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POSTGRADUATE INSTITUTE OF MEDICINE
UNIVERSITY OF COLOMBO

PROSPECTUS

MASTER OF SCIENCE

IN

BIOMEDICAL INFORMATICS

2013

SPECIALTY BOARD IN BIOMEDICAL INFORMATICS
BOARD OF STUDY IN
MULTIDISCIPLINARY STUDY COURSES

1. INTRODUCTION

Biomedical Informatics is a discipline, which intersects the knowledge pertaining to Information Communication Technology (ICT), medicine and biology. It has emerged as one of the rapidly growing disciplines in the world where health sector expansions have been proposed with the aid of ICT. In a background such as this, the Postgraduate Institute of Medicine of University of Colombo, being the only postgraduate training institute for medical doctors in the country, took up the initiative to prepare the health professionals of this country to the emerging challenge of incorporating ICT to the countries health sector.

2. JUSTIFICATION

The incorporation of ICT into the health care setting could be described as a complex process requiring meticulous planning, liaison with proper authorities and stakeholders as well as an above average understanding of the countries health care setting which does not necessarily rely on the technology or the material resources alone. Many Western countries, which made use of the usual ICT implementation process in its health care setting, failed to achieve the expected goals mainly because of the mismatching between poor understanding of the health care needs and the systems that were implemented to support such needs. At the same time, mushrooming of ICT solutions at various levels with minimal understanding of its impact and sustainment has created a chaotic situation in managing the same while wastage of resources would become apparent as the time pass by.

The Masters of Science Degree Programme in Biomedical Informatics is aimed at preparing the trainee to apply current Information and Communication Technologies to enhance the practice of medicine at various levels. This broadly includes the care of the sick, health promotion, disease prevention as well as health and medical education. This training programme specifically emphasizes the advancements made in Biomedical and health sciences and its utilization in their practices. Moreover, training in managerial skills pertaining to executing duties towards problem solving through the scientific approach, resource optimization and economization, is emphasized. Thus, it is expected that this programme would eventually lead to better integration and management of ICT solutions in the health care sector by creating a pool of well trained professionals which would not only improve the country’s health indices but would also minimize the cost for the country in developing and implementing eHealth solutions.

3. COURSE OBJECTIVES AND OUTCOMES

At the end of the programme, the trainees should be able to apply knowledge, skills and favourable attitudes to deal with complex issues systematically and creatively. They would also be able to make sound decisions and communicate decisions clearly to different specialist and non-specialist groups. The trainee should demonstrate self-direction and originality in tackling and solving problems and be able to plan and implement tasks at professional levels. In the end, the graduate should be able to demonstrate critical awareness

of current issues in the subject area and be able to apply techniques relevant to professional practice.

In addition, the trainee would also be able to demonstrate the following learning outcomes:-

Scholarship in Biomedical Informatics: The trainee would have a comprehensive and up-to-date knowledge in Biomedical Informatics, and detailed knowledge and understanding of specific areas in Biomedical Informatics, which he or she may wish to sub-specialize.

Methodological approach: The trainee would be competent in applying scientific approaches to problem solving with skills in research methodologies to solve problems in the field of Biomedical Informatics. Further, they should exercise initiatives and take personal responsibilities and also should demonstrate skills of independent learning for their continuous professions development.

4. SELECTION EXAMINATION

4.1. ELIGIBILITY REQUIREMENTS

The minimum requirements shall be as follows:

a) A Medical Degree registered with the Sri Lanka Medical Council and
b) One year of internship recognized by the Sri Lanka Medical Council and
c) One year of full-time post internship work experience in the health sector, recognised by the PGIM

OR

a) Hold a Dental Degree and registered with the Sri Lanka Medical Council (SLMC), to practice as a Dental Surgeon and
b) Completed at least 1 year in general dental practice in the government, university, armed forces or private sector at the time of closure of applications for the selection examination

4.2. FORMAT OF THE SELECTION EXAMINATION

The examination shall consist of a **MCQ Paper** consisting of **60 true/false** type questions which should be answered within **2 hours**.

A true/false type MCQ shall score +5 marks. In a True / False type MCQ, (five responses) each correct answer shall score +1, wrong answer shall score –1 or if not attempted shall score 0. Negative marks will apply within the question and will not be carried forward.

