

**HEALTH INFORMATION TECHNOLOGY (HIT) PROGRAM**

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**Curriculum Outline**

**North Florida Community College  
Rural Health IT Workforce Training Program  
Grant Period: 09/15/2013 – 08/31/2016  
Grant#: R01RH26268**



**Organization: North Florida Community College/North Florida Rural Health Network**  
**Couse: Health Information Technology**  
**Certification: AHIMA CHTS-PW**

**Course Description**

As the nation moves toward a more technologically advanced health care system, providers are going to need highly skilled health IT experts to support them in the adoption and meaningful use of electronic health records. Completion of this program will require six months of intense training, achieved through lecture, laboratory exercises, and apprenticeships. This program will also prepare students for certification as Certified Healthcare Technology Specialist (CHTS). Upon completion of the program, students will be eligible to sit for the CHTS-PW exam. Earning this credential will confirm the student's skills are ready to meet the nation's need for health information technology workers.

Practice workflow and information management redesign specialists assist in reorganizing the work of a provider to take full advantage of the features of health IT in pursuit of meaningful use of health IT to improve health and care. Individuals in this role may have backgrounds in health care (for example, as a practice administrator) or in information technology, but are not licensed clinical professionals.

Workers in this role will:

- Conduct user requirements analysis to facilitate workflow design.
- Integrate information technology functions into workflow.
- Document health information exchange needs.
- Design processes and information flows that accommodate quality improvement and reporting.
- Work with provider personnel to implement revised workflows.
- Evaluate process workflows to validate or improve practice's system

Material used in this course was obtained from the curriculum set forth by the Office of the National Coordinator (ONC). Where applicable, the instructor has modified the course material to meet student needs. Program material has been divided into four Modules, each of which is comprised of more than one ONC Component.



## **Module 1**

### ***ONC Component 2: The Culture of Healthcare***

#### **Description**

For individuals not familiar with healthcare, this component addresses job expectations in healthcare settings. It discusses how care is organized within a practice setting, privacy laws, and professional and ethical issues encountered in the workplace.

#### **Component Objectives**

1. Describe the major types of clinical personnel involved in healthcare, including their education and training, certification and licensure, and typical roles in healthcare.
2. Describe the major types of settings in which healthcare occurs including ambulatory care, acute and emergency care, hospital based and critical care, and community health and public health settings.
3. Describe the major processes of information gathering, analysis, and documentation used by clinicians to detect, understand, and prevent or treat diseases.
4. Give examples and explain the differences between common forms of care delivery including episodic one-on-one care, multidisciplinary care, interdisciplinary care, care of chronic conditions, population based care, disease management, long-term care, and end of life care.
5. Describe the role of community health and public health in managing illness outbreaks, epidemics, and pandemics.
6. Understand the basic principles of evidence-based practice, including the application of the best evidence in clinical decision-making.
7. Describe common forms of quality measurement, performance improvement, and incentive payment schemes meant to influence care delivery.
8. Discuss the role of medical ethics and professional values in care delivery including such issues as ethical conflicts, and health disparities.
9. Understand the concepts underlying the application of privacy, confidentiality, and security to health care practice and information technology, being able to help individuals and organizations adhere to the HIPAA Privacy and Security Rules.

#### **Method of Delivery**

Course delivered through Desire2Learn (D2L) learning management system. Lectures are comprised of ONC flash lectures; supplemental materials consist of ONC PowerPoint slides, audio transcripts, and instructor's study guides.

#### **Component Timeline**

2 weeks



## ***ONC Component 2: The Culture of Healthcare, Units 1-10***

### ***Unit 1: Introduction to the Culture of Healthcare***

#### ***Unit 1 Objectives:***

- Distinguish between disease and illness.
- Discuss the relationship between health and the healthcare system
- Define 'culture' in the classic sense, as well as in the modern sense of the term, and what it means for culture to be partial, plural, and relative. Explain the concept of 'cultural competence
- Explain the concepts and distinguish between 'culture', 'cultural safety', and 'safety culture', as applied to organizations Be aware of the multiple cultures that interact in healthcare delivery
- Define 'acculturation' and how it relates to working in healthcare settings Be able to give examples of health informatics applications of the study of culture

### ***Unit 2: Health Professionals – The People in Healthcare***

#### ***Unit 2 Objectives:***

- Define terms used in healthcare including clinician, patient, disease, and syndrome and in health professionals' education and training.
- Describe the education, training, certification, licensure and roles of physicians including those in primary care and other specialties.
- Describe the education, training, certification, licensure and roles of nurses, advanced practice nurses, LPNs, MAs and Medication Aids.
- Describe the education, training, certification, licensure and roles of physician assistants, pharmacists, therapists, allied health professionals.
- Describe the education, training, certification, licensure and roles of paramedics, EMTs, dental professionals, mental health professionals, and social workers.

### ***Unit 3: Healthcare Settings – The Places Where Care Is Delivered***

#### ***Unit 3 Objectives:***

- Differentiate the range of care delivery organizations, including primary care, specialty care, tertiary care, inpatient and outpatient facilities, long-term care hospitals, and long-term care facilities
- Analyze the organization of healthcare delivery from the perspective of a “continuum of care,” such as ambulatory services, in-patient care, long-term care, and end-of-life care
- Evaluate the similarities and differences of community hospitals, teaching hospitals, and community health clinics



***ONC Component 2: The Culture of Healthcare, Units 1-10 (cont.)***

***Unit 4: Healthcare Process and Decision Making***

***Unit 4 Objectives:***

- Describe the elements of the 'classic paradigm' of the clinical process.
- List the types of information used by clinicians when they care for patients.
- Describe the steps required to manage information during the patient-clinician interaction.
- List the different information structures or formats used to organize clinical information.
- Explain what is meant by the 'hypothetic-deductive' reasoning process.
- Explain the difference between observations, findings, syndromes, and diseases.
- Describe techniques or approaches used by clinicians to reach a diagnosis.
- List the major types of factors that clinicians consider when devising a management plan for a patient's condition, in addition to the diagnosis and recommended treatment.

***Unit 5: Evidence-Based Practice***

***Unit 5 Objectives:***

- Define the key tenets of evidence-based medicine (EBM) and its role in the culture of health care
- Construct answerable clinical questions and critically appraise evidence answering them
- Apply EBM for intervention studies, including the phrasing of answerable questions, finding evidence to answer them, and applying them to given clinical situations
- Understand EBM applied to the other key clinical questions of diagnosis, harm, and prognosis
- Discuss the benefits and limitations to summarizing evidence
- Describe how to implement EBM in clinical settings through clinical practice guidelines and decision analysis

***Unit 6: Nursing Care Process***

***Unit 6 Objectives:***

- Learn what nurses do and how they are trained
- Learn how nurses make clinical decisions and assess patients
- Learn about the settings where nurses work
- Learn about the procedures that nurses perform



***ONC Component 2: The Culture of Healthcare, Units 1-10 (cont.)***

***Unit 7: Quality Measurement and Improvement***

***Unit 7 Objectives:***

- Define healthcare quality and the major types of quality measures: structural, process, and outcome measures
- Describe the current state of healthcare quality in the United States
- Discuss the current healthcare quality measures used in various healthcare settings in the US, including those required for the HITECH meaningful use program
- Describe the role of information technology in measuring and improving healthcare quality
- Describe the results of current healthcare quality efforts in the US

***Unit 8: Ethics and Professionalism***

***Unit 8 Objectives:***

- Provide an orientation to ideas about medical ethics and professionalism
- Explore the relationships among ethical ideals, professionalism, and legal duties
- Apply the general principles of ethics and professionalism to specific topics
- Examine ethical issues in health informatics

***Unit 9: Privacy, Confidentiality and Security***

***Unit 9 Objectives:***

- Define and discern the differences between privacy, confidentiality, and security
- Discuss the major methods for protecting privacy and confidentiality, including through the use of information technology
- Describe and apply privacy, confidentiality, and security under the tenets of HIPAA Privacy Rule
- Describe and apply privacy, confidentiality, and security under the tenets of the HIPAA Security Rule



***ONC Component 2: The Culture of Healthcare, Units 1-10 (cont.)***

***Unit 10: Sociotechnical Aspects: Clinicians and Technology***

***Unit 10 Objectives:***

- Describe the concepts of medical error and patient safety
- Discuss error as an individual and as a system problem
- Compare and contrast the interaction and interdependence of social and technical “resistance to change”
- Discuss the challenges inherent with adapting work processes to new technology
- Discuss the downside of adapting technology to work practices and why this is not desirable
- Discuss the impact of changing sociotechnical processes on quality, efficiency, and safety



## **Module 1 (cont.)**

### ***ONC Component 3: Terminology in Healthcare and Public Health Settings***

#### **Description**

This component explains specific terminology used by workers in healthcare and public health. This is NOT a course in data representation or standards.

