Health Informatics in Low- and Middle-Income Countries: Short Course for Health Information System Professionals

Course Syllabus

September 2018

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GEMNet Health Global Evaluation & Monitoring Network for Health

MEASURE Evaluation

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The following MEASURE Evaluation staff contributed significantly to the planning and development of the curriculum:

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CONTENTS

INTRODUCTION

Competencies Covered

- Concepts, definitions, and applications—health informatics, medical informatics, clinical informatics, nursing informatics, public health informatics, etc.
- Health informatics development and health informatics literature
- Healthcare processes, process analysis, and mapping
- Medical decision making: principles, design, implementation
- Medical ethics: patient rights and confidentiality
- Electronic and digital health information systems
- Information systems to support patients and the public (public health information systems, electronic health records, etc.)
- mHealth
- Networked and shared care (telemedicine and information exchange)
- Health data management and coding systems
- Geographic Information Systems in public health
- System architectures
- Health communication systems and the health technology infrastructure
- System customization and development topics
- Health informatics nomenclatures, vocabularies, terminologies, ontologies, and taxonomies
- Health information exchanges and interoperability
- Data, information, and knowledge
    - Representation and structure
    - Analysis and manipulation
- Data visualization
- Assessment of the effects, value, and cost of information technology
- Reengineering and management of change topics
- User and process observation and assessment topics
- Principles of user-centered design—information needs assessment
- Introduction to evaluation methods in health informatics
- Policy and regulatory frameworks related to health informatics
    - Principles for digital development
- Assessing the health ecosystem

Suggested References

- Nelson, R., & Staggers, N. (2014). *Health informatics: An interprofessional approach.* St. Louis, MO, USA: Elsevier Mosby. ISBN-13: 9780323100953.

Units

- Unit 1: Introduction to Health Informatics
- Unit 2: Information Systems for Health
- Unit 3: Data and Interoperability
- Unit 4: Process Improvement, System Design, and Usability Evaluation

What is included in this syllabus?

For each unit of the course, this syllabus outlines the learning objectives, teaching methods, materials needed, a unit plan, and activity descriptions for the unit. Each unit's plan provides suggested times for the sessions in the unit. These timelines were created with the assumption of a five day course. The course can be adapted to fit longer or shorter timelines. The unit lectures and activities can be found on the course's landing page on the MEASURE Evaluation website at https://www.measureevaluation.org/health-informatics-short-course. There is additional material listed in the units. This material can be added or swapped out to fit the objectives and timelines of the course. These additional materials are labeled with an "X" in their file name.

UNIT 1. INTRODUCTION TO HEALTH INFORMATICS

Unit Learning Objectives

- Define information management, information system (technology) and informatics
- Summarize the informatics drivers and trends
- Identify attributes and functions of an electronic health record
- Describe the fundamental requirements of effective clinical decision support systems
- Describe the purpose, attributes, and functions of patient monitoring systems
- Discuss how telehealth communication technologies support clinical care

Teaching Methods

Facilitator presentations, interactive checks, in-class exercises, guided discussions

Materials Needed

Presentations, paper for students

Unit Plan

Time	Session Title	Methods
Day 1: 10.15am–12.15pm	Introduction and Overview (Unit 1.0a)	Lecture
Day 1: 12.15pm–12.30pm	Activity 1: What is the health informatics landscape in your country? (Unit 1.0b)	Discussion
Day 1: 1.30pm–2.30pm	Health Informatics for Health Information Systems (Unit 1.1)	Lecture
Day 1: 2.30pm–3.45pm	Patient-Centered Information Systems (Unit 1.2)	Lecture
Day 1: 4.00pm–4.45pm	Clinical Decision Support Systems (Unit 1.3a)	Lecture
Day 2: 8.30am–8.50am	Activity 2: Understanding Clinical Decision Support Systems (Unit 1.3b)	Individual exercise/Discussion
Day 2: 8.50am–9.35am	Health Informatics for Behavior Change Communication (Unit 1.4)	Lecture
Day 2: 9.35am–10.20am	Telehealth (Unit 1.5)	Lecture
Additional Material		
1. Patient Monitoring Systems (Unit 1.Xa)		
2. Activity 3: What health information systems and health management information systems are used in your country? (Unit 1.Xb)		
3. Information Systems (Unit 1.Xc)		

Unit 1 Activities

Activity 1: What is health informatics in your country?

