Adapting the IT2017 Curricula for Two-Year IT Transfer Programs

Determining the Optimal Level of Curricular Guidance

Markus Geissler, Cosumnes River College, CA
Svetlana Peltsverger, Kennesaw State University, GA
Tim Preuss, Minnesota State Community and Technical College – Moorhead, MN
Cara Tang, Portland Community College, OR

Introduction

- Curriculum Guidance (Cara)
  - ACM CCECC
  - IT2014, IT-Transfer2019, etc.
- IT-Transfer2019 IronDog DRAFT (Markus)
  - IT-Transfer Task Group
  - Accomplishments to date
- IT2yr2014 vs. IT-Transfer2019 (Tim)
- Example: IT Transfer program between Kennesaw State University and their feeder CCs (Svetlana)

Curriculum Guidance (Cara)

- ACM Committee for Computing Education in Community Colleges (ACM CCECC)
- IT2014, IT-Transfer2019, etc.

ACM Curriculum Guidance for Baccalaureate Programs

CC2005 (Computing Curricula 2005): The Overview Report

- Computer Engineering – CE2016
- Computer Science – CS2013
- Information Systems – IS2010
- Information Technology – IT2017
- Software Engineering – SE2014
- Cybersecurity – CSEC2017

Under Development

- CC2020
- Data Science

www.acm.org/education

Introduction to ACM CCECC

Committee for Computing Education in Community Colleges

- 40++ years of service to computing education
- Standing committee of the ACM Education Board for 25+ years

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

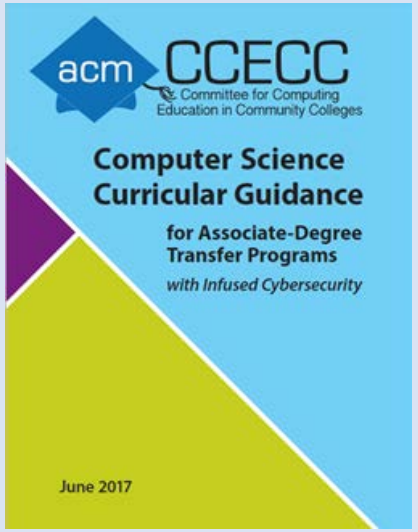
- Engage in curriculum and assessment development, community building, and advocacy in service to this sector of higher education

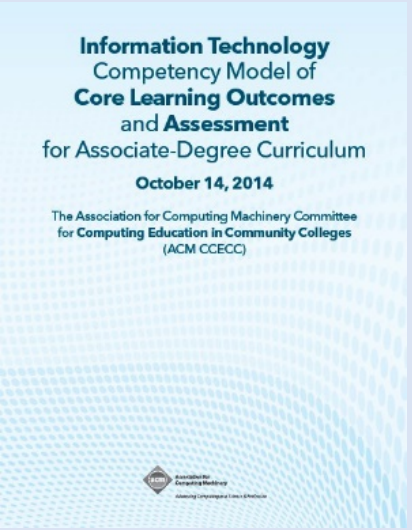
ccecc.acm.org

ACM Curriculum Guidance for Associate Programs

Produced by the CCECC

- Information Technology – IT2yr2014
  - Guidelines for the core of A.A.S. / career programs
  - Infused with cybersecurity
- Computer Science - CSTransfer2017
  - Guidelines for A.S. / transfer programs
  - Infused with cybersecurity
- Current Projects
  - Cybersecurity – Cyber2yr2020
  - IT Transfer – IT-Transfer2019