#### **Component Objectives**

1. Define, understand and correctly pronounce medical terms related to each of the major body systems.
2. Define commonly used terms in public health, nursing, health information technology, and clinical vocabularies & terminologies related to the implementation of electronic health records.
3. Identify the purpose and uses of pertinent health care terminologies in the electronic health record.
4. Demonstrate the ability to integrate and use health care terminology in the various health information technology roles.

#### **Method of Delivery**

Course delivered through Desire2Learn (D2L) learning management system. Lectures are comprised of ONC flash lectures; supplemental materials consist of ONC PowerPoint slides, audio transcripts, and instructor's study guides.

#### **Component Timeline**

2 weeks



***ONC Component 3: Terminology in Healthcare and Public Health Settings, Units 1-16***

***Unit 1: Understanding Medical Words***

***Unit 1 Objectives:***

- Discuss the four parts of medical terms
- Recognize word roots and combining forms
- Identify the most common prefixes and suffixes
- Describe the anatomical positions
- Define the body planes
- Identify regions of the body
- Define directional and positional terms
- Build, divide, spell and pronounce common medical words

***Unit 2: Integumentary System***

***Unit 2 Objectives:***

- Define, understand and correctly pronounce medical terms related to the integumentary system
- Describe common diseases and conditions with an overview of various treatments related to the integumentary system

***Unit 3: Musculoskeletal System***

***Unit 3 Objectives:***

- Define, understand and correctly pronounce medical terms related to the musculoskeletal system
- Describe common diseases and conditions with an overview of various treatments related to the musculoskeletal system

***Unit 4: Blood, Lymphatic and Immune System***

***Unit 4 Objectives:***

- Define, understand and correctly pronounce medical terms related to the blood, lymphatic and immune system
- Describe common diseases and conditions with an overview of various treatments related to the blood, lymphatic and immune system



***ONC Component 3: Terminology in Healthcare and Public Health Settings, Units 1-16 (cont.)***

***Unit 5: Cardiovascular System***

***Unit 5 Objectives:***

- Define, understand and correctly pronounce medical terms related to the cardiovascular system
- Describe common diseases and conditions with an overview of various treatments related to the cardiovascular system

***Unit 6: Digestive System***

***Unit 6 Objectives:***

- Define, understand and correctly pronounce medical terms related to the digestive system
- Describe common diseases and conditions with an overview of various treatments related to the digestive system

***Unit 7: Endocrine System***

***Unit 7 Objectives:***

- Define, understand and correctly pronounce medical terms related to the endocrine system
- Describe common diseases and conditions with an overview of various treatments related to the endocrine system

***Unit 8: Ears, Nose, Throat, Eyes, and Vision***

***Unit 8 Objectives:***

- Define, understand and correctly pronounce medical terms related to the ears, nose, throat, eyes, and vision.
- Describe common diseases and conditions with an overview of various treatments related to the ears, nose, throat, eyes, and vision.

***Unit 9: Nervous System***

***Unit 9 Objectives:***

- Define, understand and correctly pronounce medical terms related to the nervous system
- Describe common diseases and conditions with an overview of various treatments related to the nervous system



***ONC Component 3: Terminology in Healthcare and Public Health Settings, Units 1-16 (cont.)***

***Unit 10: Reproductive System***

***Unit 10 Objectives:***

- Define, understand and correctly pronounce medical terms related to the reproductive system
- Describe common diseases and conditions with an overview of various treatments related to the reproductive system

***Unit 11: Respiratory System***

***Unit 11 Objectives:***

- Define, understand and correctly pronounce medical terms related to the respiratory system
- Describe common diseases and conditions with an overview of various treatments related to the respiratory system

***Unit 12: Urinary System***

***Unit 12 Objectives:***

- Define, understand and correctly pronounce medical terms related to the urinary system
- Describe common diseases and conditions with an overview of various treatments related to the urinary system

***Unit 13: Public Health and Healthcare System Terminology***

***Unit 13 Objectives:***

- Define frequently used public health terms
- Identify distinguishing features of public health
- Identify categories and factors that influence health
- Identify terms commonly used as measures of health status

***Unit 14: What is Health Information Management and Technology?***

***Unit 14 Objectives:***

- Define and explain terms and concepts
- Understand terms that frame HIM and HIT practice
- Describe health IT hardware and software
- Define acronyms and abbreviations



***ONC Component 3: Terminology in Healthcare and Public Health Settings, Units 1-16 (cont.)***

***Unit 15: Electronic Health Records***

***Unit 15 Objectives:***

- Identify the functions of the health record
- Describe the American Recovery and Reinvestment Act of 2009 (ARRA) including the portion of the bill called the Health Information Technology for Economic and Clinical Health Act (HITECH) of 2009
- Define meaningful use

***Unit 16: Standards to Promote Health Information Exchange***

***Unit 16 Objectives:***

- Define terms related to standardized terminologies
- Identify and define HIPAA standard code sets
- Identify and define terminologies and vocabularies that represent nursing care
- Define and give examples of data interchange standards



## **Module 1 (cont.)**

### ***ONC Component 4: Introduction to Information and Computer Science***

#### **Description**

This Component provides a basic overview of computer architecture; data organization, representation and structure; structure of programming languages; networking and data communication. It also includes basic terminology of computing.

#### **Component Objectives**

1. Learn correct terminology for computing and technology including for hardware, software, networks, Internet and databases
2. Identify commonly used hardware components.
3. Identify commonly used software applications and operating systems.
4. Explain the function and use of programming languages and identify commonly used languages.
5. Define what a database is, explain what querying languages are and identify commonly used database systems.
6. Describe network computing, its benefits and risks, and identify commonly used communications hardware and software components.
7. Identify security risks for computing systems and discuss potential solutions.
8. Explain the design and development process of a software information system such as an EHR.

#### **Method of Delivery**

Course delivered through Desire2Learn (D2L) learning management system. Lectures are comprised of ONC flash lectures; supplemental materials consist of ONC PowerPoint slides, audio transcripts, and instructor's study guides.

#### **Component Timeline**

3 weeks



***ONC Component 4: Introduction to Information and Computer Science, Units 1-10 (cont.)***

***Unit 1: Basic Computing Concepts Including History***

***Unit 1 Objectives:***

- Define “What is a computer?”
- Describe different types of computers, including PCs, mobile devices and embedded computers
- Define the common elements of computer systems
- Describe the various hardware and software options for typical desktop, laptop and server systems for home and business use with a focus on healthcare systems
- Explain the development of computers and the Internet, including healthcare systems, up until the present time.

***Unit 2: Internet and the Worldwide Web***

***Unit 2 Objectives:***

- Define the Internet and how to connect to it
- Define the World Wide Web and how to access it
- Write effective search queries for Internet search engines, filter the results, and evaluate credibility of information
- Discuss security and privacy concerns on the Internet
- Describe ethical issues for the Internet
- Explore online healthcare applications and associated security and privacy issues including HIPAA

***Unit 3: Computer Hardware***

***Unit 3 Objectives:***

- List the major elements of a computer
- Describe how data is stored in memory and in secondary storage
- Describe how data is represented in binary notation
- Describe the function of the central processing unit (CPU) of the computer
- Describe how data is input/output from a computer
- Describe how the elements of a computer system work together
- Explain how specialized architectures and embedded systems are used in healthcare settings



***ONC Component 4: Introduction to Information and Computer Science, Units 1-10 (cont.)***

***Unit 4: Computer Software***

***Unit 4 Objectives:***

- Define application vs. system software.
- Give examples of application software focusing on healthcare systems.
- Describe the functions of system software.
- List different types of operating systems.
- Explain the purpose and usage of file systems.

***Unit 5: Computer Programming***

***Unit 5 Objectives:***

- Define the purpose of programming languages.
- Differentiate between the different types of programming languages and list commonly used ones.
- Explain the compiling and interpreting process for computer programs.
- Learn basic programming concepts including variable declarations, assignment statements, expressions, conditional statements and loops.
- Describe advanced programming concepts including objects and modularity.

***Unit 6: Database and SQL***

***Unit 6 Objectives:***

- Define and describe the purpose of databases
- Define a relational database
- Describe data modeling and normalization
- Describe the structured query language (SQL)
- Define the basic data operations for relational databases and how to implement them in SQL
- Design a simple relational database and create corresponding SQL commands
- Examine the structure of a healthcare database component



***ONC Component 4: Introduction to Information and Computer Science, Units 1-10 (cont.)***

***Unit 7: Networks***

***Unit 7 Objectives:***

- List and describe the various types of network communications and network addressing  
List and define the different types of networks
- Describe different network topologies
- List and describe different network standards and protocols
- Describe wireless communication
- List and describe network hardware
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***Unit 8: Security***

***Unit 8 Objectives:***

- List and describe common security concerns
- Describe safeguards against common security concerns
- Describe security concerns for wireless networks and how to address them
- List security concerns/regulations for health care applications
- Describe security safeguards used for health care applications

***Unit 9: Information Systems***

***Unit 9 Objectives:***

- Define an information system, how one is used and list examples.
- Describe the components of an information system.
- Describe the process developing an information system.
- Describe the different types of testing and when testing should occur.
- Describe how information systems are supported and maintained over time.
- Describe specialized information systems.
- Explain how information systems are used in healthcare.