Have participants share with the group: "What is the health informatics landscape in your country?"

Activity 2: Understanding Clinical Decision Support Systems

Break students into small groups to think about the following scenario and answer the questions below.

A nurse in a clinic tracks pregnant women using a mobile device included information about medications. On occasion an alert that the medication about to be administered is contra-indicated for the patient is shown.

- Why is this scenario an example of clinical decision support?
- What would be a benefit of the clinical decision support?
- What is the role of clinical decision support in this situation?
- Why is clinical decision support important at the point of care?

Activity 3: What HIS/HMIS are used in your country?

UNIT 2. INFORMATION SYSTEMS FOR HEALTH

Unit Learning Objectives

- Describe the major components of a computer system
- Define computer software and major software types
- Define the purpose of programming languages
- Describe a relational database
- Describe different ways of connecting to the Internet
- Define and discern the differences between privacy, security, and confidentiality
- Discuss methods for using information technology to protect privacy and confidentiality
- List common information technology security and privacy concerns
- Describe the components of an information system
- Describe the process of information system development

Teaching Methods

Presentations, guided discussions, group exercises, self-assessment

Materials Needed

Presentations, laptop or computer

Unit Plan

Time	Session Title	Methods
Day 2: 10.30am–1.00pm	Information Systems (Unit 2.0)	Lecture
Day 2: 2.00pm–3.30pm	Databases and SQL (Unit 2.1a)	Lecture
Day 2: 3.30pm–4.00pm	Activity 1: Database Discussion (Unit 2.1b)	Small group discussion
Day 3: 8.30am – –10.30am	Privacy, Security, and Confidentiality (Unit 2.2a)	Lecture
Day 3: 10.45am–11.15am	Activity 2: Guided Discussion about Data Privacy and Security (Unit 2.2b)	Guided discussion
Additional Material		
1. Privacy, Security, and Confidentiality, Lectures A, B, C (Unit 2.Xa, Unit 2.Xb, Unit 2.Xc)		
2. Networks (Unit 2.Xd)		
3. Computer Software (Unit 2.Xe)		
4. Computer Hardware (Unit 2.Xf)		

Unit 2 Activities

Activity 1: Database Discussion

- What are the advantages and disadvantages of storing data in a spreadsheet?
- What are the advantages and disadvantages of storing data in a database?
- When would you use a spreadsheet for data storage and when would you use a database?
- How does normalization reduce data inconsistency and redundancies?
- What is an example of how normalization reduces data inconsistency and redundancies?
- Why are there so many different tables within the NUMI application? Why not just one or two?
- Name the SQL statements and describe their resulting action.

Activity 2: Guided Discussion about Data Security and Privacy

Have a group discussion about these questions:

- Who owns information?
- How is informed consent implemented?
- When does public good exceed personal privacy?
    - For example, public health, research, law enforcement
- What conflicts are there with business interests?
- How do we let individuals "opt out" of systems?
    - What are the costs? When do we override?

UNIT 3. DATA AND INTEROPERABILITY

Unit Learning Objectives

- Define terms related to standardized terminologies
- Explain the need for standards and why they exist
- Define and differentiate between vocabulary, content exchange, and privacy and security standards
- Understand different kinds of standards being developed and for what purpose
- Understand the need for common data elements
- Define commonly used terms in data analytics

