Course: ICT for Medicine

Year (1st-2nd-3rd-4th-5th-6th): 4th

Period (1st-2nd semester – annual): 1st Semester

Credits: 2

Objectives

Building the "nervous system" of every organization, Information and Communication Technologies (ICTs) are becoming crucial in the Healthcare sector to improve the quality of healthcare and of management processes, while contributing to internal efficiency with digitalization and automation of information flows. Therefore, it is key for future healthcare staff to be aware of features and options enabled by such technologies in their daily activities as physicians, nurses, researchers.

The course will outline the main ground-breaking ICT's applications used in Medicine and their evolution in a close future scenario.

Prerequisites

General knowledge of Operating Systems.
General knowledge of RDBMS (Relation DataBase Management Systems)
Willingness to discover the most fascinating technology applied to the process of care.

Contents

Hospital information Systems (HIS) involve several different applications supporting the increasing needs of healthcare organizations, clinicians, patients and policy makers in collecting and managing all the complex data related to both clinical, research and administrative processes. Among these, the Electronic Medical Record (EMR) is a central element acting as an integrated digital workspace to support multidisciplinary collaboration and clinical decision-making. A further step is information integration among HIS to build complete electronic health records of patients (EHR).

Moreover, Mobile & Wireless technologies and Automatic Identification and Data Capture technologies have emerged as a key element, delivering functionalities directly to the bedside or remotely and enabling a safe identification and a process tracking.

This course will introduce some fundamentals and practice of ICT in medicine, including live demonstration of ICT applications, such as Radiology Information System, Data management for Decision Support Systems, Patient Portal (HCT), Pathological Anatomy and Laboratory Information System (LIS).

- **L1 - ICT for medicine: contents, agenda, course organization, background – 26/09/2022**
  Gianluca Cesare – Chief Information Officer at Humanitas Group
  Stefano Caccamo – IT Clinical Application Specialist at Humanitas & IT Manager Humanitas Medical Care

Learning objectives:

- Share a general overview of the course (the team, lessons schedule, exams)
- Describe a general overview of Health System
- Describe a general overview of National Health System
- Describe Private Vs Universal HS scenario
- Outline the increasing value of information in Healthcare
- Highlight main potential benefits of ICT applications for quality, safety, efficiency of healthcare processes

- **L2 – Trust and Belief in Hospital and support decision system in medicine – 12/10/2022**
  Gianluca Cesare – Chief Information Officer at Humanitas Research Hospital
  Stefano Caccamo – IT Clinical Application Specialist at Humanitas & IT Manager Humanitas Medical Care

Learning objectives:

- Trust and Reputation over various domains
- Computational Trust and Reputation Management
- Trust and Reputations Systems

- **L3 – An Idea of an ideal Hospital Information System – 17/10/2022**
  Gianluca Cesare – Chief Information Officer at Humanitas Group
  Stefano Caccamo – IT Clinical Application Specialist at Humanitas & IT Manager Humanitas Medical Care

Learning objectives:

- Definition and analysis of HIS and its components
- Master Patient Index (MPI)
- Admit-Discharge-Transfer (ADT)
- Benefits of HIS

- **L4 - EMR & EHR: Hands on tools (wHospital) like Humanitas EMR – 20/10/2022**
  Matteo Rubes – IT Clinical Application PM at Humanitas
  Stefano Caccamo – IT Clinical Application Specialist at Humanitas & IT Manager Humanitas Medical Care

Learning objectives:

- Share a definition of Electronic Medical Record (EMR) and Electronic Health Record (EHR)
- Highlight the historical evolution and the current state of the art of EMR and EHR from a functional and technical perspective
- ICCA- EMR of Intensive care unit
- Discuss the International and National scenario of EHR adoption, with reference to real cases (e.g. Lombardy Region – SISS)

- **L5 - The Radiology Information System: Hands on tools (Ris, Pacs) – 25/10/2022**
  Prof. Letterio Politi – Professor at Hunimed
  Ricardo Aquino – IT Clinical Application Specialist at Humanitas
  Stefano Caccamo – IT Clinical Application Specialist at Humanitas & IT Manager Humanitas Medical Care

