CSTA Standards Crosswalk with ACM Core Learning Outcomes and Assessment for Associate-Degree Curriculum in Information Technology

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Background

- 1,132 two-year colleges in the U.S.
- Increasing number of high school students decide to attend community colleges
- Clearly defined computer science pathways from high schools to two-year colleges benefit students
Outline

• Level 3B of the 2011 CSTA Computer Science Standards

• 2014 ACM Competency Model of Core Learning Outcomes and Assessment for Associate Degree Guidelines in Information Technology

• Crosswalk between the Two Guidelines
CSTA Level 3B

2011 CSTA Computer Science Standards

• Recommended for Grades 10 and 11

• *Computer Science Concepts and Practices*

• Can be realized by following the new *AP Computer Science Principles* course

• Excellent foundation in computer science prior to taking an *AP Computer Science A* course
CSTA Level 3B
2011 CSTA Computer Science Standards

Learning Objective-Based Standards

- Computational Thinking – 11
- Collaboration – 3
- Computing Practice and Programming – 8
- Computers and Communications Devices – 5
- Community, Global and Ethical Impacts – 8

- Total of 35 Standards
ACM Information Technology
Competency Model of Core Learning Outcomes and Assessment
for Associate-Degree Curriculum

- Include both technical and behavioral outcomes
- Organized in 11 program outcome areas
- Span the first 3 levels of Bloom’s Revised Taxonomy

Lower Order Thinking Skills
- Remembering: 5
- Understanding: 27
- Applying: 18

Higher Order Thinking Skills
- Analyzing
- Evaluating
- Creating
ACM Information Technology Competency Model of Core Learning Outcomes and Assessment for Associate-Degree Curriculum

- 50 learning outcomes of core IT competencies
  - Client computing and user support - 9
  - Database and information management - 8
  - Digital Media and immersive technology - 4
  - Networking and convergence - 6
  - Programming and application development - 7
  - Servers, storage, and virtualization - 7
  - Diverse team collaboration - 1
  - Interpretation and communication of information - 3
  - Lifelong learning - 1
  - Professional, legal, and ethical behavior - 2
  - Business awareness and workplace effectiveness - 2
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Competency Model of Core Learning Outcomes and Assessment
for Associate-Degree Curriculum

- 3-tiered assessment rubric for each learning outcome
- Mappings to other curricula and frameworks
  - CSTA Computer Science Standards
  - U.S. Dept. of Labor IT 2012 Competency Model
  - ACM IT Baccalaureate Guidelines
  - ACM CS2013 Baccalaureate Guideline
  - European e-Competence Framework
  - Common Criteria for Information Technology Security Evaluation
Full Report of the ACM IT Competency Model

www.capspace.org/ITreport/
# ACM Information Technology Competency Model of Core Learning Outcomes and Assessment for Associate-Degree Curriculum

## Sample Learning Outcomes and Assessment Rubric

<table>
<thead>
<tr>
<th>Learning Outcome</th>
<th>Below Expectations</th>
<th>Meets Expectations</th>
<th>Exceeds Expectations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstrate the techniques of defensive programming and secure coding.</td>
<td>Lists strategies for creating secure code.</td>
<td>Explains the techniques of defensive programming and secure code, such as input validation and avoiding buffer overflows.</td>
<td>Implements programming solutions using defensive programming and secure coding techniques.</td>
</tr>
<tr>
<td>Use communication, negotiation, and collaboration skills as a member of a diverse team.</td>
<td>Uses communication, negotiation, and collaboration skills at a subpar level within a diverse team.</td>
<td>Uses communication, negotiation, and collaboration skills as a member of a diverse team.</td>
<td>Analyzes interpersonal interactions to improve collaboration within a diverse team.</td>
</tr>
<tr>
<td>Describe the layers, protocols and components of the OSI model.</td>
<td>Lists the layers, protocols or components of the OSI model inaccurately or insufficiently.</td>
<td>Identifies the layers, names the major protocols and describes common components of the OSI model.</td>
<td>Explains the interaction of the OSI model layers in the encapsulation process.</td>
</tr>
</tbody>
</table>
Crosswalk Highlights
Level 3B to ACM IT Core Learning Outcomes

• **Computational Thinking (18%)**
  – 2 of 11 CSTA standards map to ACM IT LOs

• **Collaboration (66%)**
  – 2 of 3 CSTA standards map to ACM IT LOs

• **Computing Practice and Programming (87%)**
  – 7 or 8 CSTA standards map to ACM IT LO

• **Computers and Communications Devices (40%)**
  – 2 of 5 CSTA standards map to ACM IT LOs

• **Community, Global and Ethical Impacts (75%)**
  – 6 of 8 standards with 7 met
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