence in Engineering Education Courseware*



The criteria described below reflect the values associated with good teaching practices and pedagogy that we wish to promote and guide the selection of the *Premier Award for Excellence in Engineering Courseware*. The criteria are divided into three categories: instructional design, software design, and engineering content. Each category is described by a set of components and sub-components. The entire learning experience of using the software, as well as the materials in the submission packet, should demonstrate that the submission meets (and hopefully exceeds) the criteria by addressing each component and sub-component.

#### Scoring for Instructional Design and Software Design

- Scoring is done on a seven point scale from 1 = poor to 7 = excellent.
- To earn four (4) points for a given category, the software must address most, if not all, applicable sub-components in Part 1.
- To earn six (6) points, the software must address most applicable sub-components of Parts 1 and 2.
- To earn seven (7) points, the software must address all applicable sub-components of Parts 1 and 2.
- If none of the sub-components in Part 2 have been addressed, that category cannot receive a score higher than a four.

#### Scoring for Engineering Content

- Engineering Content is not scored the same way as the other categories, it is scored to reflect its accuracy and appropriateness for the *Premier Award*. Engineering content is evaluated by the judges' agreement with the statements listed: Strongly Disagree, Disagree, Agree and Strongly Agree.
- If any judge evaluates the statements as Strongly Disagree or Disagree the software cannot be considered for the *Premier Award* or as a finalist candidate.

The sub-components relate to the scale in such a way as to ensure the excellence of the winners. Winning software need not address all sub-components specifically, since not all components are appropriate for each type of courseware. For example, a piece of software may not include a simulation; as a result, not all components dealing with user feedback are appropriate. We expect the software selected for the *Premier Award* will address most, if not all, of the applicable components in an exemplary manner.

## 1.0 INSTRUCTIONAL DESIGN

### ***1.1 Learning Objectives: Learning objectives and goals are clearly stated and supported by the software and learning experience.***

#### Part 1:

- Learning objectives and goals are appropriate and clearly stated, in the software (preferred) in an instructor's guide or the submission packet.
- The presentation and organization of content, as well as related activities, supports the learning objectives and goals.

#### Part 2: Support for Learning Objectives is enhanced if:

- Learners are aware of learning objectives as they are using the software and participating in the learning experience.
- A clear method of measuring achievement of learning objectives and goals is provided within the software or by the learning experience.
- Learning objectives and goals can be correlated to ABET accreditation criteria.

### ***1.2 Interactivity: The learner is actively involved in the learning process—the interaction enhances learning.***

#### Part 1:

- The software responds appropriately to learner actions.
- Communication is 2-way.
- Learners control their own pace and are informed of their progress so they can make appropriate decisions about how to proceed.
- Choices that learners make are meaningful and not “just for the sake of making choices”.

#### Part 2: Interactivity is enhanced if:

- Learners decide: what they want to learn; in what order; and how deeply they want to concentrate on specific topics.
- The learner can select the type of media that she wants to use (e.g., audio, transcript, etc.).
- There are questions and challenges to help the learner monitor his or her progress.
- Learners are presented with relevant problems to solve; exemplary solutions are included.
- There is an analysis of learner input and useful, appropriate feedback.
- The system adapts its delivery style or content based on learner actions.

### ***1.3 Cognition/Conceptual Change: Learning appears to be significant and long lasting—strong and useful cognitive models can be built.***

#### Part 1:

- It appears that learners will be able to demonstrate or apply the concepts introduced by the software in meaningful ways.
- It appears that learners will be able to transfer what they've learned to areas beyond what is specifically covered in the software.
- The software encourages and supports reflection, deep thinking, knowledge integration, and making connections.

#### Part 2: Cognition/Conceptual Change is enhanced if:

- The software has been tested with real learners and there is evidence that it enhances learning.
- Learners are encouraged to make predictions; provide self-explanations; or to analyze, synthesize or reorganize the information.
- Mechanisms are provided so learners can monitor their own understanding and correct their misconceptions or poorly developed mental models.

