

# Cybersecurity Curricular Guidance for Associate Degree Programs & Other Efforts



George Mason University in Fairfax, Virginia  
Wednesday, August 14th  
11:15-12:05pm  
Room A

**Dr. Melissa Stange, Professor of Computer Science**  
**Dr. Henry Coffman, Professor of Cybersecurity & IT**



and  
Curricular Guidelines

**Global Mission**

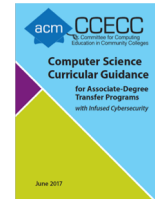
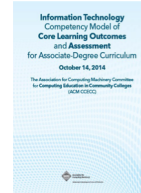
Serve and support community and technical college educators in all aspects of computing education

[ccecc.acm.org](http://ccecc.acm.org)

# ACM Curriculum Guidelines for Associate-Degree Programs

Produced by the CCECC

- Information Technology - IT Competency Model 2014
  - Guidelines for the core of A.A.S. / career programs
  - Infused with cybersecurity
- Computer Science - CTransfer2017
  - Guidelines for A.S. / transfer programs
  - Infused with cybersecurity



Current Projects

- Cybersecurity - CSEC2Y
- IT Transfer

# CSEC2Y Background



# CSEC2Y Task Group

Cara Tang\*+ | Portland Community College, Portland, OR

Cindy Tucker\* | Bluegrass Community and Technical College, Lexington, KY

Christian Servin\* | El Paso Community College, El Paso, TX

Markus Geissler\* | Cosumnes River College, Sacramento, CA

Melissa Stange\* | Lord Fairfax Community College, Middletown, VA

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Amelia Phillips | Highline College, Des Moines, WA

Lambros Piskopos | Wilbur Wright College, Chicago, IL

Pam Schmelz | Ivy Tech Community College, Columbus, IN

\* Steering Committee

# CSEC2Y Advisors

Antonio Bologna | Rapid 7

Elizabeth Hawthorne | Union County College

Phil Helsel | Microsoft

Sidd Kaza | Towson University

Sepehr (Sepi) Hejazi Moghadam | Google

Bill Newhouse | NICE (National Initiative for Cybersecurity Education)

Casey O'Brien | National CyberWatch Center

Allen Parrish | Mississippi State University

John Sands | Moraine Valley Community College, CSSIA

Brian Ventura | SANS Instructor

# StrawDog – Reviewers

**Daniel Sehnal, Rappahannock Community College (RCC), Glens Campus, Saluda, VA**

**Alvin Brewer, Lord Fairfax Community College, VA**

**Henry Coffman, Lord Fairfax Community College, Middletown VA**

**Crystal Dye, Southwest Virginia Community College, Richlands, VA**

John Impagliazzo, Hofstra University, Hempstead, NY

Michael McKeever, Santa Rosa Junior College, Petaluma, CA

Margaret, Montgomery College, Montgomery College

Trang D. Nguyen, Prince George's Community College, Largo, MD

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James Walden, Northern Kentucky University, Highland Heights, KY

Tim Preuss, Minnesota State Community and Technical College, Moorhead, MN

John Cook, Herkimer College, Herkimer, NY

Sepi Hejazi Moghadam, Google, CA

Suvineetha Herath, Carl Sandburg College, Galesburg, IL

# CSEC2Y Project Scope

- Curriculum guidelines for associate degree programs (2 years)
  - Transfer programs (A.S. degree)
  - Career programs (A.A.S. degree)
- Based on ACM CSEC2017
- Updated for currency & appropriateness at the two-year college level
- Other influences:
  - CAE2Y knowledge units (KUs) - 2019 Foundational + Technical Core
  - NICE Cybersecurity Workforce Framework
  - Others



