**CMP3104 Computer Based Medical Systems**

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| --- | --- | --- | --- | --- | --- | --- | --- |
| 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