Teaching Methods

Lectures, self-assessment

Materials Needed

Presentations

Unit Plan

Time	Session Title	Methods
Day 3: 11.15am–12.00pm	Standards to Promote Health Information Exchange (Unit 3.0)	Lecture
Day 3: 12.00pm–12.30pm	National and International Standards Developing Organizations (Unit 3.1a)	Lecture
Day 3: 1.30 pm–2.00pm	Activity 1: Standards Discussion (Unit 3.1b)	Discussion
Day 3: 3.00pm–3.45pm	Data warehousing (Unit 3.2)	Lecture
Day 4: 8.30am–9.15am	Introduction to Healthcare Data Analytics (Unit 3.3a, Unit 3.3b)	Lecture
Day 4: 9.15am–10.15am	Activity 2: Working with Data (Unit 3.4a, Unit 3.4b)	Lecture
		Word document example
		Excel data set
Additional Material		
1. Case Study: Indian Health Information Network (Unit 3.Xa)		
2. Using ICT for Integration and Interoperability (Unit 3.Xb)		

Unit Activities

Activity 1: Standards Discussion

Activity 2: Working with Data

See PowerPoint, Excel, and Word documents.

UNIT 4. PROCESS IMPROVEMENT, SYSTEM DESIGN, AND USABILITY EVALUATION

Unit Learning Objectives

- Describe the purpose for healthcare workflow process improvement in the clinical setting
- Describe the purpose of process analysis
- Create a process map for a healthcare system (or system component)
- Define the concept of system usability
- Demonstrate concept knowledge of principles of user-centered design
- Explain the role of requirements gathering in usability evaluation
- Explain how cognitive, physical, and organization ergonomics can be applied to human factors engineering
- Describe the importance of usability in relation to health information technologies
- Explain what a user-centered design approach is and how it is done

Teaching Methods

Facilitator presentations, exercises, group work, participant presentations, and plenary discussions

Materials Needed

Presentations, flip charts

Unit Plan

Time	Session Title	Methods
Day 4: 11.30am–12.30pm	Introduction to Quality Improvement and Health Information Technology (Unit 4.0a)	Lecture
Day 4: 12.30pm–1.00pm	Activity 1: Quality Improvement Discussion (Unit 4.0b)	Guided discussion
Day 4: 2.00pm–2.45pm	Process Mapping Theory and Rationale (Unit 4.1a)	Lecture
Day 4: 2.45pm–4.15pm	Activity 2: Process Mapping Exercise (Unit 4.1b)	Group or individual activity
Day 5: 8.00am–8.45am	Process Analysis (Unit 4.2a)	Lecture
Day 5: 8.45am–9.15am	Activity 3: Process Analysis for Organizational Units (Unit 4.2b)	
Day 5: 9.15am–10.15am	People and Technology (Unit 4.3)	Lecture
Day 5: 10.30am–11.00am	Process Redesign (Unit 4.4a, Unit 4.4b)	Lecture
Day 5: 11.00am–12.00pm	Requirements Engineering (Unit 4.5)	Lecture
Day 5: 12.00pm–1.00pm	Evaluating Usability (Unit 4.6)	Lecture
Additional Material		
1. Activity 4: Requirements Gathering Affinity Diagram (Unit 4.Xa)		
2. Activity 5: Evaluating Usability Discussion (Unit 4.Xb)		
3. People and Technology (Lecture A) (Unit 4.Xc)		

Unit Activities

Activity 1: Guided Discussion on Quality Improvement

- Think about the last time you had an encounter with the healthcare system: the last time you saw your doctor, you saw any doctor, you took your child to the pediatrician, had a test, visited a friend in the hospital, and so on. Consider what, in that experience, could have been better. Write it down because you will use it to explore the basic tenant of quality improvement.
- Can you think of an example of how telemedicine can be used to increase the effectiveness of care?
- Can you think of other ways secure messaging systems can support patient-centeredness?
- Can you think of an example of how health information technology (HIT) can help ensure timely access to information?
- Can you think of an example of how HIT can help ensure efficiency?
- Can you think of an example of how HIT can help decrease healthcare disparities?

Activity 2: Process Mapping Exercise

List and use basic flowchart symbols to diagram the process for a visit to a health care facility.

Discussion questions:

- What process steps did you identify?
- What decisions did you include?

Have students present their process maps and discuss.

Activity 3: Process Analysis for Organization Units

Activity 4: Requirements Gathering Affinity Diagram

Activity 5. Evaluating Usability Discussion

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