4.3. CURRICULUM OF THE SELECTION EXAMINATION

Questions included in the selection examination shall be derived from basic knowledge on information and communication technology (ICT) and health sciences. Basic information and communication technology related questions would consist of questions pertaining to

commonly used operating systems, office productivity suites, Internet, e-mail, computational logic and basic mathematics. The health sciences component will consist of questions derived from medical statistics, basic epidemiology, basic sciences, and knowledge in medical records and medical coding standards.

4.4. REQUIREMENTS TO PASS THE SELECTION EXAMINATION

The candidates who pass the selection examination by obtaining **50% or more** of the total aggregate shall be considered for enrolment to the course.

4.5. SELECTION PROCESS

a) The PGIM will place an advertisement to select a pre-determined number of candidates (as determined each year by the Board of Study in Multidisciplinary Study courses).
b) Candidates who pass the Selection Examination will be selected to the course according to rank order of marks at the selection examination and the number of positions available.

5. PROGRAMME DURATION

Two years on a full time basis.

6. COURSE CURRICULUM

The Masters of Science Degree in Biomedical Informatics training program consists of four semesters designated as S1, S2, S3 and S4. Each semester shall consist of five complete modules and each module will derive its credits through lecture sessions, lab work and fieldwork.

The first semester (S1) mainly focus on fundamental basic sciences, the second semester (S2) mainly focus on user level applications, the third semester (S3) mainly focus on data management while last semester (S4) meant for completing ‘project work’ and submission of the dissertation. However, selected contents of the last semester will be covered in other three semesters in order to integrate ‘project work’ into their learning.

The **table 1** illustrates the modules that are designated for each semester and the criteria on which credits are allocated.

The curriculum of each module is described in **Annex 1**

7. CREDIT ALLOCATION

Table 1 : Credit allocation for the MSc in Biomedical Informatics programme

Semester	Module Number	Module Name	Credits
Year 1			
S1	M1	Mathematics for Computing and Object Oriented Programming	3
	M2	DBMS, Data Mining and Web Programming	3
	M3	Soft Skills, Professional Practice and Ethics	2
	M4	Networking, Computer Hardware, Operating Systems and Application Packages	3
	M5	Software Engineering and Software Project Management	3
	Total credits for S1		**14**
S2	M6	Basic Epidemiology and Statistics	3
	M7	IT Law and Information Security	3
	M8	Public Health Informatics	3
	M9	Bioinformatics	2
	M10	IT for Health Education	3
	Total credits for S2		**14**
Year 2			
S3	M11	Management	3
	M12	HMIS, IT governance and Organizational Management	3
	M13	Medical Data and Information Management	3
	M14	Disease Surveillance and IT for Population Genomics	3
	M15	Logic, Clinical Reasoning and Decision Making	2
	Total credits for S3		**14**
S4	M16	Research Project	18
	Total credits for S4		**18**
Total credits			**60**

- The MSc in Biomedical Informatics program shall derive 60 credits over a two year period.
- For lecture sessions, each credit comprises 15 hours of lectures/classroom activities.
- For laboratory work, each credit comprises 45 hours of laboratory work.

- For fieldwork, each credit comprises 60 hours of field activities.
- Project work should be equivalent to 15 credits (minimum of 675 hours) during the last three semesters.
- In general, each week will comprise 8 hours of lectures, 13 hours of lab sessions and 14 hours of fieldwork. Allocation of time for lecture sessions, lab work and fieldwork would be determined by the Speciality Board based on the module content, availability of resources and the fieldwork undertaken.
- The average number of weeks per semester would be 20.

8. TEACHING / LEARNING METHODS

Lecture sessions

Lecture sessions can take the form of lectures and lecture-demonstrations depending on the content and the objectives of a specific training session. Most of the lectures would be conducted in the computer laboratory and practical sessions would be conducted as separate or integrated activity along with the lectures or lecture-demonstrations. However, some lecture sessions can be conducted in lecture halls within the PGIM or else in any other training unit recognized by the Speciality Board (e.g. National Institute of Health Sciences, Kalutara). Students are expected to go through the recommended readings **(Annex 2)** in addition to any other recognized literature pertaining to the course content and the projects that are undertaken before attending relevant learning activities.

