Curriculum Development Centers Program

Awardee of The Office of the National Coordinator for Health Information Technology

HEALTH IT WORKFORCE CURRICULUM
COMPONENT BLUEPRINT
Version 2.0/Spring 2011

Component Number: 4
Component Name: Introduction to Health Care and Public Health in the U.S.

Component Description (from FOA):
For students without an IT background, provides a basic overview of computer architecture; data organization, representation and structure; structure of programming languages; networking and data communication. Includes basic terminology of computing.

Assigned Institution: Oregon Health & Science University
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Workforce Roles:
- Clinician/Practitioner Consultant
- Implementation Support Specialist
- Practice Workflow and Information Management Redesign Specialist
- Technical/Software Support
- Trainer

Component Objectives:
1. Use proper hardware, network, Internet and software computer terminology in written and verbal communications.
2. Write simple computer programs including constructs such as conditional statements, loops, functions, objects, simple data structures, etc.
3. Design a simple database and develop querying statements for it.

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4. Describe network computing, its benefits and risks, and identify commonly-used communications hardware and software components.
5. Identify security risks for computing systems and discuss potential solutions.
6. Explain the design and development process of a large system such as an EHR.

Unit Topic(s):

1. Basic computing concepts, including history
2. Internet and the World Wide Web
3. Computer hardware and architecture
4. Application and system software
5. Overview of programming languages, including basic programming concepts
6. Databases and SQL
7. Networks
8. Security
9. Components and development of large scale systems
10. Future of computing

Component Units with Objectives and Topics

Unit 1: Basic Computing Concepts Including History

Unit Description:
This unit will discuss the history of basic computing concepts and the ways that computers input, manipulate, calculate, and output data. It will provide information on selecting a computer by discussing the range of computer types, from desktops to laptops to servers. It will also discuss computer hardware and software and other electronic devices that contain computers.

Objectives:
By the end of this unit the student will be able to:

a. Define what a computer is.
b. List different types of computers (PC's, mobile devices, embedded computers, etc.).
c. Define the common elements of computer systems.
d. Describe the various hardware and software options for typical desktop, laptop and server systems for home/business use (focusing on healthcare systems).
e. Explain the development of computers and the Internet, including healthcare systems up until the present time.

Topics:

What is a computer?

1.0a - Definition of a computer

1.0b - Types of computers

1.0c - Common Elements of computer systems

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2.0 - Selecting a computer
2.0a – Selecting a desktop
2.0b – Selecting a laptop
2.0c – Selecting a system for healthcare applications
3.0 – History of Computing
3.0a – The beginnings of computers
3.0b – The first computers
3.0c – Early electronic medical records
3.0d – Personal computers
3.0e – The Internet
3.0f – Current and future computers

Unit 2: Internet and World Wide Web

Unit Description:
This unit will cover the implications, origins, and use of the Internet and the World Wide Web. It will also discuss the advantages and disadvantages of this technology.

Objectives:
By the end of this unit the student will be able to:

a. Define the Internet and how to connect to it.
b. Define the World Wide Web and how to access it—with URL's and search engines .
c. Learn how to write effective search queries for Internet search engines, filtering the results and evaluate credibility of information.
d. Discuss security and privacy concerns on the Internet (phishing, identify theft, keystroke copying).
e. List ethical issues for the Internet, including intellectual property rights and copyright, free speech vs. libel/slander, etc.
f. Explore online healthcare applications and associated security and privacy issues (including HIPAA).

Topics:
2.0 What is the Internet?
2.1a The Origins of the Internet
2.1b The Internet Today
2.1c The Internet Spawns the WWW
2.2 Who Created the WWW?
2.2a How does the Web Work?
2.2b HTML – The Language of the Web
2.2c The World's First Web Server
2.2d Who Owns the Web?

