Education on eHealth

a master program in health informatics





What is eHealth?

- The World Health Organisation says ehealth is the transfer of health resources and health care by electronic means:
 - The delivery of health information, for health professionals and health consumers.
 - Using the power of IT and e-commerce to improve public health services, e.g. through the education and training of health workers.
 - The use of e-commerce and e-business practices in health systems management.
- Ehealth provides a new method for using health resources such as information, money, and medicines - and in time should help to improve efficient use of these resources.
- Improve information dissemination, and for interaction and collaboration among institutions, health professionals, health providers and the public.



- Is eHealth a need or a technology-driven innovation?
- Both: As technology advances and it becomes even more embedded within our lives, its also part of health care.
- There is increasing evidence that HIT technology improves health, health care, public health, and biomedical research.
- Growing range of research and application fields in biomedical, and ehealth informatics.
- There is also growth in related areas of health informatics, such as clinical research informatics and bioinformatics.



Why Do We Need eHealth education?

- There are still barriers to HIT in clinical settings, including a mismatch of return on investment between those who pay and those who benefit.
- Challenges to improve workflow in clinical settings.
- Lack of standards and interoperability.
- Concerns about privacy and confidentiality.
- The lack of characterization of the workforce.
- Workforce training needed to effectively implement HIT systems.

Tasks that eHealth can improve

Recordkeeping	Teamwork
Information Retrieval and Visualization	Acquisition
Clinical Decision Making	Communication
Workflow	Analysis and Visualization of results
Planning	Learning and Teaching
Imaging and Image Management	Business Operations Management
Ordering and Results Reporting	Assessment and Evaluation
Management	Research



Professionals in health care

• A master programs to develop, implement ehealth, and evaluate these systems.

a) IT users

 Physicians, nurses, pharmacists, dentists, medical laboratory technicians, radiology technicians, occupational therapists, health care managers, health record administrators

b) IT specialists

Medical informatics (bachelor), informatics/computer science, and engineers.



- To provide scientific education that captures the theoretical foundations of the field and practical skills.
- To know how to efficiently use information and communication technology in healthcare.
- Develop skills in information processing and communication technology as it is needed and used in medicine and healthcare.
- Project management and teamwork between IT users and IT specialists.
- Graduates are expected to contribute to the field scientific advancement.

What students will understand

- The technologies that can be applied to clinical practice, administration, teaching and research.
- The value and impacts of IT systems.
- The nature of data, information and knowledge.
- The nature of how decisions are made and the technological mechanisms for assisting humans in making decisions.
- The nature and capabilities of electronic records systems.
- Healthcare workflow and how humans and systems interact.
- Understanding the implementation and use of IT systems.
- Understanding the economics of IT systems and how to evaluate their impacts.

eHealth: the use of ICT for health

Electronic Health Record Systems	Imaging Systems in Radiology
Health Information	Clinical Decision-Support Systems
Management of Information	Information Retrieval
Patient-Centered Care Systems	Computers in Health Care Education
Public Health Informatics	Bioinformatics
Consumer Health Informatics and Personal Health Records	Translational Bioinformatics
Telehealth	Clinical Research Informatics
Patient Monitoring Systems	mHealth



- Two tracks, an IT users track and an IT specialist track with
 - eHealth core knowledge and skills,
 - Medicine, health and biosciences, health system organization,
 - Informatics/computer science, mathematics,
 - Biomedical engineering related fields.
- Knowledge and skills should also have additional depth and breadth and students may choose to gain additional insight into elective fields that are at the core of their research.
- Student's workload, according to the European Credit Transfer and Accumulation System (ECTS). A two academic year's student Master program is 120 ECTS.

Courses tracks for eHealth

IT users track

IT specialists track

	Knowledge/Skill Area	ECTS		Knowledge/Skill Area	ECTS
A1	eHealth core knowledgeand skills	81	A1	eHealth core knowledge and skills	81
A2	Medicine, biosciences, health system organization	9	A2	Medicine, biosciences, health system organization	18
A3	Informatics/computer science, statistics	15	A3	Informatics/computer science, statistics	9
A4	Biomedical Enginneer	15	A4	Biomedical Enginneer	12
	Total	120		Total	120



- Machine processing of data, information and knowledge in health care and medicine.
- A strong emphasis on the need for advanced knowledge and skills of medical informatics, workflow, people and organizational aspects, of mathematics, as well as of theoretical.
- Practical and technical informatics/computer science, especially semantic interoperability, ontology-based software engineering and its relationship with effective and safe data, information and knowledge processing and representation.
- A sound knowledge of the business of providing healthcare services.