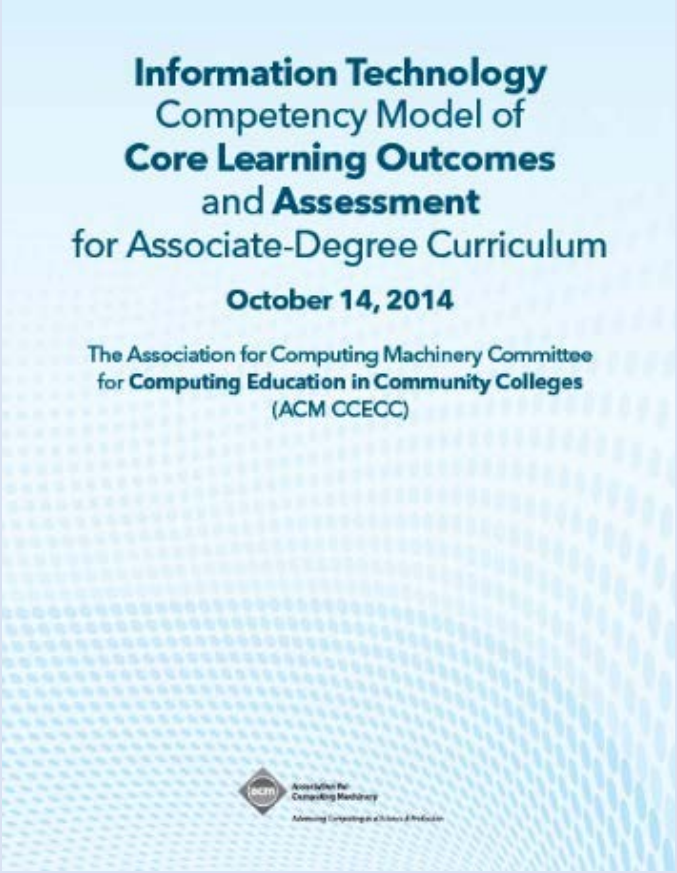


IT2yr2014: IT Competency Model

Information Technology Competency Model of Core Learning Outcomes and Assessment for Associate-Degree Curriculum

- Includes 50 core IT learning outcomes
- Includes assessment metrics for each learning outcome
- 7 of the 50 learning outcomes focus on cybersecurity

ccecc.acm.org/ITreport



ACM Curriculum Guidance for Associate Programs

- Non-prescriptive guidance
  - Community needs vary
- Competency-based
  - Focus on student achievement
  - What students can do rather than what students know
- Utilize Bloom's Revised Taxonomy
  - Creating, Evaluating, Analyzing, Applying, Understanding, Remembering
- Infused with cybersecurity

IT-Transfer2019 IronDog DRAFT (Markus)

- IT-Transfer Task Group
- IT-Transfer2019 IronDog DRAFT highlights
- Looking for feedback

IT-Transfer Task Group

- Markus Geissler (chair), Cosumnes River College
- Dana Brown, Bluegrass Community & Technical College
- Norma McKenzie, El Paso Community College
- Svetlana Peltsverger, Kennesaw State University
- Tim Preuss, Minnesota State Community and Technical College - Moorhead
- Mihaela Sabin, University of New Hampshire
- Cara Tang, Portland Community College

IT-Transfer2019 Highlights

- Full competency-based approach to learning IT
- 29 Essential (ITE) and 27 Supplemental (ITS) competencies
  - 19 IT domains, plus a Mathematics domain
    - IT2017 lists 80 competencies
- IT programs that articulate convincingly what students should be able to achieve by the time they transfer to a four-year institution
- Readers should be familiar with IT2017 guidance

IT Transfer vs. Applied IT Programs

- IT transfer programs which prepare students for transfer to a four-year college or university where they will complete their IT baccalaureate degree (IT-Transfer2019)
- Separate *Information Technology Competency Model of Core Learning Outcomes and Assessment for Associate-Degree Curriculum* exists for applied two-year IT programs (IT2yr2014)
  - Tim will contrast guidance documents later

General Education Requirements

- To accommodate GE, the IT Transfer2019 Task Group chose to keep this guidance as flexible as possible.
- Example: California's Intersegmental General Education Transfer Curriculum (IGETC) pattern
  - California Community College students can use IGETC to fulfill all lower-division general education requirements at any CSU or University of California campus.
  - Requires completion of a minimum of 37 semester/49 quarter units of lower division work

Professional, Communication, and Teamwork Skills + Work Experience

- Most IT professionals must be able to complement their IT skills with professional skills, communication skills, and teamwork skills to be successful.

- Students should gain as much hands-on experience as possible prior to graduation.
  - Greatest benefit from work experience or work-based learning after transfer

10 Essential IT Domains and IT Transfer 2019 Competencies

Tag	IT Domain	IT-Transfer2019 Essential Competencies	IT-Transfer2019 Supplemental Competencies
ITE-CSP	Cybersecurity Principles	2	1
ITE-GPP	Global Professional Practice	3	0
ITE-IMA	Information Management	1	2
ITE-IST	Integrated Systems Technology	2	2
ITE-NET	Networking	3	1
ITE-PFT	Platform Technologies	5	0
ITE-SPA	System Paradigms	2	1
ITE-SWF	Software Fundamentals	2	3
ITE-UXD	User Experience Design	1	1
ITE-WMS	Web and Mobile Systems	1	4
	Total Competencies	**22**	**15**