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2.3 Standardized Communications
2.3a Internet Addressing Basics
2.3b How to Obtain an IP Address
2.4 Introducing Domain Names
2.4a DNS and IP Work Well Together
2.4b What is a Domain Name?
2.5 Connecting to the Internet
2.5a Service Providers and You
2.5b Internet Access For a Fee
2.5c Provider Equipment
2.5d Customer Premises Equipment
2.5e Leasing an IP Address
2.5f Leasing a Dynamic IP Address
2.5g Leasing a Static IP Address
2.5h DNS – Another ISP Service
2.6 Searching the Internet
2.6a Search Engine Providers
2.6b How do Search Engines Function?
2.6c Using a Search Engine
2.6d Web Search Tips
2.6e Search Results in a Nutshell
2.7 Internet Security and Privacy Concerns.
2.7a What Devices are Usually Attacked
2.7b How do Hackers Attack Devices?
2.7c Secure Your Operating System
2.7d Secure Your Files
2.7e Engage in Safe Browsing
2.7f Close Popup Windows Safely
2.7g Secure Your Computer System
2.7h Manage Cookies
2.7i Passwords and the Internet
2.7j Passwords and the Internet
2.8 Other Internet Security Considerations
2.9 Trojans, Viruses, and Worms
2.9a Trojans
2.9b Viruses
2.9c Macros
2.9d Worms
2.9e Phishing
2.9f E-mail Links
2.9g Hoaxes
2.10 Ethical Considerations of the Internet
2.10a Sharing Internet Connections with Neighbors
2.10b Downloading Music and Movies from the Internet

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2.10c Copyright Infringement
2.10d Internet Databases
2.10e Truth or Lies?
2.11 Everyone's Online Today – Social Networking Sites
2.12 What is Privacy?
2.13 What is Confidentiality?
2.14 Federal Rules Emerge - HIPAA
2.14a HIPAA – Privacy and Security Rules
2.15 Free Online PHR Systems Readily Available
2.15a EHRs Used by Health Care Providers
2.16 EHR Security Q & A

Unit 3: Computer Hardware and Architecture

Unit Description:
This unit will provide a foundation on how a computer functions and how data is represented in memory as a key element in understanding the field of information and computer science. Various input and output devices will be discussed, including how these devices connect to the computer, and the CPU and its role in making the whole computer system function.

Objectives:
By the end of this unit the student will be able to:

a. List the major elements of a computer (motherboard, CPU, I/O devices, memory, secondary storage, buses, expansion cards, ports, etc.).
b. Describe how data is stored in memory and in secondary storage.
c. Describe how data is represented in binary.
d. Describe the function of the CPU.
e. Describe how data is input/output from the computer.
f. Describe how a computer system works together.
g. Introduce specialized architectures and embedded systems used in healthcare settings.

Topics:
What is a computer?
3.1a Computer hardware components.
3.1b System components.
3.1c Motherboard ports.
3.1d Motherboard buses.
3.2 Device functionality.
3.2a Input devices.

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3.2b Output devices.
3.3 Input/Output ports.
3.4 Storage devices.
3.4a Primary storage.
3.4b Secondary storage.
3.5 Data storage.
3.5a Binary data storage.
3.5b Data storage example.
3.5c Data representation in memory.
3.5d Data storage acronyms.
3.5e Data addressing.
3.5f Data storage reality check.
3.6 CPU functionality.
3.6a CPU components.
3.6b CPU execution.
3.6c CPU performance.
3.6d The evolving CPU.
3.7 Data vs. information.
3.8 Putting it all together.
3.9 Specialized health care CPUs.
3.10 Unit summary.

Unit 4: Application and System Software

Unit Description:
This unit will cover application and system software including definitions and the elements that comprise them with a focus on healthcare systems. It will also describe the functions of file organization, different operating systems and the purpose and usage of file systems.