# CSEC2017

cybered.acm.org

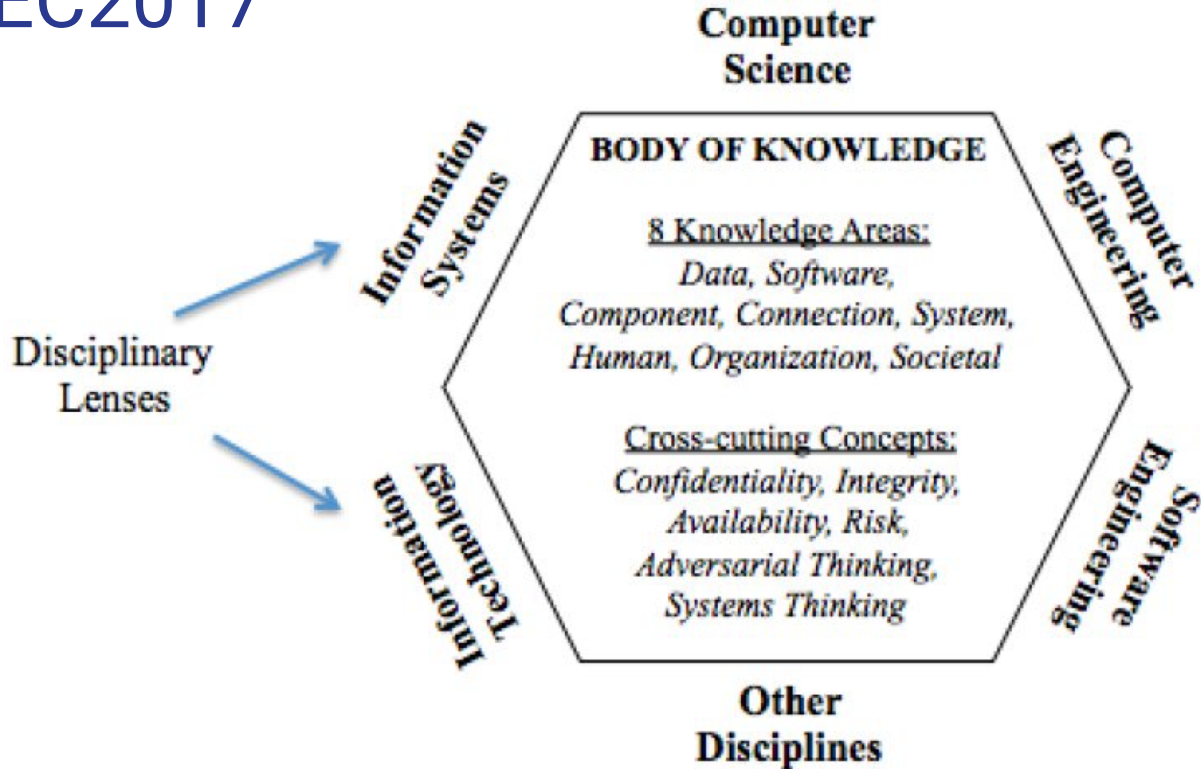
**Vision:** *The CSEC2017 curricular volume will be the leading resource of comprehensive cybersecurity curricular content for global academic institutions seeking to develop a broad range of cybersecurity offerings at the post-secondary level.*

## Organization

- Knowledge areas, knowledge units, topics
- Cross-cutting concepts
- Disciplinary lenses



# CSEC2017



# CSEC2Y IronDog



[ccecc.acm.org/guidance/cybersecurity](https://ccecc.acm.org/guidance/cybersecurity)