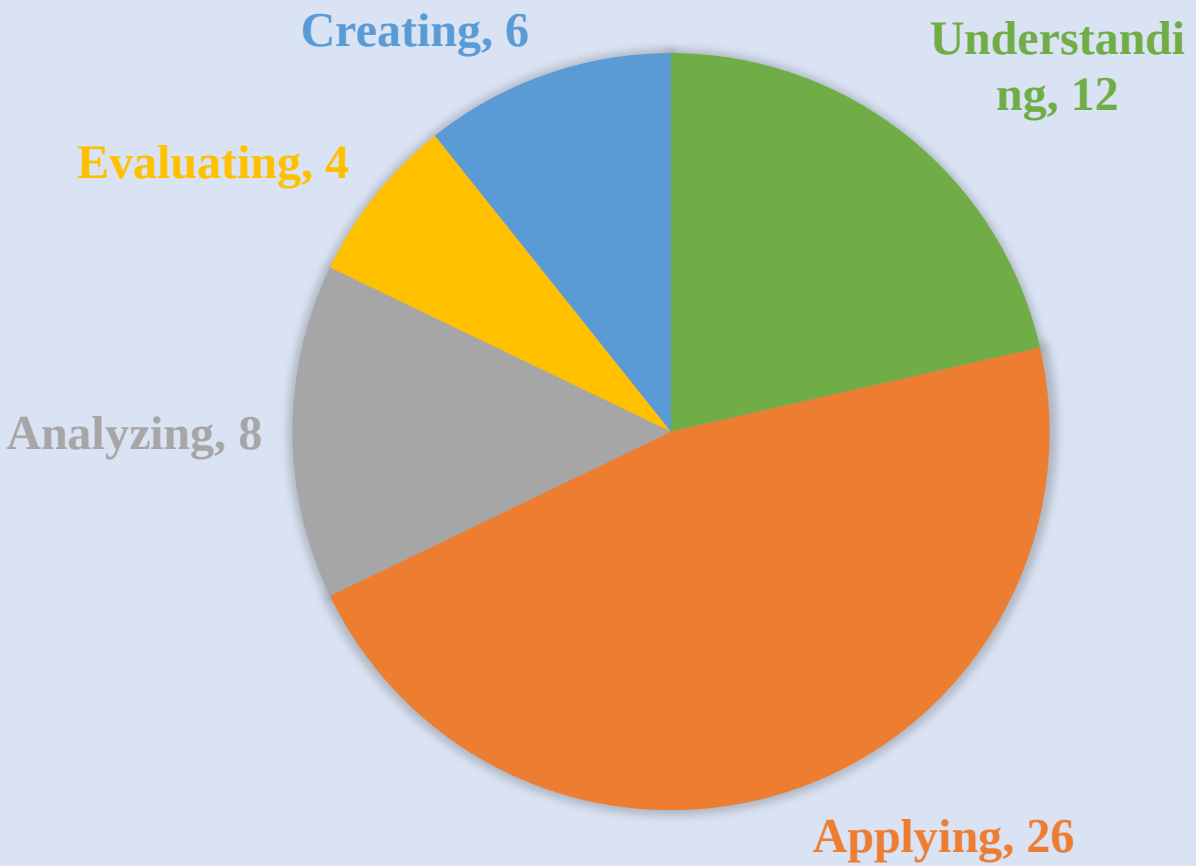
9 Supplemental IT Domains and IT Transfer 2019 Competencies

Tag	IT Domain	IT-Transfer2019 Essential Competencies	IT-Transfer2019 Supplemental Competencies
ITS-ANE	Applied Networks	0	1
ITS-CCO	Cloud Computing	1	2
ITS-CEC	Cybersecurity Emerging Challenges	2	1
ITS-DSA	Data Scalability and Analytics	0	1
ITS-IOT	Internet of Things	0	1
ITS-MAP	Mobile Applications	0	2
ITS-SDM	Software Development and Management	0	1
ITS-SRE	Social Responsibility	2	1
ITS-VSS	Virtual Systems and Services	2	2
	Total Competencies	**7**	**12**

