Title (Units):	**COMP7430 Health Information Systems: Architecture and Technologies (3,3,0)**

Course Aims:	To gain an understanding of the key architectural principles, open standards and development technologies behind healthcare information systems; to be aware of the state of the art as well as the future trends in the development of electronic health record systems; to examine several core technical issues in acquiring, integrating, and analyzing and utilizing healthcare data.

Prerequisite:	Postgraduate Student Standing

Course Intended Learning Outcomes (CILOs):
Upon successful completion of this course, students should be able to:

No.	Course Intended Learning Outcomes (CILOs)
	Knowledge
1	Describe the key elements and architectures of healthcare information systems as well as the needs for their corresponding open standards.
2	Explain the essential components and ontology models of electronic health record systems
3	Identify the core issues in acquiring, integrating, and analyzing and utilizing healthcare data
	Professional Skill
4	Recommend appropriate architectural and standard-based designs given some application scenarios
5	Explain how to access the necessary development resources and to use some of the available tools for modeling and developing healthcare data/information systems

Calendar Description:	This course provides a comprehensive study of the key architectural principles, open standards and development technologies behind healthcare information systems. At the same time, it introduces the present state of the art as well as the future trends in the development of electronic health record systems, and discusses several core technical issues in acquiring, integrating, analyzing and utilizing healthcare data.

Teaching and Learning Activities (TLAs):

CILOs	Type of TLA
1-3	Students will learn the key concepts and the state of the art of healthcare information systems via lectures, tutorials, and assignments.
4	Students will discuss some scenarios and case studies to practice the acquired knowledge.
5	Students will work on a mini-project to gain practical experience in accessing and using some of the useful development resources and tools.

Assessment:

No.	Assessment Methods	Weighting	CILOs to be addressed	Description of Assessment Tasks
1	Written Assignment	15%	1-5	Written Assignment is designed to measure how well the students have learned the key concepts and the state of the art of healthcare information systems.
2	Hands-on Project and Presentation	15%	1-5	Project is designed to provide an opportunity for the students to access and use some of the useful development resources and tools to solve the real-world problems.
3	Quiz	10%	1-5	Quiz questions are designed to evaluate the students' understanding of the key concepts and how they could be used to solve the concrete problems.
4	Examination	60%	1-5	Final examination questions are designed to measure how well students have attained the

				respective learning outcomes. Questions will be analytical and skill-based.

Assessment Rubrics:

Excellent (A)	• Achieves all five LOs, demonstrating a good mastery of both the theoretical and practical aspects of the knowledge and skills associated with healthcare information systems • Able to develop and present sound arguments and correct solutions to problems, accompanied by in-depth analysis and insight • Demonstrates a thorough understanding and solid knowledge of healthcare information systems concepts, architectures, and development technologies • Able to draw on a variety of techniques and relevant knowledge and appropriately apply them to new healthcare information systems scenarios and problems
Good (B)	• Achieves all five LOs, demonstrating a good understanding of the associated concepts and underlying methodologies • Able to develop solutions to problems, accompanied by adequate explanations • Demonstrates a competent level of knowledge of healthcare information systems concepts, architectures, and development technologies • Ability to make use of appropriate techniques and knowledge and apply them to familiar situations and problems
Average (C)	• Achieves most of the five LOs, demonstrating a basic level of understanding of the associated concepts and underlying methodologies • Able to provide acceptable solutions to problems • Demonstrates an adequate level of knowledge of healthcare information systems concepts, architectures, and development technologies • Ability to make use of some techniques and knowledge and apply them to familiar situations
Unsatisfactory (F)	• Achieves less than three of the LOs, with little understanding of the associated concepts and underlying methodologies • Unable to provide solutions to simple problems • Knowledge of healthcare information systems concepts, architectures, and development technologies falling below the basic minimum level • Unable to apply techniques or knowledge to situations or problems

Course Content and CILOs Mapping:

Content		CILO No.
I	Overview of Healthcare Information Systems	1,4
II	Healthcare Information System Architectural Design	1,2,4,5
III	Electronic Health Records Systems	2,4,5
IV	Health Data Analytics	2,3,5
V	Major Initiatives and Case Studies	2,4

References:
• Pamela Oachs, and Amy Watters, Health Information Management: Concepts, Principles, and Practice, Fifth Edition, AHIMA Press, 2020.
• Christo El Morr, Hossam Ali-Hassan, Analytics in Healthcare: A Practical Introduction, Springer Briefs in Health Care Management and Economics, Springer, 2019
• Tim Benson, and Grahame Grieve, Principles of Health Interoperability SNOMED CT, HL7 and FHIR, 3rd Edition, Springer, 2016.
• OpenEHR Reference Model (RM) − openEHR 1.0.2 UML resources
(https://openehr.atlassian.net/wiki/spaces/spec/pages/4915210/openEHR+1.0.2+UML+resources)
• Chandan K. Reddy (Ed), Charu C. Aggarwal (Ed), Healthcare Data Analytics (Chapman & Hall/CRC Data Mining and Knowledge Discovery Series Book 36) 1st Edition, Kindle Edition, CRC Press, Taylor &

Francis Group, LLC, 2015.Karen A. Wager, Frances W. Lee, and John P. Glaser, Health Care Information Systems: A Practical Approach for Health Care Management, 4th Edition, Jossey-Bass, 2017.
- Keith W. Boone, The CDA TM book, Springer 2011
- Fred Trotter and David Uhlman, Hacking Healthcare, O'Reilly, 2011

Course Content:

Topic

I. Overview of Healthcare Information Systems
    A. Healthcare organizations, and hospital and clinical workflow
    B. HIS, RIS and LIS
    C. EMR, EHR and PHR
    D. Telemedicine and telehealth

II. Healthcare Information System Architectural Design
    A. Open standards (ICD, LOINC and HL7 CDA etc. for messaging, terminology and nomenclature, document, conceptual, application and architecture)
    B. Data models and distribution
    C. XML, RDF, Services and SOA
    D. Interoperability

III. Electronic Health Records Systems
    A. EHR functional model
    B. Information models (HL7 RIM)
    C. Ontologies

IV. Health Data Analytics
    A. Analytics Building Blocks
    B. Healthcare Analytics Applications
    C. Data Visualization

V. Major Initiatives and Case Studies