***Unit 10: The Future of Computing***

***Unit 10 Objectives:***

- Describe the latest advances in technology
- Discuss the implications of advances in technology for healthcare systems, including potential risks



## Module 1: Assignments and Assessments

### *ONC Component 2: The Culture of Healthcare*

- Syllabus Quiz
- Week 1 Discussion
  - **Prompt:** Using knowledge gained from the Culture of Healthcare, Unit 3e, discuss the role of different healthcare providers, with an emphasis on the delivery of care in an interdisciplinary setting.
- The Culture of Healthcare Activity
  - **Description:** Students given choice of two writing prompts:
    - Interaction of Healthcare Departments
    - Procedures and Technology
- The Culture of Healthcare Quiz

### *ONC Component 3: Terminology in Healthcare and Public Health Settings*

- Week 3 Discussion
  - **Prompt:** Using knowledge gained from Terminology in Healthcare and Public Health Settings, Unit 15, describe the American Recovery and Reinvestment Act of 2009 (ARRA) including the portion of the bill called the Health Information Technology for Economic and Clinical Health Act (HITECH) Act of 2009.
- Terminology in Healthcare and Public Health Settings Activity
  - **Description:** Crossword puzzle
- Terminology in Healthcare and Public Health Settings Quiz

### *ONC Component 4: Introduction to Information and Computer Science*

- Week 5 Discussion
  - **Prompt:** Using knowledge gained from Introduction to Information and Computer Science, Unit 8, describe safeguards against common security concerns.
- Week 6 Discussion
  - **Prompt:** Describe various types of technologies that support healthcare information systems.
- Introduction to Information and Computer Science Activity
  - **Description:** Writing prompt regarding Internet security.
- Introduction to Information and Computer Science Quiz
- Week 8 Discussion
  - **Prompt:** Students are given the link to a video and asked to answer the prompt Compare and contrast EMR and EHR.



## **Module 1: Assignments and Assessments**

After students have completed the above assignments, they must complete the following:

- Module 1 Extra Credit Opportunity (optional)
- Module 1 Test



## **Module 2**

### ***ONC Component 6: Health Management Information System***

#### **Description**

A “theory” component, specific to health care and public health applications. Introduction to health IT standards, health-related data structures, software applications; enterprise architecture in health care and public health organizations.

#### **Component Objectives**

1. Describe general functions, purposes and benefits of health information systems in various health care settings
2. Describe the federal initiatives and other significant developments that have influenced the evolution and adoption of health information systems
3. Compare/Contrast different types of health information systems in terms of their ability to meet the needs of various types of health care enterprises
4. Explain how electronic health records affect patient safety, quality care, efficiency, productivity, and reporting/documentation mechanisms
5. Propose strategies to minimize major barriers to the adoption of electronic health records
6. Explain how the principles of health care data exchange and health care data standards relate to patient care, productivity and data analysis

#### **Method of Delivery**

Course delivered through Desire2Learn (D2L) learning management system. Lectures are comprised of ONC flash lectures; supplemental materials consist of ONC PowerPoint slides, audio transcripts, and instructor’s study guides.

#### **Component Timeline**

2 weeks



## ***ONC Component 6: Health Management Information Systems, Units 1-9***

### ***Unit 1: What is Health Informatics?***

#### ***Unit 1 Objectives:***

- Define information management, information system (technology) and informatics
- Explain the basic theoretical concept that underlies informatics practice
- Define the meaning of biomedical and health informatics as a field of study

### ***Unit 2: Health Information Systems Overview***

#### ***Unit 2 Objectives:***

- Define the concept of an information system and its characteristics
- Describe the different types of information systems
- Describe various types of technologies that support health care information systems

### ***Unit 3: Electronic Health Record***

#### ***Unit 3 Objectives:***

- State the similarities and differences between an electronic medical record (EMR) and electronic health record (EHR)
- Identify attributes and functions of an EHR
- Describe the perspectives of health care providers and the public regarding acceptance of or issues with an EHR, which can serve as facilitators of or major barriers to its adoption
- Explain how the use of an EHR can affect patient care safety, efficiency of care practices, and patient outcomes

### ***Unit 4: Computerized Provider Order Entry (CPOE)***

#### ***Unit 4 Objectives:***

- Describe the purpose, attributes and functions of CPOE
- Explain ways in which CPOE is currently being used in health care

### ***Unit 5: Clinical Decision Support System***

#### ***Unit 5 Objectives:***

- Describe the history and evolution of clinical decision support
- Describe the fundamental requirements of effective clinical decision support systems
- Discuss how clinical practice guidelines and evidence-based practice affect clinical decision support systems



***ONC Component 6: Health Management Information Systems, Units 1-9 (cont.)***

***Unit 6: Patient Monitoring System***

***Unit 6 Objectives:***

- Describe the purpose, attributes, and functions of patient monitoring systems
- Discuss ways in which automation can improve the quality of patient care
- Analyze how the integration of data from many sources assists in making clinical decisions

***Unit 7: Medical Imaging System***

***Unit 7 Objectives:***

- Examine the purposes, processes, and management issues
- Understand the economic and technological factors associated with digital displays
- Describe the major challenges
- Describe the future directions

***Unit 8: Consumer Health Informatics***

***Unit 8 Objectives:***

- Explain how current and emerging technologies have impacted and may continue to affect consumer health informatics
- Describe the role of genomics in consumer health informatics
- Describe the emergence of personal health records and their implications
- Discuss how consumerism influences the ongoing development and use of health information systems

***Unit 9: Administrative, Billing, and Financial Systems***

***Unit 9 Objectives:***

- Explain applications that need to be integrated in health care information systems
- Describe the strategies used by health care organizations to ensure integration of functions
- Discuss the critical elements needed to integrate billing, financial, and clinical systems



## **Module 2 (cont.)**

### *ONC Component 7: Working with Health IT Systems*

#### **Description**

This is a laboratory component. Students will work with simulated systems or real systems with simulated data. As they play the role of practitioners using these systems, they will learn what is happening “under the hood.” They will experience threats to security and appreciate the need for standards, high levels of usability, and how errors can occur. Materials must support hands-on experience in computer labs and on-site in health organizations

#### **Component Objectives**

1. Identify common components of an HIT system and types of HIT applications (e-Mar, POE, PACS, ADT, Lab, Registries, Billing/Coding, etc, and acute care, community health, public health, small provider practices, etc.)
2. Describe data flows across HIT systems and implication of standards.
3. Identify root causes of HIT-induced error (i.e. usability, workflow interference, system error, etc.) and suggest solutions.
4. Assess the strengths and weaknesses of identified solutions to identified HIT problems (to emphasize the reality of “solutions” and illustrate the frequent domino effect/unintended consequences of change of an HIT system)
5. Defines usability, describes general usability principles, and relates usability to adoption in relation to HIT.
6. Define and differentiate security, confidentiality, and privacy and identify common threats.
7. Demonstrate beginning level competency in general HIT system use

#### **Method of Delivery**

Course delivered through Desire2Learn (D2L) learning management system. Lectures are comprised of ONC flash lectures; supplemental materials consist of ONC PowerPoint slides, audio transcripts, and instructor’s study guides.

#### **Component Timeline**

2 weeks



***ONC Component: Working with Health IT Systems, Units 1-11***

***Unit 1: Introduction and Overview: Components of HIT System***

***Unit 1 Objectives:***

- Define a system and relate systems concepts to HIT.
- Discuss specific examples of settings where Health IT is used (acute, rural, public health, clinic, office, patient home, etc.).
- Identify common components of a clinical HIT system.
- Demonstrate beginning level competency in maneuvering the demonstration Electronic Health Record System (EHRS).

***Unit 2: Under the Hood***

***Unit 2 Objectives:***

- Identify the health IT functions that support a generic *ambulatory* patient care process.
- Identify the health IT functions that support a generic *inpatient* care process.

***Unit 3: Understanding Information Exchange in HIT System***

***Unit 3 Objectives:***

- Identify entities that are commonly involved in HIT system data exchange.
- Explain the need for standards and why they exist.
- Define and differentiate between vocabulary, content exchange, and privacy and security standards.
- Compare current efforts to facilitate health information exchange between providers, communities, regions, and nation (NHIN, HIEs, and NHIN Direct).

***Unit 4: The Effective HIT System***

***Unit 4 Objectives:***

- Identify characteristics of an effective HIT system.
- Define and provide examples of how evidence-based practice can be supported in HIT systems.
- Define and cite examples of usability, configurability, scalability, and reliability in HIT systems.
- List and contrast different types of reports/queries (predefined vs. ad hoc) required for internal and external reporting.