Learning objectives:

- Share a definition of Radiology Information System (RIS)
- Define a reference model for RIS, including functional and technical architectures, and portrait the state of the art of ICT support to providers' operations
- Discuss a set of hot topics in Hospital Information Systems management: system integration, interoperability standards, ICT and medical equipment

- **L6 – The Pathological Anatomy and tracking of the full process: Hands on tools (AP, OEWEB, Digital Pathology and AI application) – 26/10/2022**
  Prof. Luca Di Tommaso – Professor at Hunimed
  Stefano Caccamo – IT Clinical Application Specialist at Humanitas & IT Manager Humanitas Medical Care

Learning objectives:

- History of DP applied to moder medicine
- Environments
- Challenges
- Benefits
- Digital Pathology & AI

- **L7 - The Clinical Laboratory Information System: Hands on tools (LIS) – 04/11/2022**
  Stefano Garbelli – IT Clinical Application Specialist at Humanitas
  Stefano Caccamo – IT Clinical Application Specialist at Humanitas & IT Manager Humanitas Medical Care

Learning objectives:

- Share a definition of Laboratory Information System (LIS)
- Define a reference model for LIS, including functional and technical architectures, and portrait the state of the art of ICT support to providers' operations
- Humanitas Research Hospital LIS Hub & Spoke model

- **L8 - Telemedicine and Patient Portal Systems** - **07/11/2022**
  Gianluca Cesare – Chief Information Officer at Humanitas Group
  Stefano Caccamo – IT Clinical Application Specialist at Humanitas & IT Manager Humanitas Medical Care

Learning objectives:

- Humanitas Telemedicine Systems

- Humanitas Patient Portal

- **L9 – Data Management for Decision Support Systems - 11/11/2022**
  Stefano Accornero – IT Data Engineer Humanitas Group
  Stefano Caccamo – IT Clinical Application Specialist at Humanitas & IT Manager Humanitas Medical Care

  Learning objectives:

  - Define Clinical Decision Support System (CDSS)
  - Describe how to use data gathered by Clinical Information Systems among HIS architecture (RIS, LIS, Anatomy Pathology Lab System, Pharmacy Information System,..)

- **L10 – Focus on Cyber Security adopted in Healthcare environment– 15/11/2022**
  Luca Della Giovanna – IT Service & Cyber Security Manager at Humanitas Group
  Stefano Caccamo – IT Clinical Application Specialist at Humanitas & IT Manager Humanitas Medical Care

  Learning objectives:

  - Definition of Cyber Security
  - Best practise adopted at Humanitas Group

- **L11 – Data Privacy - 21/11/2022**
  Simone Paolucci– Data Protection Office at Humanitas Group
  Stefano Caccamo – IT Clinical Application Specialist at Humanitas

  Learning objectives:

  - Definition of data Privacy
  - Describe how privacy issues apply to healthcare and to clinician's role
  - Definition of digital signature and its application in clinical practice

Teaching Methods

Frontal Lectures will be held to introduce the Hospital Information Systems and its main architecture.
Each lesson will be characterized by a dedication section, called "hands on tools", in which students will have the opportunity to get acquainted with the most used application inside Humanitas Research Hospital.
Students will be encouraged to actively participate to the lectures with questions and comments.

Assessment

A multiple choice written test on the entire programme will be held at the end of each the semester, according to the modality defined by the University.

Texts

- Introduction: The Role of Information Technology in Transforming Health Systems; Brown, G.D.; In: Strategic Management of Information Systems in Healthcare, Brown, F.D.; Stone, T.T. & Patrick T.B. (Eds.), Health Administration Press, ISBN 978-1-56793-242-3, Chicago (IL)
- The History of Medical Informatics in the US, Morris F. Collen, Marion J. Ball, Springer, ISBN 978-1-4471-6732-7
- Trust and Reputation Management Systems – An e-Business Prospective , D. Trcek, Springer, ISBN 978-3-319-62373-3.