19 Domain Cards

ITE-CSP Domain: Cybersecurity Principles
Scope 1. A computing-based discipline involving technology, people, information, and processes to enable assured operations. 2. A focus on implementation, operation, analysis, and testing of the security of computing technologies 3. Recognition of the interdisciplinary nature of the application of cybersecurity including aspects of law, policy, human factors, ethics, and risk management in the context of adversaries. 4. The practice of assuring information and managing risks related to the use, processing, storage, and transmission of information or data and the systems and processes used for those purposes. 5. Measures that protect and defend information and information systems by ensuring their availability, integrity, authentication, confidentiality, and non-repudiation.
Essential Competencies A. Evaluate the purpose and function of cybersecurity technology, identifying the tools and systems that reduce the risk of data breaches while enabling vital organization practices. (Cybersecurity functions) B. Implement systems, apply tools, and use concepts to minimize the risk to an organization's cyberspace to address cybersecurity threats. (Tools and threats)
Supplemental Competencies A. Use a risk management approach for responding to and recovering from a cyber-attack on system that contains high value information and assets such as an email system. (Response and risks)

Bloom's Level Distribution for IT-Transfer2019 Competencies



IT Essential Mathematics

IT Essential Mathematics	
ITM-DSC	**Discrete Structures**
ITM-DSC-01	Perspectives and impact
ITM-DSC-02	Sets
ITM-DSC-03	Functions and relations
ITM-DSC-04	Proof techniques
ITM-DSC-05	Logic
ITM-DSC-06	Boolean algebra principles
ITM-DSC-07	Minimization
ITM-DSC-08	Graphs and trees
ITM-DSC-09	Combinatorics
ITM-DSC-10	Iteration and recursion
ITM-DSC-11	Complexity Analysis
ITM-DSC-12	Discrete information technology applications

IT-Transfer2019 Competencies vs. IT2yr2014 Learning Outcomes

IT-Transfer2019 Competencies	*IT2yr2014 Learning Outcomes*
ITE-CSP Domain: Cybersecurity Principles	
Evaluate the purpose and function of cybersecurity technology, identifying the tools and systems that reduce the risk of data breaches while enabling vital organization practices. *(Cybersecurity functions) (Essential)* Implement systems, apply tools, and use concepts to minimize the risk to an organization's cyberspace to address cybersecurity threats. *(Tools and threats) (Essential)* Use a risk management approach for responding to and recovering from a cyber-attack on system that contains high value information and assets such as an email system. *(Response and risks) (Supplemental)*	Differentiate among various techniques for making a computer network secure. Use a variety of practices for making end-user systems secure. Explain the process of authentication and authorization between end-user devices and computing network resources.

IT-Transfer2019 Assessment Rubrics

Emerging	*Developed*	*Highly Developed*
ITE-CSP Domain: Cybersecurity Principles		
Analyze the purpose and function of cybersecurity technology, identifying the tools and systems that reduce the risk of data breaches while enabling vital organization practices. *(Cybersecurity functions) (Essential) (Bloom's level: Analyzing)*	Evaluate the purpose and function of cybersecurity technology, identifying the tools and systems that reduce the risk of data breaches while enabling vital organization practices. *(Cybersecurity functions) (Essential) (Bloom's level: Evaluating)*	Design a cybersecurity system using the tools and systems that reduce the risk of data breaches while enabling vital organization practices. *(Cybersecurity functions) (Essential) (Bloom's level: Creating)*

IT2yr2014 vs. IT-Transfer2019 (Tim)

- Definition not M State Reality
- M State Advisory Notes
- Need logic class
- Virtualization and containers are not optional
- Associate degree is ready for work

IT Transfer Example (Svetlana)

- Bachelor of Applied Science in Information Technology Kennesaw State University (Georgia) https://ccse.kennesaw.edu/it/programs/basit.php
  - Articulation Agreement for BAS degrees on the University System of Georgia level

KSU Requirements

- Associate of Applied Science in Computing from a member institution of the Technical College System of Georgia (TCSG) with a GPA of 2.3 or better
- Additional 67 credit hours
  - Or approximately 2.5 years of full-time study
- Can use Prior Learning Assessment

Chattahoochee Tech. Coll. to Kennesaw State

State: Georgia
School: Chattahoochee Tech College
Subject(s): CIS, CIST
Level(s): Undergraduate
Term: Fall Semester 2019

Start Over | Search Another State | Search Another School | Search Another Subject/Level/Term