Learning Objectives:
By the end of this unit the student will be able to:

a. Define application vs. system software.
b. Give examples of application software and the elements that comprise them, focusing on healthcare systems.
c. Describe the functions of system software (OS), including file organization (file types, downloading, zipped files).
d. List different types/brands of Operating Systems
e. Explain the purpose and usage of file systems

Unit Topic(s):
1.0 Application vs. System Software
2.0 Application Software

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2.1 Forms of Application Software
2.2 Types of Application Software
2.3 Examples of Application Software
3.0 Components of Software
3.1 Hardware Needs
4.0 Installing and Uninstalling Software
5.0 Ethical Considerations of Software
6.0 System Software
6.1 Operating Systems
6.1a Functions of an Operating System
6.2 Utility Programs
6.3 Types of OS
6.3a Examples of OS
7.0 File Systems
7.1 Computer Files
7.2 File "Containers"
7.3 File Management Utilities
7.4 File System Implementation
7.5 Putting it all together

Unit 5: Overview of Programming Languages Including Basic Programming Concepts

Unit Description:
This unit will discuss the purpose and types of programming languages from simple machine code to high level programming languages, including the process of compiling and interpreting. Students will use variables, loops and conditional statements to build a simple program.

Objectives:
By the end of this unit the student will be able to:

a. Define the purpose of programming languages.
b. Define the different types of programming languages.
c. Explain the continuum of programming languages from machine code and assembly languages through scripting languages and high level structured programming languages.
d. Explain the compiling and interpretation process for computer programs.
e. Use the following components of programming languages to build a simple program: variables, loops and conditional statements.
f. Introduce additional programming concepts such as objects and modularity.

Topics:
1.0 Overview of programming languages
1.1 Software development and programming

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1.2 Algorithms
2.0 Different types of programming languages
2.1 5 Generations of programming languages
2.2 Programming paradigms
2.3 Scripting languages
2.4 Programming languages developed for healthcare
3.0 Continuum of programming languages
4.0 The compiling and interpreting process
4.1 Java's hybrid approach
5.0 Programming language constructs with Java examples
5.1 Variables and datatypes
5.2 Assignment statements and expressions
5.3 Input and Output
5.4 Example program in Java (calculating BMI)
5.5 Control Structures
5.5.1 If statements
5.5.2 Conditional expressions
5.5.3 Loops
5.5.3.1 While loops
5.5.3.2 For loops
5.6 Another example program in Java
6.0 Object Oriented Programming (OOP)
6.1 Objects and classes
6.2 OOP Designs
6.3 Inheritance
6.4 Modularity
6.5 Encapsulation
7.0 Summary

Unit 6: Databases and SQL

Unit Description:
This unit will discuss the purposes of databases, a relational database, and the querying language SQL. Students will design a simple database using data modeling and normalization. Basic data operations will be defined, common query statements will be created, and SQL implementation will be discussed.

Objectives:
By the end of this unit the student will be able to:

a. Define and describe the purpose of databases.
b. Define a relational database.
c. Describe the SQL querying language.

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d. Define the basic data operations for databases and how to implement them in SQL, including data modeling and normalization .
e. Design a simple relational database.
f. Create simple querying statements for the database.

Topics:

1.0 The definition and purpose of databases
2.0 Relational databases
3.0 The SQL querying language
4.0 Data operations for databases
5.0 Designing a database
6.0 Examples of querying statements for databases

Unit 7: Networks and Networking

Unit Description:

This unit will discuss the history and evolution of computer networks, including the various types of network communications. Various forms of networking addressing will be covered, as will network topologies, standards and protocols, and logical model concepts. Network hardware and wireless communication will also be addressed.

Learning Objectives:

By the end of this unit the student will be able to:

a. List and describe the various types of network communications and network addressing.
b. List and define the different types of networks.
c. Describe different network topologies.
d. List and describe different network standards and protocols.
e. Describe wireless communication.
f. List and describe network hardware.