***ONC Component: Working with Health IT Systems, Units 1-11 (cont.)***

***Unit 5: Fundamentals of Usability in HIT System – What Does It Matter?***

***Unit 5 Objectives:***

- Define usability and its relationship to HIT systems.
- Explain the impact of HIT usability on user satisfaction, adoption, and workarounds including error rates and unintended consequences.
- Provide alternatives to HIT usability bottlenecks.

***Unit 6: HIT Facilitated Error – Cause and Effect***

***Unit 6 Objectives:***

- Explain the concept of facilitated error in HIT
- Cite examples of situations where HIT systems could increase the potential for user error
- Analyze sources of HIT facilitated errors and suggest realistic solutions

***Unit 7: Protecting Privacy, Security and Confidentiality – HIT Systems***

***Unit 7 Objectives:***

- Explain and illustrate privacy, security, and confidentiality in HIT settings.
- Identify common threats encountered when using HIT.
- Formulate strategies to minimize threats to privacy, security, and confidentiality in HIT systems.

***Unit 8: HIT System Planning, Acquisition, Installation and Training: Practices to Support and Pitfalls to Avoid***

***Unit 8 Objectives:***

- Conduct a basic user needs analysis for a given example situation.
- Create a plan for training users in a small office practice, a large community clinic, or a single unit in an ambulatory care setting.
- Identify several potential challenges that may emerge during installation and generate a strategy to solve (lack of basic computer literacy in staff, etc.).



***ONC Component: Working with Health IT Systems, Units 1-11 (cont.)***

***Unit 9: Potential Issues with Adoption and Installation of a HIT System***

***Unit 9 Objectives:***

- Identify frequently encountered challenges to adoption and implementation of HIT systems.
- Propose solutions to common problems in the implementation of HIT systems.
- Design a plan to address barriers to implementation of an HIT system.

***Unit 10: HIT Aspects of Patient Centered Care***

***Unit 10 Objectives:***

- Define patient-centered care.
- Suggest HIT-enabled solutions/strategies to enhance patient involvement in health and healthcare.
- Assess the effectiveness of HIT systems in supporting patient-centered care.
- Perform self-assessment of personal beliefs related to HIT and patient-centered care.

***Unit 11: Health IT in the Future***

***Unit 11 Objectives:***

- Speculate on the relationship between HIT and health reform.
- Suggest alternative designs for usable & supportive HIT.
- Hypothesize how HIT may intersect with publicly available data to improve health (i.e. Point of Sale, Weather, GIS, foods, etc.).
- Predict avenues of future innovations in HIT.



## Module 2: Assignments and Assessments

### *ONC Component 6: Health Management Information Systems*

- Week 9 Discussion
  - **Prompt:** Using knowledge gained from Component Health Management Information Systems, Unit 3, Explain the need for standards and why they exist.
- Neehr Perfect Level I Scavenger Hunt: EHR Orientation
  - **Description:** Introduction to Neehr Perfect, navigating the EHR and beginner level use of the EHR
- Health Management Information System Activity
  - **Description:** Students choose one of three writing prompts:
    - Similarities and differences between EMRs and EHRs
    - Advantages and disadvantages of using the internet as a platform for healthcare applications
    - Describe fundamentals of effective clinical decision support systems
- Health Management Information System Quiz

### *ONC Component 7: Working with Health IT Systems*

- Week 11 Discussion
  - **Prompt:** Describe how and why the SDLC applies to HIT software deployment.
- Neehr Perfect Level II Scavenger Hunt: EHR Essential Skills Usability
  - **Description:** Essential skills needed to navigate the EHR using filters, setting preferences and more detailed aspects of the electronic chart
- Neehr Perfect Activity: Introducing HI-TECH and the history of EHRs
  - **Description:** Introduction to Health Information Technology in the US, The HITECH Act, the American Recovery and Investment Act (ARRA), the US Institute of Medicine (IOM), the evolution of electronic health records, and how Neehr Perfect incorporates these pieces of healthcare information technology. The key attributes of a computer-based patient record are discussed in detail as well.
- Working with Health IT Systems Activity
  - **Description:** Scenario-based writing prompt regarding clinical decision support
- Working with Health IT Systems Quiz
- Neehr Perfect Activity: Structured and Unstructured Data
  - **Description:** Foundation for understanding structured and unstructured data, coding, and meaningful use.



## Module 2: Assignments and Assessments (cont.)

### *ONC Component 7: Working with Health IT Systems (cont.)*

- Week 13 Discussion
  - **Prompt:** Describe how and why the SDLC applies to HIT software deployment.

After students have completed the above assignments, they must complete the following:

- Module 2 Extra Credit Opportunity (optional)
- Module 2 Test



## **Module 3**

### ***ONC Component 8: Installation and Maintenance of Health IT Systems***

#### **Description**

This component covers fundamentals of selection, installation and maintenance of typical Electronic Health Records (EHR) systems. Students will be introduced to the principles underlying system configuration including basic hardware and software components, principles of system selection, planning, testing, troubleshooting, and final deployment. System security and procedures will also be introduced in this component.

#### **Component Objectives**

1. Describe the use of client and server hardware for access to and storage of EHRs
2. Describe network needs for access to and storage of EHRs
3. Identify the application software and back-end data storage software needed for a comprehensive, effective Health IT System
4. Compare and contrast COTS (Commercial Off-The-Shelf) and In-House /homegrown systems and describe their relative advantages and disadvantages
5. Verify system compliance with ONC-ATCB certification
6. Identify purpose and categories of ARRA “Meaningful Use” criteria
7. Identify 12 possible steps to choosing an EHR system
8. Gather functional requirements from institution and users
9. Document use-cases and relate them to functional requirements
10. Identify the 8 basic components to a project plan
11. Define the role of a project manager
12. Equate the basic project plan components to a typical EHR implementation plan
13. Create a project plan for system design and implementation
14. Define the steps of the Software Development Life Cycle (SDLC) and the purpose and importance of each.
15. Describe different models of the SDLC and their key differences.
16. Describe how and why an HIT software application would go through the SDLC
17. Identify regulatory requirements for EHRs and integrate into the project plan
18. Identify best practices for OS and network system security installation and patches (such as those provided by vendors, SANs, and ISC2) and integrate into project plan
19. Identify and assess protection measures including access control, firewalls, intrusion detection and encryption
20. Provide training for system users regarding the methods and importance of security compliance
21. Determine and document system interfaces and integration requirements



## ***ONC Component 8: Installation and Maintenance of Health IT Systems***

### **Component Objectives (cont.)**

22. Describe the pitfalls associated with installing a new application in an environment of pre-existing applications
23. Give examples of interfacing modalities
24. Identify and implement an effective troubleshooting procedure for reporting, evaluating, fixing, deploying, and follow-up of errors, problems, or limitations for the system
25. Integrate downtime schedule for OS, network, database, and client application maintenance and updates
26. Develop a process for communicating requirements and supplying updates between vendors/developer and users
27. Create a baseline for system performance measurement and comparison for troubleshooting
28. Create redundancy and fault-tolerance in systems for access and data storage, providing high performance and reliability
29. Backup and restore databases, applications, and operating systems
30. Develop a plan for decommissioning systems and data
31. Gather user feedback and performance baseline for system validation and testing
32. Document problems with their resolution status
33. Create, execute, and document a test plan
34. Identify pilot group and plan scope of pilot
35. Install pilot system, train pilot users, and make pilot available
36. Gather and prioritize feedback from pilot test, revising project plan if necessary
37. Develop and implement strategy for:
  - a. Communicating deployment plan to end users and management
  - b. Technical support of deployment (e.g. live on-site support versus phone/Internet support)
  - c. Getting feedback from end users following deployment
  - d. Evaluating usage and capacity of system resources under conditions of full deployment
38. Deploy revised system

### **Method of Delivery**

Course delivered through Desire2Learn (D2L) learning management system. Lectures are comprised of ONC flash lectures; supplemental materials consist of ONC PowerPoint slides, audio transcripts, and instructor's study guides. Lab activities delivered through D2L and Neehr Perfect Educational Electronic Health Record (EHR).

### **Component Timeline**

1 week



## ***ONC Component 8: Installation and Maintenance of Health IT Systems, Units 1-11***

### ***Unit 1: Elements of a Typical Electronic Health Record System***

#### ***Unit 1 Objectives:***

- Identify the core elements that comprise an EHR system
- Describe the use of client and server hardware for access to and storage of EHRs
- Describe network needs for access to and storage of EHRs
- Identify the application software and back-end data storage software needed for a comprehensive, effective health IT system

### ***Unit 2: System Selection – Software and Certification***

#### ***Unit 2 Objectives:***

- Compare and contrast COTS (Commercial Off-The-Shelf) and In-House /homegrown systems and describe their relative advantages and disadvantages
- Verify system compliance with ONC-ATCB certification
- Identify purpose and categories of ARRA “Meaningful Use” criteria

### ***Unit 3: System Selection – Functional and Technical Requirements***

#### ***Unit 3 Objectives:***

- Identify 12 possible steps to choosing an EHR system
- Gather functional requirements from institution and users
- Document use-cases and relate them to functional requirements

### ***Unit 4: Structured Analysis and Design***

#### ***Unit 4 Objectives:***

- Identify the 8 basic components to a project plan
- Define the role of a project manager
- Equate the basic project plan components to a typical EHR implementation plan
- Create a project plan for system design and implementation

### ***Unit 5: Software Development Life Cycle (SDLC) Model***

#### ***Unit 5 Objectives:***

- Define the steps of the Software Development Life Cycle (SDLC) and the purpose and importance of each.
- Describe different models of the SDLC and their key differences.
- Describe how and why the SDLC applies to HIT software deployment.