Chattahoochee Tech College				vs.	Kennesaw State University		
Class	Title	Level	Minimum Grade	=>	Class	Title	Credit Hours
CIS 105	Program Design & Development	US	D	=>	IT 1113	Programming Principles	3.0
CIS 1121	Visual Basic.Net I	US	D	=>	IT 1113	Programming Principles	4.0
CIS 157	Intro to Visual Basic Program	US	D	=>	IT 1113	Programming Principles	4.0
CIS 191	Computer Progrm Fund	US	D	=>	CSE 1321	Programming & Prob Solv I	3.0
CIS 2110	Adv Web Programming Using PHP	US	D	=>	MET 3501	Engr Computation using MATLab	4.0
CIS 2129	Database Administration	US	D	=>	CSE 3153	Database Systems	4.0
CIS 214	Database Management	US	D	=>	CSE 3153	Database Systems	4.0
CIS 2421	Intermediate Java Programming	US	D	=>	IT 1324	Adv Programming Principles	4.0
CIS 2431	Advanced Java Programming	US	D	=>	IT 1324	Adv Programming Principles	4.0
CIS 252	Introduction to JAVA Progm	US	D	=>	CSE 1321	Prog and Problem Solving I	3.0
				And	CSE 1321L	Prog and Problem Solving I Lab	1.0
CIS 2520	Intro to Game Development	US	D	=>	CGDD 2002	Fundm of Game Design	3.0
CIST 1305	Program Design & Development	US	D	=>	CSE 1311	C++ Programming for Engr	3.0
CIST 2341	C# Programming I	US	D	=>	CS 2350	Object-Oriented Programming	4.0
CIST 2361	C++ Programming I	US	D	=>	CSE 1311	C++ Programming for Engrs	4.0
CIST 2362	C++ Programming II	US	D	=>	CSE 1312	Obj Orient C++ Prog for Engrs	4.0
CIST 2371	Java Programming I	US	D	=>	CSE 1321	Prog and Problem Solving I	3.0
				And	CSE 1321L	Prog and Problem Solving I Lab	1.0
CIST 2372	Java Programming II	US	D	=>	IT 1323	Adv. Programming Principles	3.0
				And	IT 1323L	Adv. Prog. Principles Lab	1.0
CIST 2421	Intermediate JAVA Programming	US	D	=>	IT 1323	Adv. Programming Principles	3.0
				And	IT 1323L	Adv. Prog. Principles Lab	1.0
CIST 2740	Intro to Game Development	US	D	=>	CGDD 2002	Fundamentals of Game Design	4.0

KSU Example: Challenges

- TCSG courses 1- 2-thousand level <-> KSU IT courses mostly 3- and 4-thousand level
- One-to-one course mappings almost impossible
  - Minimum of 39 semester hours at the 3-, 4-level, including at least 21 semester hours at the 3-, 4- level in the major field of study
- Different requirements for TCSG degrees (next slide)

Requirements for TCSG degrees

- Cisco Network Specialist
- Computer Information Systems
- Computer Programming
- Computer Simulation/Game Developer
- Computer Specialist
- Computer Support Specialist
- Cyber Forensics Technology
- Database Specialist
- Database Administrator Specialist
- E-Commerce Web Programming
- Gaming Technology
- Health Information Technology
- Information Security Specialist
- Information Systems Technology
- Internet Specialist - Web Applications and Services Development
- Internet Specialist - Web Site Design
- Internet Specialist - Web Site Design Version 2
- IT Professional
- Linux Network Specialist
- Micro Computer Specialist
- Network Specialist
- PC Maintenance Specialist
- Windows Network Specialist
- Web Application Development
- Web Site Design
- Windows Network Specialist

66-74 credit hours, including 15 credit hours of general education

IT Degree Requirements

- General Education (42 hours)
  - Including Pre-Calculus, Statistics (Calculus I starting Fall 2020) and two lab sciences
- Area F Lower Division Major Requirements (18 hours)
  - CS1, CS2, Discrete Math + 7 credit hours from tech block
- Technical Block (21 credit hours)
  - Courses from the AAS degree

Sample Courses

- CIST 2602 Network Security
- CIST 1510 Web Development I
- CIST 2731 Intermediate 3D Animation
- CIS 1015 Cyber Crime Technology
- EDP 2201 Comp System Administrator
- CIST 2351 PHP Programming I
- CIS 2202 XHTML Fundamentals
- CIST 2531 Web Graphics II
- CIST 2122 A+ Preparation
- ACC 2150 Cost Accounting
- CAPS 2278 CCNA Security

Enrollment in Fall 2019

- BASIT ~150
- BSIT ~700

Looking for Feedback

- The intent of IT-Transfer2019 is to make it easy for you to
  - Implement an IT Transfer Program at your two-year college
  - Facilitate communication between IT Transfer partners
  - Help students to meet their academic and professional goals

Submit your feedback at
https://ccecc.acm.org .

Submit your feedback by November 11th, 2019!

Download
the IT-Transfer2019 IronDog DRAFT

Complete a short survey to comment on
the IT-Transfer2019 IronDog DRAFT