Topics:

7.0 What is a network?
7.1a A modern network example
7.1b Why networks
7.1c Networks decrease cost
7.2 Networks serve customers
7.2a How devices connect to a network
7.2b Wired vs. wireless networks
7.2c It's all about speed (bandwidth vs. throughput)
7.2d Service providers and you

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7.3 Connecting to the Internet
7.3a Leasing an IP address
7.3b Leasing a dynamic IP Address
7.3c Leasing a static IP address
7.4 IP addressing basics
7.4a IP address versions (IPv4 and IPv6)
7.5 LANs use more than IP addressing
7.5a MAC address example
7.5b How to obtain an IP address
7.6 Domain names
7.6a What is a domain name?
7.6b DNS
7.7 Network types
7.8 Network topologies
7.9 Network standards and protocols
7.10 Wireless communications
7.11 Networking logical models
7.12 The OSI model

Unit 8: Security

Unit Description:
This unit will describe common security concerns and safeguards, including firewalls, encryption, virus protection software and patterns, programming for security. Security of wireless networks will also be addressed. Concerns and regulations relating to healthcare applications will be covered as well as safeguards in those platforms.

Objectives:
By the end of this unit the student will be able to:

a. List and describe common security concerns (viruses, worms, etc.).
b. Describe safeguards against common security concerns, including firewalls, encryption, virus protection software and patterns, programming for security, etc.
c. Describe security concerns for wireless networks and how to address them.
d. List security concerns/regulations for health care applications.
e. Describe security safeguards used for health care applications.

Topics:
8.0 Why concerned about security?
8.1a Common threats to security.

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8.1b Trojan horse
8.1c Viruses.
8.1d Macro viruses.
8.1e Personal information attacks.
8.1f Worms.
8.1g False information.
8.2 How do hackers operate?
8.3a What is network security?
8.3b Authentication.
8.3c Authorization.
8.4d Permissions.
8.4e Mitigating security issues.
8.4f Security policy.
8.4g Authentication factors – proving your identity.
8.4h Factor authentication.
8.4i Firewalls.
8.4j Windows Firewall example.
8.4k AV software & software.
8.4l Intrusion Protection Systems.
8.4m Encryption & examples.
8.4n Audit security policy practices.
8.5 Additional steps to take...
8.6 Security and wireless networking.
8.6a Wireless device security.
8.7 Health care applications and security.
8.8 Concerned about security of health data?
8.9 What is an EHR system?
8.10 EHRs used by health care providers.
8.11 EHR security Q & A.
8.12 Federal regulations.
8.13 HIPAA and privacy.
8.14 What is privacy?
8.15 What is confidentiality.
8.16 Steps to secure EHR and records.

Unit 9: Components and development of large scale systems

Unit Description:
This unit will discuss large scale systems that support multiple, simultaneous users who access the core functionality through some kind of network. The components and development of these systems will be covered through the Systems Development Lifecyle, or SDLC, including the financial support of these systems over time.

Objectives:

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By the end of this unit the student will be able to:

a. Describe the building blocks of a large scale system.
b. Explain the initial design process/options for a large scale system
c. Describe the evaluation process/criteria for including and selecting existing software applications.
d. Describe the process for new software development.
e. Describe the different types of testing (unit, system, usability) and when testing should occur.
f. Describe systems maintenance.
g. Explain the process of financially supporting large scale systems over time.

Topics:

1.0 Building Blocks of a large system
2.0 Development of a large system—The Systems Development Life Cycle
3.0 Financial Support of large systems

Unit 10: Future of Computing

Unit Description:

This unit will cover five topics: trends in computing, interfaces used to communicate with computer systems, cloud computing, the changing social implications of the use of computer systems, and the ubiquity of computers in our daily lives.

Objectives:

By the end of this unit the student will be able to:

a. Describe latest advances in technology
b. Discuss implications for healthcare systems, including potential risks.

Topics:

1.0 Trends in Computing
2.0 User Interfaces
3.0 Cloud Computing
4.0 Social Implications
5.0 Ubiquitous Computing

Unit Elements:

Instructors manual, unit self-assessment questions, discussion questions

Format:

Slides with narration (voiceover PowerPoint in Flash format), suitable for lecture, team-based learning, or online independent study; lecture transcripts (MS Word documents); and audio files in mp3 format for each lecture; self-assessment and discussion questions and keys (MS Word documents).

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Local Resources Required for Implementation:
Computer, Microsoft Office, PowerPoint, Flash player (free download), mp3 player (free download), Learning Management System (optional)

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