***ONC Component 8: Installation and Maintenance of Health IT Systems, Units 1-11 (cont.)***

***Unit 6: System Security Procedures and Standards***

***Unit 6 Objectives:***

- Identify regulatory requirements for EHRs
- Provide training for system users regarding the methods and importance of security compliance
- Identify administrative, physical, and technical safeguards for system security and regulatory compliance
- Identify best practices for system security
- Identify best practices for risk / contingency management

***Unit 7: System Interfaces and Integration***

***Unit 7 Objectives:***

- Determine and document system interfaces and integration requirements
- Describe the pitfalls associated with installing a new application in an environment of pre-existing applications
- Give examples of interfacing modalities

***Unit 8: Troubleshooting; Maintenance and Upgrades; Interaction with Vendors, Developers, and Users***

***Unit 8 Objectives:***

- Identify and implement an effective troubleshooting procedure for reporting, evaluating, fixing, deploying, and follow-up of errors, problems, or limitations for the system
- Integrate downtime schedule for OS, network, database, and client application maintenance and updates
- Develop a process for communicating requirements and supplying updates between vendors/developer and users
- Create a baseline for system performance measurement and comparison for troubleshooting

***Unit 9: Creating Fault-Tolerant Systems, Backups, and Commissioning***

***Unit 9 Objectives:***

- Define availability, reliability, redundancy, and fault tolerance
- Explain areas and outline rules for implementing fault tolerant systems
- Perform risk assessment
- Follow best practice guidelines for common implementations
- Develop strategies for backup and restore of operating systems, applications, configuration settings, and databases
- Decommission systems and data



***ONC Component 8: Installation and Maintenance of Health IT Systems, Units 1-11 (cont.)***

***Unit 10: Developing a Test Strategy and Plan***

***Unit 10 Objectives:***

- Gather user feedback and performance baseline for system validation and testing
- Document problems with their resolution status
- Create, execute, and document a test plan

***Unit 11: Pilot Testing and Full-Scale Deployments***

***Unit 11 Objectives:***

- Identify pilot testing, deployment steps, and group for pilot testing
- Develop a plan for training pilot users
- Gather and prioritize feedback from pilot test
- Recommend amount of legacy data to preload
- Develop a plan for implementation using best practices
- Identify post-implementation practices



## **Module 3 (cont.)**

### ***ONC Component 10: Fundamentals of Health Workflow Process Analysis and Redesign***

#### **Description**

This component covers fundamentals of health workflow process analysis and redesign as a necessary component of complete practice automation. Process validation and change management are also covered.

#### **Component Objectives**

1. Identify the elements involved in providing patient care within a complex health care setting that must be taken into consideration when examining and proposing changes in workflow processes.
2. Create diagram of processes in the healthcare setting that support workflow analysis and re-design.
3. Critically analyze the workflow processes in a selected health care setting to determine their effectiveness from the perspective of those being served (i.e., patients), those providing the services (i.e., professional and non-professional staff), and the organization's leadership (i.e., decision makers).
4. Propose ways in which quality improvement methods, tools and health IT can be applied within a healthcare setting to improve workflow processes.
5. Suggest approaches that would ensure the success of workflow re-design from development and presentation of the implementation plan, to facilitation of decision making meetings, implementation of the changes, evaluation of the new processes, sustainability of new workflow processes, and continuous quality improvement efforts to achieve meaningful use.
6. Apply to these activities an understanding of health IT, meaningful use, and the challenges practice settings will encounter in achieving meaningful use.

#### **Method of Delivery**

Course delivered through Desire2Learn (D2L) learning management system. Lectures are comprised of ONC flash lectures; supplemental materials consist of ONC PowerPoint slides, audio transcripts, and instructor's study guides. Lab activities delivered through D2L and Neehr Perfect Educational Electronic Health Record (EHR).

#### **Component Timeline**

3 weeks



***ONC Component 10: Fundamentals of Health Workflow Process Analysis and Redesign, Units 1-11***

***Unit 1: The Concepts of Healthcare Processes and Process Analysis***

***Unit 1 Objectives:***

- Describe the purpose for process analysis and redesign in the clinical setting
- Describe the role of a practice workflow and information management redesign specialist and contrast it with other roles such as technical support and implementation management
- Explain how health care process analysis and redesign and meaningful use are related
- Analyze a health care scenario and identify the components of clinical workflow
- Given a scenario of a health care analysis and redesign, analyze the responsibilities of each participant in the process and how the roles complement or overlap with one another
- Describe how the workflow processes used by a health care facility might differ depending on the type of facility

***Unit 2: Process Mapping***

***Unit 2 Objectives:***

- Articulate the value of process mapping.
- Describe standard process mapping symbols and conventions.
- Analyze an existing workflow process chart in terms of the information that could be generated, and the sequence of steps that are being communicated.
- Choose the correct scope and detail level for a process map.
- Choose an appropriate process mapping methodology.
- Create a process map for a health care system (or system component) using correct symbols and conventions.

***Unit 3: Interpreting and Creating Process Diagrams***

***Unit 3 Objectives:***

- Create a process flowchart for a health care system (or system component) using appropriate ISO 5807 symbols and conventions. (Lecture b)
- Create context and data flow diagrams for a health care system (or system component) using appropriate Yourdon symbols and conventions (Lecture c)
- Choose the correct scope and detail level for a process flowchart and data flow diagram (Lecture b, c)
- Read and interpret Gane-Sarson data flow diagram (Lecture d)
- Read and interpret an entity relationship diagram in crow's foot notation (Lecture e)
- Read and interpret UML class, activity, and state diagrams (Lecture f)



***ONC Component 10: Fundamentals of Health Workflow Process Analysis and Redesign, Units 1-11 (cont.)***

***Unit 4: Acquiring Clinical Process Knowledge***

***Unit 4 Objectives:***

- Identify how the strategic goals and stakeholders for a given health care facility can influence workflow processes in that facility
- Create an agenda for an opening meeting to discuss workflow processes in a health care facility
- Compare and contrast different types of knowledge and their impact on organizations
- Analyze a health care scenario according to CMMI levels
- Identify the workflow processes that are likely to be used by a healthcare facility
- Identify the workflow processes that are essential to document and analyze in order to determine how best to streamline the operations in a given health care facility
- Identify key individuals with whom the analyst should meet or observe in order to gain an understanding of the nature and complexity of their work
- Given a process observation scenario, formulate the questions that would facilitate a productive discussion of the workflow of information, activities and roles within that facility
- Suggest ways to successfully respond to common challenges encountered in knowledge acquisition
- Given a practice scenario, choose an appropriate knowledge acquisition method
- Given a process analysis scenario including list of observations, create agenda for visit closing meeting and an initial meeting report
- Given a set of diagrams and observations from an information gathering meeting draft a summary report

***Unit 5: Process Analysis***

***Unit 5 Objectives:***

- Describe the purpose of Process Analysis
- Describe skills and knowledge necessary for Process Analysis
- Perform a process analysis for a given clinic scenario
- Given results of a process analysis, draft a summary report
- Given results of a process analysis, identify desired electronic medical record functionality



***ONC Component 10: Fundamentals of Health Workflow Process Analysis and Redesign, Units 1-11 (cont.)***

***Unit 6: Process Redesign***

***Unit 6 Objectives:***

- Identify the factors that optimize workflow processes in health care settings
- Describe how information technology can be used to increase the efficiency of workflow in health care settings
- Identify aspects of clinical workflow that are improved by EHR
- Propose ways in which the workflow processes in health care settings can be re-designed to ensure patient safety and increase efficiency in such settings
- Use knowledge of common software functionality and meaningful use objectives to inform a process redesign for a given clinic scenario

***Unit 7: Facilitating Meetings for Implementation Decisions***

***Unit 7 Objectives:***

- Describe major health care facility decisions in process redesign that includes EHR technology
- Draft an agenda and facilitation plan for a decision making meeting,
- Prepare a presentation to communicate findings of a workflow analysis or process redesign to health care facility decision makers, and
- Document those decisions that are made and actions identified in a decision making meeting
- Critique a decision making meeting agenda, facilitation plan or scenario to identify problems and how they could have been prevented

***Unit 8: Quality Improvement Methods***

***Unit 8 Objectives:***

- Describe strategies for quality improvement
- Describe the role of Leadership in Quality Improvement
- Describe the local clinic improvement capabilities
- Describe and recommend tools for quality improvement
- Compare and contrast the quality improvement methodologies and tools and their appropriate uses in the health care setting



***ONC Component 10: Fundamentals of Health Workflow Process Analysis and Redesign, Units 1-11 (cont.)***

***Unit 9: Leading and Facilitating Change***

***Unit 9 Objectives:***

- Explain concerns expressed by participants in a process analysis & redesign scenario in terms of common change management concepts.
- Propose strategies to gain acceptance of changes in work processes.
- Create and critique a facilitation plan, including appropriate facilitation tools for a given process analysis & redesign scenario.
- Given a health care change management scenario, explain outcomes in terms of common change management concepts.