# CSEC2Y

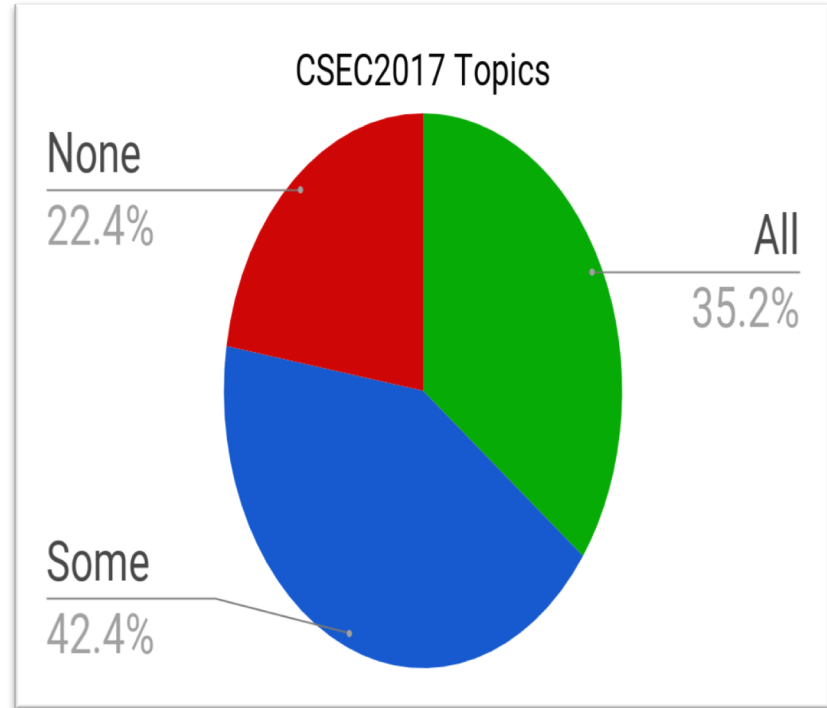
Maintain the 8 Knowledge Areas (KAs) of CSEC2017:

- Data Security
- Software Security
- Component Security
- Connection Security
- System Security
- Human Security
- Organizational Security
- Societal Security

## CSEC2017 Structure

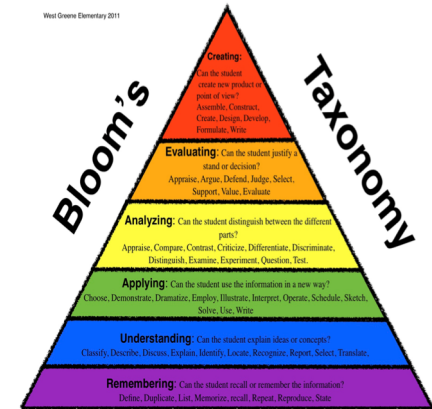
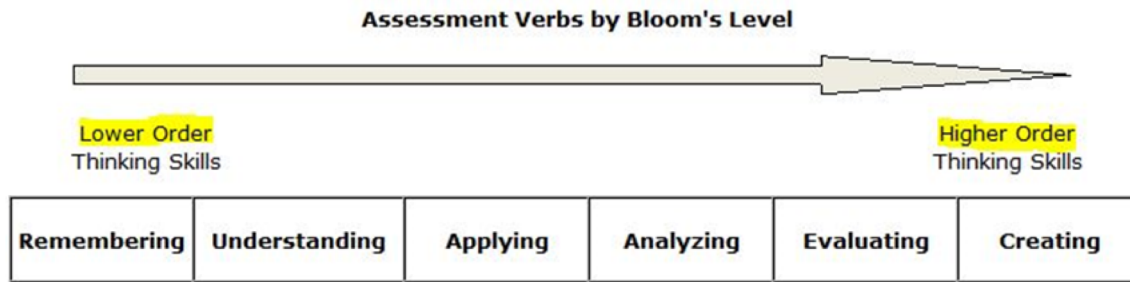
### 8 Knowledge Areas

- Essentials
- Knowledge Units
  - **Topics**



# Competencies and Learning Outcomes Instead of Topics

- Competency: integrates knowledge, skills, and dispositions in context
  - Dispositions: “attitudinal, behavioral, and socio-emotional qualities of how disposed people are to apply knowledge and skills to solve problems”\*
- Learning outcomes focus on **student achievement**
- Avoid traditional body of knowledge focus on topics
- Use Bloom’s Revised Taxonomy



\* Frezza et al, 2018. *Modelling Competencies for Computing Education beyond 2020: A Research Based Approach to Defining Competencies in the Computing Disciplines*

# CSEC2Y Curricular Framework Structure

- Learning outcomes for each KU and topic
- Focus on **student achievement**
- Focus on what students *can do* rather than what students *know*
- Avoid traditional body of knowledge focus on topics and contact hours

## Essential

- 8 Knowledge Areas
  - Competencies
  - Knowledge Units
    - **Learning Outcomes**

## Supplemental

- 8 Knowledge Areas
  - Competencies
  - Knowledge Units (KUs)
    - **Learning Outcomes**

