

**Title (Units):** **COMP4126 Health Informatics: Technology and Practices (3,2,1)**

**Course Aims:** This course is designed to better equip computer science students for building their career in healthcare sector and working on real-world health care data. Experiential learning activities (e.g., hospital visits) will be arranged. After completion of this course, students will learn the structures, operations and workflow in healthcare organizations, understand typical healthcare datasets, and be equipped with data analysis skills. Students are able to describe the data involved, the data modeling techniques, the data standards, and typical pipelines to process data in the healthcare industry. Moreover, students can explain how IT can support and improve the healthcare systems and data analysis can promote better healthcare services.

**Prerequisite:** i) Year III or above standing in Computer Science;  
or  
ii) Any ITEC course at Level 2 or above  
or  
iii) COMP2036 AI and Data Analytics for Health and Social Innovation II

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

No.	Course Intended Learning Outcomes (CILOs)
	<b>Knowledge</b>
1	Describe the structures, daily operations and workflow in healthcare organizations
2	Describe the data types and the data modeling techniques, and data standards involved in healthcare and the data standards used in the healthcare industry
3	Explain how IT can support and improve the healthcare systems
	<b>Professional Skill</b>
4	Communicate effectively with the necessary health informatics knowledge to both IT and medical professionals
5	Represent basic healthcare data and information using standards in the healthcare industry
6	Apply data analysis skills to process healthcare data
	<b>Attitude</b>
7	Recognize the value and importance of IT in healthcare

**Calendar Description:** This course is designed to better equip computer science students for building their career in healthcare sector and working on real-world health care data. Experiential learning activities (e.g., hospital visits) will be arranged. After completion of this course, students will learn the structures, operations and workflow in healthcare organizations, understand typical healthcare datasets, and be equipped with data analysis skills. Students are able to describe the data involved, the data modeling techniques, the data standards, and typical pipelines to process data in the healthcare industry. Moreover, students can explain how IT can support and improve the healthcare systems and data analysis can promote better healthcare services.

**Teaching and Learning Activities (TLAs):**

CILOs	Type of TLA
1-3, 5, 6	Students will acquire the knowledge about health information technology and healthcare data analysis via lectures, video presentations, and system demonstrations.
4-7	Student will acquire the skill to communicate with both IT and medical professionals, and gain some hands-on experience in analysing healthcare data through projects, written assignments, and visits of healthcare organizations.

**Assessment:**

No.	Assessment Methods	Weighting	CILOs to be addressed	Description of Assessment Tasks
1	Continuous Assessment	40%	1-7	Continuous assessments are designed to evaluate how well the students have mastered the concept of health information technology. They may include written assignments, presentations, and/or term papers.
2	Quiz	10%	1-3	Quiz is design to evaluate how well the students master the concept of health information technology.
3	Visit report	10%	1,3	Experiential learning activities (e.g., hospital visits) will be arranged to help students learn how IT improves the healthcare systems.
4	Final project	40%	1-7	Final project is designed to check whether students would be able to apply the learned health informatics skills in solving real-world problems. It may also require students to write reports and have presentations.

**Assessment Rubrics:**

	Excellent (A)	Good (B)	Satisfactory (C)	Marginal Pass (D)	Fail (F)
Describe the structures, daily operations and workflow in healthcare organizations	Fully understand all the structures, daily operations and workflow in healthcare organizations	Understand most of the structures, daily operations and workflow in healthcare organizations	Sufficiently understand the structures, daily operations and workflow in healthcare organizations	Understand a minimum set of structures, daily operations and workflow in healthcare organizations	Do not understand most of the structures, daily operations and workflow in healthcare organizations
Describe the data involved in healthcare and the data standards used in the healthcare industry	Fully understand all the data involved in healthcare and the data standards used in the healthcare industry	Understand most of the data involved in healthcare and the data standards used in the healthcare industry	Sufficiently understand the data involved in healthcare and the data standards used in the healthcare industry	Understand a minimum set of the data involved in healthcare and the data standards used in the healthcare industry	Do not understand most of the data involved in healthcare and the data standards used in the healthcare industry
Explain how IT can support and improve the healthcare systems	Fully understand how IT can support and improve the healthcare systems	Understand how IT can support and improve the healthcare systems	Sufficiently understand how IT can support and improve the healthcare systems	Barely understand how IT can support and improve the healthcare systems	Do not understand how IT can support and improve the healthcare systems
Apply data analysis skills to process healthcare data	Fully understand various data analysis methods and successfully apply them to implement various healthcare services	Understand various data analysis methods and apply them to implement various healthcare services	Sufficiently understand various data analysis methods and apply them to implement some healthcare services	Barely understand data analysis methods and can apply them to implement some healthcare services	Do not understand data analysis methods and cannot apply them to implement any healthcare services

**Course Content and CILOs Mapping:**

Content	CILO No.
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I	Information and Information Technology in Healthcare	1,3,5,7
II	Health Information Systems	1,2,3,5,7
III	Health data analysis	2,3,4,6
IV	Major Initiative and Case Studies	4,5,6,7

**References:**

- Tim Benson, Principles of Health Interoperability HL7 and SNOMED, 2nd Edition, Springer, 2012.
- T. Thomas-Brogan, Health Information Technology Basics: A Concise Guide to Principles and Practice, Jones & Bartlett Publishers, 2008.
- Ramona Nelson, and Nancy Staggers, Health Informatics: An Interprofessional Approach, Elsevier, 2013. ISBN-13: 978-0323100953, ISBN-10: 0323100953.
- Nadinia A. Davis, and Melissa LaCour, Health Information Technology (3rd Edition), Elsevier Saunders 2013. ISBN-13: 978-1437727364, ISBN-10: 1437727360.
- Robert E. Hoyt, and Ann Yoshihashi, Health Informatics: Practical Guide for Healthcare and Information Technology Professionals (6th Edition), Informatics Education, 2014. ISBN: 978-1-304-79110-8.
- P. Tan, M. Steinback and V. Kumar, Introduction to Data Mining, Pearson, Second Edition, 2018.

**Course Content:**

**Topic**

- I. Information and Information Technology in Healthcare
  - A. Healthcare Organizations
  - B. Medical terminology, modeling techniques & open standards
  - C. Disease coding and classification system
  - D. Medical devices and systems
  - E. Medical data & information management
  - F. Public health informatics and consumer health informatics
  
- II. Health Information Systems
  - A. System overview
  - B. Electronic health records
  - C. Clinical and departmental management
  - D. Clinic Management Systems
  - E. Interoperability issues
  - F. Security and privacy issues
  
- III. Health data analysis
  - A. Introduction to real world datasets
  - B. Time-series data analysis
  - C. Medical image analysis
  - D. Unstructured medical notes analysis
  - E. Omics data analysis
  
- IV. Major Initiative and Case Studies
  - A. Applications of AI in healthcare
  - B. Health & Medical services in Hong Kong