***Unit 10: Process Change Implementation and Evaluation***

***Unit 10 Objectives:***

- Develop a process change implementation plan for a health care facility that includes tasks to be accomplished, responsible parties for tasks, a timeline, and the human and material resources needed
- Identify management tracking and measurement opportunities for the process change
- Outline elements of an evaluation plan that will help determine the success of a workflow process change implemented in a health care facility
- Describe how the workflow analyst can help a health care facility continually improve its workflow processes, based on results of ongoing evaluations

***Unit 11: Maintaining and Enhancing Improvements***

***Unit 11 Objectives:***

- Design control strategies to maintain performance of clinic processes
- Develop and present a sustainability and continuous improvement plan for a health care setting
- Work with practice staff to develop a set of plans to keep the practice running (to the extent necessary and practical) if the EHR system fails
- Work with practice staff to evaluate the new processes as implemented and identify problems and changes that are needed



## Module 3: Assignments and Assessments

### *ONC Component 8: Installation and Maintenance of Health IT Systems*

- Neehr Perfect Level III Scavenger Hunt: Meaningful Use
  - **Description:** Coded and non-coded data, health factors, purpose of meaningful use
- Week 14 Discussion
  - **Prompt:** Using your knowledge gained from Fundamentals of Health Workflow Process Analysis & Redesign, Unit 1, Lecture A, explain how health care process analysis and redesign and meaningful use are related.
- Installation and Maintenance of Health IT Systems Quiz

### *ONC Component 10: Fundamentals of Health Workflow Process Analysis and Redesign*

- Neehr Perfect Level Activity: Registering a Patient and Adding Orders Part I
  - **Description:** Students register a patient in the EHR (creating a new chart) and will add orders for the patient.
- Week 15 Discussion
  - **Prompt:** Using your knowledge gained from Fundamentals of Health Workflow Process Analysis & Redesign, Unit 10, propose strategies to gain acceptance of changes in processes.
- Neehr Perfect Activity: Case Study Review
  - **Description:** A detailed case study review, or audit, of a chart and its contents to determine what is present, or not present, in the chart. Students will be introduced to the documentation in the health record, how the diagnosis supported through documentation, the patient's progress, clinical findings, and discharge status.
- Fundamentals of Health Workflow Process Analysis and Redesign
  - **Description:** Scenario-based activity involving the use of the *Lucid Chart* online flowchart creator
- Neehr Perfect Activity: Quality Improvement Utilizing the EHR
  - **Description:** Students will review five patient charts from the EHR. Using "Plan, Do, Study/Check, Act (PDSA/PDCA), students will analyze the documentation of consents in the chart for accuracy and quality. Quality management, performance improvement, and initiatives within a healthcare system are discussed.
- Week 17 Discussion
  - **Prompt:** Using knowledge gained from Component Configuring EHRs, Unit 7, describe elements of disaster preparedness and disaster recovery.
- Fundamentals of Health Workflow Process Analysis and Redesign Quiz



### **Module 3: Assignments and Assessments (cont.)**

After students have completed the above assignments, they must complete the following:

- Module 3 Extra Credit Opportunity (optional)
- Module 3 Test



## **Module 4**

### *ONC Component 11: Configuring EHRs*

#### **Description**

This component provides a practical experience with a laboratory component (utilizing the Neehr Perfect Educational EHR system) that will address approaches to assessing, selecting, and configuring EHRs to meet the specific needs of customers and end-users.

#### **Component Objectives**

1. Describe the process of migration to an electronic health record (EHR) from the perspectives of organizational strategy, planning, analysis of EHR options, decision-making techniques, training, and implementation strategies.
2. Discuss the migration path from a paper to an electronic health record with an emphasis on organizational strategy to implementation, including meaningful use criteria.
3. Discuss the importance and use of clinical decision support systems for clinical and administrative use.
4. Given an EHR system, configure the system to achieve features required for meaningful use. The course includes VistA simulation EHR environment lab exercises for:
  - a. Patient care clinical workflow
  - b. Implementing clinical decision support
  - c. Building order sets
  - d. Utilizing data entry templates
  - e. Health summary and clinical reminder reports
5. Understand clinical workflows from multiple clinician perspectives, and in different clinical settings.
6. Understand concepts of privacy and security as applied to the EHR, including regulatory frameworks, risk management, authentication and authorization, user passwords, and physical security of systems.
7. Describe security issues with mobile and medical devices, and elements of disaster preparedness and disaster recovery.
8. Discuss the migration path from a paper to an electronic health record with an emphasis on organizational strategy to implementation, including meaningful use criteria.



## ***ONC Component 11: Configuring EHRs***

### **Method of Delivery**

Course delivered through Desire2Learn (D2L) learning management system. Lectures are comprised of ONC flash lectures; supplemental materials consist of ONC PowerPoint slides, audio transcripts, and instructor's study guides. Lab activities delivered through D2L and Neehr Perfect Educational Electronic Health Record (EHR).

### **Component Timeline**

2 weeks



## ***ONC Component 11: Configuring EHRs, Units 1-8***

### ***Unit 1: Migration to an Electronic Health Record System***

#### ***Unit 1 Objectives:***

- Describe the process of initial planning, including identification of stakeholders, champions, management and implementation teams, and determining appropriate members for a steering committee
- Develop a timeline for choosing and implementing an electronic health record, including defining the scope of implementation, budget estimates, and additional critical steps to build a basic strategic plan for implementation
- Develop functional requirements, including a workflow analysis and a gap analysis, and recognizing when to bring in expertise
- Develop and applying criteria for selecting an appropriate vendor for the electronic health record including:
  - Generate an RFI/RFP
  - Select an appropriate system, including utilizing an appropriate ranking model
  - Generate interface requirements
  - Compare and contrast EHR solutions (e.g. locally hosted versus cloud solutions)
- Negotiate a contract
- Develop a training plan

### ***Unit 2: Patient Care Clinical Workflow: Multiple Perspectives of Patient Care***

#### ***Unit 2 Objectives:***

- Register a patient in a VistA simulation EHR environment. (Lab Exercise 1)
- Enter vitals and chief complaint as a Medical Assistant in a VistA simulation EHR environment. (Lab Exercise 1)
- Enter a progress note as a Physician in a VistA simulation EHR environment. (Lab Exercise 3)
- Enter nursing notes and implement physician orders as a Registered Nurse in a VistA simulation EHR environment. (Lab Exercise 2)
- Understand the importance of clinical workflows in the functioning of EHRs. (Lecture, Lab Exercise 1,2, 3)



***ONC Component 11: Configuring EHRs, Units 1-8 (cont.)***

***Unit 3: Implementing Clinical Decision Support***

***Unit 3 Objectives:***

- Define and discuss clinical decision support (Lecture)
- Describe, view and create Alerts/Notifications in a VistA simulation EHR environment (Lecture, Lab exercise 1)
- Describe, view and create Order Checks in a VistA simulation EHR environment (Lecture, Lab exercise 2)
- Describe, view and resolve Reminders in a VistA simulation EHR environment (Lecture, Lab exercise 3)
- Discuss the value of these EHR functions as clinical decision support tools (Lecture)

***Unit 4: Building Order Sets***

***Unit 4 Objectives:***

- Define and describe an order set (Lecture)
- Describe the benefits and costs associated with order sets (Lecture)
- Demonstrate the ability to build a variety of order sets in VistA, a simulation EHR environment (Lab exercises 1-3)

***Unit 5: Creating Data Entry Templates***

***Unit 5 Objectives:***

- Access and use the template editor (Lab exercise 1)
- Effectively use the different field controls to promote data quality and efficiency of data entry (Lecture, Lab exercise 1)
- Design, create and view Personal and Shared Templates for data entry (Lab exercise 2 & 3)
- Describe how the effective use of data entry templates supports quality care, patient safety and efficiency (Lecture)

***Unit 6: Health Summary and Clinical Reminder Reports***

***Unit 6 Objectives:***

- Design, view and create Health Summary reports in the VistA EHR simulation environment. (Lecture & Lab exercise 1)
- Design, view and create Clinical Reminder reports in the VistA EHR simulation environment. (Lecture & Lab exercise 2)
- Design, view and create ad hoc reports. (Lecture & Lab exercise 1)