#### ***1.4 Content: The content is well chosen and structured.***

##### Part 1:

- The scope of the content is appropriate for the intended learning objectives and intended audience.
- There is a default sequencing of material that makes sense for learning (i.e., concepts build upon each other and are presented in a clear, logical manner).
- The structure of the knowledge to be learned is clearly conveyed.
- The content builds on prior knowledge that learners can be expected to have; the required background knowledge is clearly stated or understood.

##### Part 2: Choice and Structure of Content is enhanced if:

- There are useful links between content areas.
- The organization facilitates the user's exploration of the area of knowledge both inside and outside the learning experience.

#### ***1.5 Multimedia use: Multimedia is used effectively and promotes the learning objectives and goals.***

##### Part 1:

- None of the multimedia representations used are ambiguous, lead to serious misconceptions, or are likely to be misinterpreted by learners.
- Media is used appropriately and not gratuitously.
- Multiple representations are used to help learners construct inter-related knowledge.
- Media elements are of high visual and aural quality.

##### Part 2: Multimedia use is enhanced if:

- Multiple media types support each other. For example, text transcripts are available for audio data, or audio data narrates animation(s).
- Multimedia elements are clearly labeled, so the learner doesn't have to struggle to figure out what they are looking at, or why the element is there. The software has multimedia elements that in themselves are interactive (e.g., learner can interact with animation of a system, by pressing buttons or moving levers, etc.).

#### ***1.6 Instructional Use/Adaptability: The software can be used in a variety of settings.***

##### Part 1:

- Instructions or an instructor's guide clearly explains how this software should be used to be effective, and who is expected to use the software.
- The intended use is not so narrowly defined that only a select few could use this software.
- There are suggestions in the instructors' guide or mechanisms in the software to assess learning.

##### Part 2: Instructional Use/Adaptability is enhanced if:

- The software provides different use levels (beginner, intermediate, expert).
- Help functions and guides are provided.
- There are instructor configurable software settings.
- There are clear suggestions for alternate uses in the instructors' guide, or easily identifiable alternate uses.
- This software has potential to improve the way instructors spend their time.

## **2.0 SOFTWARE DESIGN**

### ***2.1 Engagement: The software holds the interest of a diversity of learners.***

#### Part 1:

- The software is stimulating and challenging.
- The software does not contain stereotypes (racial, gender, ethnic, age).
- Speed of software is satisfactory.
- The software is visually appealing and attractive in the design of its screens.

#### Part 2: Engagement is enhanced if:

- The learner would use it more than once.
- There are learner-tailorable interface settings.
- There is consideration for learners with physical impairments.
- The software promotes diversity and gender equity.

### ***2.2 Learner Interface and Navigation: The software is easy to use.***

#### Part 1:

- The software is consistent in its design and response to learner actions.
- The learner will not get confused about how to proceed.
- The learner can form a mental map of where they are and how to get around in the software (e.g., through an explicit map or because the software is simple enough).

#### Part 2: Learner Interface and Navigation is enhanced if:

- Icons and graphical symbols are clear and unambiguous.
- There are multiple forms of navigation (e.g., table of contents, next/previous, index, and search).
- Screens can be viewed without scrolling.
- Text on screens is appropriately scaled and cannot be erased.

### ***2.3 Technical Reliability: The software is free from technical problems.***

#### Part 1:

- There are no obvious software bugs.
- There are no interface problems (e.g., all buttons function, screen graphics are displayed and updated appropriately, text on screens cannot be erased and/or are not cut off, etc.)
- Software crashes occur very rarely, if at all.

#### Part 2: Technical Reliability is enhanced if:

- Screens can be viewed without scrolling.
- Text on screens is appropriately scaled and cannot be erased.

## **3.0 ENGINEERING CONTENT**

### ***3.1 Accuracy: The content is accurate and error free.***

### ***3.2 Appropriateness: The content is appropriate for the scope of the Premier Award.***