- To focus on the machine processing of data, information and knowledge in health care and medicine
- requiring, apart from knowledge in BMHI, also knowledge in medicine or other health sciences to such an extent that can only be imparted within the scope of a medical or health science education.
- In such an approach to eHealth education, clinical knowledge and skills predominate but these must be applied within the medical informatics context.
- They need to know about the potentials and the risks of information processing in healthcare and efficiently use methods and tools of information processing and information and communication technology.

A 1 eHealth Core Knowledge and Skills

Knowledge/Skill

Need for systematic information processing in health care acquisition, storage, and use.

Use of information processing tools, to support health care professionals practice and decision making.

Architectures of information systems standards for communication for interfacing and integration of component, architectures (SOA).

Management of information systems in health care, IT governance, legal and regulatory issues.

Information systems to support patients and the public (e.g. system architectures and applications, personal health records).

Health-enabling technologies, ubiquitous health systems and AAL

Networking and shared care health telematics.

Health data management using medical coding systems.

A 1 eHealth Core Knowledge and Skills

Knowledge/Skill

Structure, design and analysis principles of the health records, including notions of data quality, minimum data sets, architecture and applications of the electronic patient record.

Ethnography including workflow/process modelling and reorganization of clinical practice.

Principles of data representation and data analysis using primary and secondary data sources, principles of data mining, data warehouses, knowledge management.

Ethical and security issues including confidentiality, privacy and security of patient data.

Nomenclatures, vocabularies, terminologies, ontologies and taxonomies in eHealth.

Evaluation and assessment of IS, impact evaluation, economic evaluation, evidence-based health informatics

A2 Medicine, biosciences, health system organization

Knowledge/Skill

Biosciences basics anatomy, physiology, microbiology, genomics

Fundamentals of health, and its assessment

Principles of clinical/medical decision making ,diagnostic and therapeutic strategies

Organization of health institutions and the overall health system

Policy and regulatory frameworks for information handling in health care

Principles of evidence-based practice in medicine and nursing

Health administration and economics, quality management and resource management, patient safety, public health services and outcome measurement.

A3 Informatics/computer science, mathematics

Knowledge/Skill

Basic informatics terminology like data, information, knowledge, hardware, software, computer, networks, information systems.

Programming languages, software engineering, data structures, database management, information and system modelling tools.

Network architectures, telecommunications, wireless technology, virtual reality, multimedia.

Methods of **interfacing and integration** of information system components in health care, interfacing standards.

Methods of **project management and change management** (i.e. project planning, resource management, team management.

Decision support and their application to patient management, acquisition, medical knowledge, clinical pathways and guidelines

Usability engineering, human-computer interaction.

Mathematics: algebra logic, numerical mathematics, and statistics.

A4 Biomedical engineering related fields

Knowledge/Skill

Biomedical imaging

Bioinformatics

Digital signal processing

Biomedical Instrumentation, and patients monitoring systems

Biodesign and the process of innovating medical technologies

Rehabilitation engineering, assistive technologies and accessibility

Molecular Genetics

1º Year/1º Semester			
skill/area	Track	UC (Unit Course)	ECTS
A1	U/S	Health Information Systems I	6
A1	U/S	Biomedical Data and Databases	6
A2	S	Human Biology	6
A2	S	Medical Practice and Healthcare	6
A2	S	Healthcare Organization and Management	6
A3	U	Fundamentals of Healthcare Programming	6
A3	U	Computer and Network Architectures	6
A4	U	Bioinformatics	6

(continuation)

1º Year/2º Semester			
skill/area	Track	UC (Unit Course)	ECTS
A1	U/S	Ethical and Security Issues	3
A1	U/S	Clinical Decision Support Systems	6
A1	U/S	Health Telematics	6
A1	U/S	Health Information Systems II	6
A3	U	Software Engineering	3
A4	U/S	Biomedical Instrumentation	6
A4	S	Digital Image Processing	3

(continuation)

2º Year/1º Semester			
skill/area	Track	UC (Unit Course)	ECTS
A1	U/S	Data Mining and Information Visualization/mHealth	6
A1	U/S	Dissertation	12
A2	U	Translational Bioinformatics/Patient Centered Care	3
A2	U	Clinical Research	6
A3	S	Systems Integration/Human-Computer Interaction	6
A4	U/S	Medical Devices Development	3
A3	S	Personalised Health	3

2º Year/2º Semester			
skill/area	Track	UC (Unit Course)	ECTS
A1	U/S	Dissertation	30





Education on eHealth

a master program in health informatics

danke!