***ONC Component 11: Configuring EHRs, Units 1-8 (cont.)***

***Unit 6: Health Summary and Clinical Reminder Reports (cont.)***

***Unit 6 Objectives:***

- Describe how quality reporting functions in an EHR supports quality care, patient safety and efficiency. (Lecture)
- Define the attributes of quality information. (Lecture)

***Unit 7: Privacy and Security in the US***

***Unit 7 Objectives:***

- Compare and contrast the concepts of privacy and security
- List the regulatory frameworks for an EHR
- Describe the concepts and requirements for risk management
- Describe authentication, authorization and accounting
- Describe passwords and multi-factor authentication and their associated issues
- Describe issues with portable devices
- Describe elements of disaster preparedness and disaster recovery
- Describe issues of physical security
- Describe malware concepts

***Unit 8: Meaningful Use and Implementation***

***Unit 8 Objectives:***

- Describe meaningful use (MU) of health information technology in the context of the Health Information Technology for Economic and Clinical Health (HITECH) Act
- Define the criteria for Stage 1 of meaningful use for eligible professionals and eligible hospitals
- Demonstrate examples of meaningful use using the VistA Electronic Health Record (EHR)



## **Module 4 (cont.)**

### ***ONC Component 12: Quality Improvement***

#### **Description**

Quality Improvement introduces the concepts of health IT and practice workflow redesign as instruments of quality improvement. It addresses establishing a culture that supports increased quality and safety. It also discusses approaches to assessing patient safety issues and implementing quality management and reporting through electronic systems.

#### **Component Objectives**

1. Analyze clinical decision-making requirements, including who, what, when, how, and where information is needed.
2. Design and implement information technology that supports effective teamwork, fosters open communication and enables shared decision-making to achieve quality patient care
3. Analyze clinical workflows to design information technology that supports clinical decision-making and care coordination.
4. Design and apply of information technology and standardized practices that support safety and quality
5. Formulate activation planning that supports and maintains safety and quality
6. Select and apply quality measures for incorporation into information systems to enable review of outcomes of care and identification of improvement opportunities
7. Assess findings from quality reviews of reported events to design and implement clinical information system improvements.
8. Select improvement tools to assist clinical teams in improving the quality and safety of the electronic health record.
9. Monitor use of information technology for inappropriate use leading to hazards and errors
10. Design an information technology culture conducive to highly reliable processes built on human factors research.
11. Design and implement effective strategies to use information technology to decrease reliance on memory.

#### **Method of Delivery**

Course delivered through Desire2Learn (D2L) learning management system. Lectures are comprised of ONC flash lectures; supplemental materials consist of ONC PowerPoint slides, audio transcripts, and instructor's study guides. Lab activities delivered through D2L and Neehr Perfect Educational Electronic Health Record (EHR).

#### **Component Timeline**

2 weeks



## ***ONC Component 12: Quality Improvement, Units 1-12***

### ***Unit 1: Introduction to Quality Improvement and Health Information Technology***

#### ***Unit 1 Objectives:***

- Identify the current challenges in healthcare quality.
- Examine the components of the healthcare system that have an impact on quality.
- Explain healthcare quality and quality improvement (QI).
- Describe quality improvement as a goal of meaningful use.
- Analyze the ways that HIT can either help or hinder quality improvement.

### ***Unit 2: Principles of Quality and Safety for HIT***

#### ***Unit 2 Objectives:***

- Investigate the fallibility of people and systems.
- Describe the ways that every system is designed to achieve the results it gets.
- Apply the basic principles of safe design.
- Explain the ways that teams make wise decisions with diverse and independent input.

### ***Unit 3: Introduction to Reliability***

#### ***Unit 3 Objectives:***

- Discuss the basic concepts of reliability.
- Understand what makes organizations highly reliable.

### ***Unit 4: Reliability, Culture of Safety, and HIT***

#### ***Unit 4 Objectives:***

- Discuss reliability as a tool for ensuring safety.
- Examine how ultra-safe organizations operate.
- Identify how teams make wise decisions.

### ***Unit 5: Decision Support for Quality Improvement***

#### ***Unit 5 Objectives:***

- Define decision support, its importance, and why it is difficult to implement.
- Compare decision support tools that help improve quality.
- Analyze the benefits and shortfalls of alerts and clinical reminders.

### ***Unit 6: Workflow Design***

#### ***Unit 6 Objectives:***

- Assess decision-making requirements in health or healthcare.
- Construct a work process flowchart.
- Appraise ways to incorporate decision-making requirements into HIT design.



***ONC Component 12: Quality Improvement, Units 1-12 (cont.)***

***Unit 7: HIT Design to Support Teamwork and Communication***

***Unit 7 Objectives:***

- Assess the impact of teamwork and communication on care coordination.
- Investigate ways in which HIT design can serve as a barrier to effective communication.
- Describe ways in which HIT design can enhance communication and care coordination.

***Unit 8: HIT and Infecting a Patient Safety Culture***

***Unit 8 Objectives:***

- Apply QI tools to the analysis of HIT errors.
- Identify strategies for adaptive work that can be useful to HIT initiatives.

***Unit 9: HIT Implementation Planning for Quality and Safety***

***Unit 9 Objectives:***

- Critique an implementation team and the role it plays in ensuring quality.
- Analyze effective implementation planning.
- Assess the quality implications of “big-bang,” versus, “staggered,” approaches to activation.
- Discuss go-live support strategies that minimize risk.

***Unit 10: Measuring Quality***

***Unit 10 Objectives:***

- Understand the basic concept of variation.
- Explain the attributes of an effective reporting system.
- Examine the importance of having standardized and structured health information so that you can use those data to make valid reports.
- Discuss how HIT can facilitate data collection and reporting for improving quality and patient safety.

***Unit 11: Data Quality Improvement***

***Unit 11 Objectives:***

- Understand the different purposes of data.
- Discuss the impact of poor data quality on quality measurement.
- Identify ten attributes of data quality and key process recommendations.
- Explore the attributes of data quality and key process recommendations for maintaining data integrity.
- Discuss common causes of data insufficiency.
- Describe how health information technology (HIT) design can enhance quality.



*ONC Component 12: Quality Improvement, Units 1-12 (cont.)*

*Unit 12: Learning from Mistakes: Error Reporting and Analysis and HIT*

*Unit 12 Objectives:*

- Explain how reporting errors can help to identify HIT system issues.
- Describe ways in which HIT can facilitate error reporting and detection.
- Assess HIT for unintended negative consequences.
- Examine common themes in HIT design deficiencies.
- Apply QI tools to analyze HIT errors



## **Module 4 (cont.)**

### *ONC Component 15: Usability and Human Factors*

#### **Description**

This component will discuss rapid prototyping, user-centered design, understanding effects of new technology workflow on downstream processes; facilitation of unit-wide focus groups or simulation.

#### **Component Objectives**

1. Articulate a systems approach to usability and human factors as it applies to health information technology.
2. Explain the cognitive consequences of health information technology on clinical performance.
3. Identify the consequences of suboptimal design in the delivery of healthcare.
4. Apply methods of cognitive research, sources of usability evidence, and principles of user-centered design to decisions regarding systems evaluation, technology evaluation, and iterative design, given a population of users.
5. Apply requirements engineering methods to inform design and technology selection.
6. Demonstrate concept knowledge of cognition and human performance models in their relevance to systems evaluation methods.
7. Apply concept knowledge of cognitive, physical and organization ergonomics to human factors engineering.
8. Select the most appropriate usability evaluation method, given particular system, setting, and development phase.
9. Apply principles of usability and design to critiquing EHR systems and to making recommendations for iterative improvement.
10. Diagnose problems associated with a clinical decision support system.
11. Apply cognitive methods of analysis to medical device testing.
12. Evaluate user interface designs using cognitive methods of analysis, usability testing, and Nielsen's heuristic evaluation method.
13. Diagnose various types of error and create or select potential solutions.
14. Select appropriate technology input methods given different technology uses, user populations and contexts.
15. Describe how information visualization can support and enhance the representation of trends and aggregate data.



***ONC Component 15: Usability and Human Factors (cont.)***

**Method of Delivery**

Course delivered through Desire2Learn (D2L) learning management system. Lectures are comprised of ONC flash lectures; supplemental materials consist of ONC PowerPoint slides, audio transcripts, and instructor's study guides. Lab activities delivered through D2L and Neehr Perfect Educational Electronic Health Record (EHR).