# Selected Competencies - Cross-Cutting Concepts

- Outline via appropriate methods, and using industry standard terminology, cybersecurity-related issues within an organization as they pertain to Confidentiality, Integrity, and Availability. *Analyzing*
  - Apply appropriate countermeasures to help protect organizational resources based on an understanding of how bad actors think and operate. *Applying*
  - Discuss how changes in one part of a system may impact other parts of a cybersecurity ecosystem. *Understanding*
- Confidentiality, Integrity, Availability*
- Adversarial Thinking*
- Systems Thinking*



# Selected Competencies - Software Security

- Demonstrate techniques of defensive programming and secure coding in a software system. *Understanding*
- Analyze the software development life cycle and explain and discuss how security can be incorporated into the software development life cycle. *Analyzing*
- Use documentation or a knowledge base to resolve a security challenge in an identified computing scenario. *Applying*

# CSEC2Y IronDog Table of Contents

## Introduction

- Overview
- How to use these Guidelines
- Two-year/Community College Environment
- Diversity in the Computing Profession
- Ethics and Professionalism
- Mathematics Requirement
- The Cybersecurity Discipline

## Cybersecurity Curricular Framework

### Essential

- Cross-Cutting Competencies
- 8 Knowledge Areas
  - Competencies
  - Knowledge Units
    - Learning Outcomes

### Supplemental

- (same as Essential)

### References

### Appendix: Competencies

# Review CSEC2Y IronDog



Review the IronDog draft and complete the feedback survey to offer your input and help shape the next version of the guidelines!

- Input on specific competencies
- What would make the guidelines more useful?
- Would adding rubrics help you?
- Any other input

*Feedback deadline:*  
**August 15**

Find IronDog and the feedback survey at:

[ccecc.acm.org](http://ccecc.acm.org)



# Related Cybersecurity Initiatives



# ABET Cybersecurity Program Accreditation

ABET accredits 4-year computing programs in

- Computer Science
- Information Systems
- Information Technology
- **Cybersecurity** - new; first 4 schools accredited in pilot round 2017-2018

ABET is developing criteria for accrediting **2-year cybersecurity programs**.

- **Criteria will be based on CSEC2Y**



# ABET Criteria Development

- Joint CAC/CSAB 2YCy Criteria Subcommittee
  - Hoot Gibson – CAC EXCOM, CSAB, 4YCy Criteria, CSEC2017
  - Ed Sobiesk – CAC, 4Y Cybersecurity Criteria Co-chair
  - Cara Tang – ACM CCECC Chair, CSEC2Y Chair
  - Mary Marchegiano – ETAC 2Y Program Evaluator
- Primary reference documents
  - Cybersecurity Curricula 2017 (CSEC 2017)
  - Cybersecurity Curricular Guidance for Associate Degree Programs (CSEC2Y)
  - CAC 4-Year General and Cybersecurity program criteria
  - ETAC 2-Year Engineering Technology program criteria
  - NSA CAE-2Y requirements

# ABET Accreditation Criteria

- All ABET Commissions have the following 8 Criteria **General Criteria** with the five black (“harmonized”) criteria common to all
  1. Students
  2. Program Educational Objectives
  3. **Student Outcomes**
  4. Continuous Improvement
  5. **Curriculum**
  6. **Faculty**
  7. Facilities
  8. Institutional Support
- The **Student Outcomes**, **Curriculum**, and **Faculty** criteria differ between commissions (EAC, CAC, ETAC, and ANSAC)
- These three criteria also may be augmented by **Program Criteria** specific to disciplines and developed by member societies

# Criteria for Accrediting Computing Programs, 2019 – 2020

To Get Big Picture

<https://www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-computing-programs-2019-2020/>

Associate program Criteria 3 & 5 -

This program criteria REPLACE the General Computing Accreditation Commission Criteria 3 and 5





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## Provide your input to shape and improve CSEC2Y

- Review IronDog and complete a feedback survey till **August 15!**

IronDog: <https://ccecc.acm.org/files/publications/CSEC2Y-IronDog.pdf>

IronDog Survey:

