CMP3104 Computer Based Medical Systems

Period per Week			Contact Hour per Semester	Weighted Total Mark	Weighted Exam Mark	Weighted Continuous Assessment Mark	Credit Units
LH	PH	TH	CH	WTM	WEM	WCM	CU
45	30	00	60	100	60	40	4

Rationale

This course aims to prepare life scientists and engineers for the electronic age in healthcare. It is expected to fill a major gap in healthcare management, namely the management of biomedical technologies and emerging e-health applications. Students will acquire the necessary skills to integrate biomedical, information and communication technologies in order to enhance the existing healthcare processes and conform to international standards.

Objectives

By covering the course in Computer Based Medical Systems, the student will be well versed with the fundamentals of:

- Procurement, calibration and management of biomedical technologies: compliance with ISO-9000 and JCI standards, establishment and management of clinical engineering units.
- Systems integration of biomedical, information and communication technologies for developing hospital information systems, picture archival and communication systems, special departmental systems and e-health applications involving communication technologies and medical equipment, medical software and e-health systems development.
- Design of clinical trials, database development, design of data entry procedures and statistical analysis of clinical data.

Subject Content

1. Health Regulations and Standards

- JCAHO Accreditation Standards
- ISO 9000 Quality Standards
- NFPA 99 standards for healthcare facilities
- Guidelines for the design and construction of hospitals and healthcare facilities
- Overview of Ugandan standardization in the healthcare sector
- Medical devices regulatory system in Uganda

2. ***Design of Clinical Trials***
   - Formulating and testing a hypothesis;
   - New chemical entity cycle;
   - Overview of ICH (International Conference on Harmonization), GCP (Good Clinical Practice)
   - analysis and design of a protocol, CRF (Case Report Form) and a complete trial, comparative review of laws, directives and conventions, ethical standards about clinical trials
   - SOPs (Standard Operating Procedure), conducting, monitoring and auditing clinical trial processes; data management, reporting and documentation.

3. ***Medical Informatics***
   - Overview of health information systems
   - Medical language, coding and classification systems
   - Computer based patient records
   - Hospital information systems, technical choices, information systems in clinical departments
   - Clinical support systems, nursing information systems, and health information resources
   - Fundamentals of epidemiology, quality management fundamentals, and medical decision support systems
   - Biomedical signal analysis
   - Medical imaging
   - Human-computer interfaces in healthcare
   - Costs and benefits of information systems,
   - Security in medical information systems;
   - Standards for medical informatics

4. ***Data Mining for Healthcare***
   - Data mining algorithms; association rules, predictive modeling, classification, clustering
   - Data mining in healthcare, privacy, security handling, data access from distributed databases, data integration from multiple healthcare institutions and data mining for decision making.
   - Case studies for hospital administrators, for clinicians and for medical researchers.

5. ***Clinical Decision Support Systems***
   - Development and evaluation of clinical diagnostic decision support systems
   - Legal and ethical issues
   - Mathematical foundations of decision support systems
   - Applications of clinical diagnostic decision support systems.

6. Medical Imaging Systems and PACS

- Principles of radiological imaging
- Projection radiography
- Digital radiography
- Tomography
- Magnetic resonance imaging
- Nuclear medicine imaging
- Ultrasound and microscopic imaging
- Picture archiving and communication systems (PACS
- Basic image processing methods, image compression and computer assisted diagnosis.
- Hospital Information Systems (HIS) and Radiology Information Systems (RIS)
- PACS data management, telemedicine and Teleradiology

Recommended and Reference Books

[1] Institute of Medicine (U.S.). Committee on Improving the Patient Record, Richard S. Dick, Elaine B. Steen *The Computer-based Patient Record: An Essential Technology for Healthcare.* National Academy Press (1991) - ISBN 0309044952

[2] Katharina Kaiser, Silvia Miksch, Samson W. Tu. *Computer-based Support for Clinical Guidelines and Protocols.* IOS Press (2004) - ISBN 158603412X