**Component Timeline**

2 weeks



## ***ONC Component 15: Usability and Human Factors, Units 1-12***

### ***Unit 1: People and Technology, Studies of Technology***

#### ***Unit 1 Objectives:***

- Explain the importance of technology in health
- Describe the contributions of Human-Computer interaction to the Health field
- Define the concept of system usability
- Patient safety issues
- Demonstrate concept knowledge of principles of user-centered design, methods of cognitive research, and sources of usability evidence
- Describe the seven stages of User Activity in Norman's Theory of Action
- Describe the role of human factors and human computer interaction concerning patient safety in the healthcare setting
- Demonstrate concept knowledge of principles of user-centered design and sources of usability evidence
- Demonstrate concept knowledge of principles of user-centered design, methods of cognitive research, and sources of usability evidence
- Describe the role of human factors and human computer interaction concerning patient safety in the healthcare setting
- Demonstrate concept knowledge of principles of user-centered design and sources

### ***Unit 2: Requirements Engineering***

#### ***Unit 2 Objectives:***

- Explain the role of requirements gathering in usability evaluation
- Identify the uses, advantages, and disadvantages of data collection methods used for requirements gathering
- Demonstrate an understanding of how to conduct a workflow analysis
  - Identify contextual design principles as they apply to the healthcare setting
- Describe the methods to interpret results of data collection

### ***Unit 3: Cognition and Human Performance***

#### ***Unit 3 Objectives:***

- Describe the impact of different kinds of representation on cognition as it applies to human computer interaction and web design
- Describe how humans process information and obtain skills
- Describe the Gestalt principles of perception and their relevance to human computer interaction and cognitive theory
- Describe the processes of memory and their relationship to web-design
- Describe the cognitive constructs for mental representation
- Explain how cognition and human performance models should inform iterative design processes



***ONC Component 15: Usability and Human Factors, Units 1-12 (cont.)***

***Unit 4: Human Factors and Healthcare***

***Unit 4 Objectives:***

- Distinguish between human factors and human computer interactions (HCI) as they apply to usability
- Explain how cognitive, physical and organization ergonomics can be applied to human factors engineering
- Describe how the concepts of mental workload, selective attention and information overload affect usability
- Describe the different dimensions of the concept of human error
- Describe a systems-centered approach to error and patient safety
- Apply methods for measuring mental workload and information overload
- Describe how human factors analysis can be applied to the study of medical devices

***Unit 5: Usability Evaluation Methods***

***Unit 5 Objectives:***

- Describe the importance of usability in relation to health information technologies
- List and describe usability evaluation methods
- Given a situation and set of goals, determine which usability evaluation method would be most appropriate and effective
- Conduct a cognitive walkthrough
- Design appropriate tasks for a usability test
- Describe the usability testing environment, required equipment, logistics, and materials

***Unit 6: Electronic Health Records and Usability***

***Unit 6 Objectives:***

- Define usability as it pertains to the EHR (*HIMSS document*)
- Challenges of EHR design and usability in typical workflow
- Identify a set of well-established principles of usability and design and describe their application to EHRs (*HIMSS document*)
- Identify and explain usability methods for enhancing efficiency of use and minimizing likelihood of user error (*HIMSS document*)
- Explain how user-centered design can enhance adoption of EHRs
- Discuss the role of usability testing, training and implementation of electronic health records
- Describe Web 2.0 and novel concepts in system design
- Identify potential methods of assessing and rating EHR usability when selecting an appropriate EHR system (*HIMSS document*)



***ONC Component 15: Usability and Human Factors, Units 1-12 (cont.)***

***Unit 7: Decision Support Systems: a Human Factors Approach***

***Unit 7 Objectives:***

- Discuss factors in understanding Human Decision Making
- Discuss Clinical Decision Support Systems (CDSS)
- Discuss computer provider order entry systems (CPOES) and clinical decision support systems (CDSS)

***Unit 8: Approaches to Design***

***Unit 8 Objectives:***

- Explain a user-centered design approach
- Define conceptual models
  - Explain the iterative design process
  - Describe how requirements analysis influences design
- Describe requirements analysis and cognitive task analysis
- Characterize the role of prototypes in design
- Describe the principles of participatory design
- Explain the difference between low fidelity and high fidelity prototypes
- When it would be appropriate to use one versus the other
- Explain the iterative design process
- Describe principles of sound design to support usability
- Describe how Nielsen's heuristics and design principles apply to user interface design

***Unit 9: Ubiquitous Computing***

***Unit 9 Objectives:***

- History of Ubiquitous Computing
- Basic Principles
- Examples of Ubicomp in Healthcare
- Technical Challenges

***Unit 10: Designing for Safety***

***Unit 10 Objectives:***

- Apply principles underlying the design of healthcare systems for safety
- Identify common sources of error documented in research studies in medicine
- Apply the cognitive taxonomy of errors
- Define "workflow analysis" and methods for examining and addressing human errors
- Design a workflow analysis study
- Identify common sources of error documented in research studies in medicine
- Apply principles underlying the design of healthcare systems for safety



***ONC Component 15: Usability and Human Factors, Units 1-12 (cont.)***

***Unit 11: Input and Selection Methods***

***Unit 11 Objectives:***

- Provide a rationale as to why input methods are an important consideration in the design process for health technology
- Compare and contrast technology input methods
- Select appropriate technology input methods given different technology uses, user populations and contexts

***Unit 12: Information Visualization***

***Unit 12 Objectives:***

- Field of Information Visualization
- Main concepts
  - Presentation
  - Interaction and dynamic queries
  - Hierarchies and trees
  - Time-series data
- Information Visualization in Medicine
- Describe how information visualization can support and enhance the representation of trends and aggregate data



## Module 4: Assignments and Assessments

### *ONC Component 11: Configuring EHRs*

- Neehr Perfect Activity: Introduction to Clinical Reminders
  - **Description:** Introduces students to the Clinical Reminder system of the EHR. Students will learn about the Clinical Reminder system, evaluate potential uses and create an example clinical reminder to solve a current healthcare problem.
- Week 18 Discussion
  - **Prompt:** Using knowledge gained from Component Quality Improvement, Unit 1, analyze the ways that HIT can either help or hinder quality improvement.
- Neehr Perfect Activity: Meaningful Use Stage 2 - Clinical Quality Measures (for Eligible Professionals)
  - **Description:** The activity uses online resources from the CMS website, patients from the Neehr Perfect EHR and content found in this activity. This Meaningful Use activity focuses on Clinical Quality Measures, Core Objectives and Menu Objectives for the eligible professional.
- Neehr Perfect Activity: Clinical Decisions through Orders
  - **Description:** In this activity the student will be introduced to the electronic health record's function in clinical decision making. The activity will explore entering orders, computerized alerts and reminders in Neehr Perfect.
- Week 19 Discussion
  - **Prompt:** Using knowledge gained from Component Quality Improvement, Unit 5, analyze the benefits and shortfalls of alerts and clinical reminders.
- Configuring EHRs Quiz

### *ONC Component 12: Quality Improvement*

- Neehr Perfect Level Activity: Patient Problems and Communication
  - **Description:** The focus of the activity is how documenting correctly a patient's problems (or medical diagnosis) and Code status can be used for communication, continuity of care, improved patient safety, and an interdisciplinary approach.
- Week 20 Discussion
  - **Prompt:** Using knowledge gained from Component Quality Improvement, Unit 9, discuss "go live" support strategies that minimize risk.



## Module 4: Assignments and Assessments (cont.)

### *ONC Component 12: Quality Improvement (cont.)*

- Neehr Perfect Activity: Cause and Effect
  - **Description:** The student will document in a chart, run the specified report and then identify any errors. Critical thinking will be applied as the student formulates possible ways that these health information errors could be prevented with better health information technology design.
- Week 21 Discussion
  - **Prompt:** Using knowledge gained from Component Quality Improvement, Unit 8, identify patient safety issues.
- Quality Improvement Quiz

### *ONC Component 15: Usability and Human Factors*

- Neehr Perfect Activity: Classifications and Terminology
  - **Description:** This activity explores classification and terminology systems and supports the student's current knowledge of these concepts and terms. This activity is a require pre-requisite to the SNOMED CT activity.
- Neehr Perfect Activity: SNOMED CT
  - **Description:** This activity is a continuation of the Classifications and Terminology activity and provides an in-depth look at SNOMED CT.
- Week 22 Discussion
  - **Prompt:** Using knowledge gained from Component Usability and Human Factors, Unit 2, explain the role of requirements gathering in usability evaluation.
- Neehr Perfect Activity: Reporting in the EHR
  - **Description:** The students will utilize the Reports Tab functions in the EHR to query patient information. The activity introduces the student to graphing patient chart data.
- Week 23 Discussion
  - **Prompt:** Using knowledge gained from Component Usability and Human Factors, Unit 5, list and describe usability evaluation methods.
- Week 24 Discussion
  - **Prompt:** Using knowledge gained from Component Usability and Human Factors, Unit 6C, explain how user-centered design can enhance adoption of EHRs.
- Usability and Human Factors Quiz



## **Module 4: Assignments and Assessments (cont.)**

After students have completed the above assignments, they must complete the following:

- Module 4 Extra Credit Opportunity (optional)
- Module 4 Test
- CHTS-PW Mock Examination (Program Final Exam)