Laboratory sessions

Each student will be allocated a separate computer within the PGIM Biomedical Informatics lab and it is expected that the student would make use of the same machine during the entire duration of the course. A malfunctioning computer should be brought to the notice of the PGIM computer administrator without any delay while students should take responsibility for the stored data and to protect the software and hardware components from virus and related threats by undertaking reasonable precautions including frequent backups.

Field work and external collaborations

The PGIM would designate the relevant fieldwork to be undertaken for a given session. The fieldwork may comprise of attachments, visits, tours etc. Students are expected to participate in these fieldwork sessions and achieve the desired objectives designated for each session. A logbook made according to the structure provided **(Annex 3)** should be maintained for each fieldwork session and students should take measures to complete, obtain the supervisor/head of unit signatures and submit the logbook to the PGIM at the end of the 3rd semester. In order to become eligible to sit for the final examination, submission of a completed logbook is mandatory. In order to establish sites for student projects and field work, the PGIM would engage in collaborative activities with external organizations including the Ministry of Health and would utilize funds received from donor agencies towards such efforts depending on the availability of such funds.

On-line sessions

In the event of obtaining the services of resource persons either locally or internationally who are unable to be present at the PGIM, on-line sessions (e.g via Skype) would be arranged accordingly. In addition, on-line training sessions based on the MOODLE platform would also be used where it is deemed necessary by the Speciality Board. By incorporating on-line learning activities, it is expected that the students would be able to experience the newest technologies related to distance learning and master the art of conducting such training in order to make use of the same in their work practice or else for their future learning.

9. RESEARCH PROJECT LEADING TO A DISSERTATION

The dissertation is an integral part of the training program and students should adhere to the dissertation guidelines provided by the PGIM when submitting the same. The dissertation should be based on the project work undertaken mainly in the 4th semester and should consist of a minimum of 10,000 words and a minimum of 20 relevant recent references from scientific literature. Two designated supervisors will perform supervision of the project and the students are expected to consult both supervisors when conducting the project, writing and finalising the dissertation. Progress reports should be submitted according to the guidelines given below.

Project proposal

1) The proposal should be submitted as a hard copy to the Specialty Board on the stipulated date.
2) The proposal should be submitted through both supervisors.

Progress reports

1) Two progress reports have to be submitted during semester 4 on the stipulated dates.
2) The reports (hard copy) should be in the given format
3) It is the responsibility of the student to ensure that the progress reports (duly completed by both the student and supervisors) are submitted by the required deadline.
4) The date of submission will be extended only for students with genuine difficulties in submission. The extension must be agreed with the Course Coordinator in advance, before the due submission date.

Annex 4: Guidelines for preparation of the Research Proposal
Annex 5: Guidelines for the dissertation supervisors
Annex 6: Guidelines for preparation and submission of the Dissertation
Annex 7: Progress Reports

Zero tolerance for Plagiarism

All academic material submitted by the students to the PGIM would be perused using sophisticated software for acts of plagiarism. In the event of detecting plagiarism, action will be taken according to the degree of the violation as decided by the PGIM rules and regulations governing such offenses.

10. MSc ASSESSMENTS

10.1 TIMING OF THE EXAMINATION

There shall be 4 End of Semester Assessments. First three End of semester assessments will include identified modules as given below:

End of Semester 1 Examination: M1, M2, M3, M4. M5

End of Semester 2 Examination: M6, M7, M8, M9, M10

End of Semester 3 Examination: M11, M12, M13, M14, M15

The End of 4th semester assessment will consist of assessments pertaining to the project (dissertation and viva).

10.2. ELIGIBILITY TO SIT FOR THE END OF SEMESTER ASSESSMENTS

In order to qualify for the Semester 1, 2 and 3 End of semester assessments, the candidate should:

- Demonstrate at least 80% attendance for lecture sessions and laboratory work during the semester for which the assessment is held

In order to qualify for the semester 4 End of semester assessment, the candidate should:

- Demonstrate at least 80% attendance for lecture sessions and laboratory work during the 4th semester
- Submit satisfactory progress reports of the research project
- Submit the Log Book

A candidate who fails to submit the logbook/progress report or if not acceptable, should submit a completed logbook/progress report as designated by the Speciality Board in order to be considered as eligible for the relevant end of semester assessments with a junior batch.

10.3. FORMAT OF THE EXAMINATION

There are three formats for the examination:

F1: Assignments

F2: Theory paper

F3: Dissertation (Marks for the submitted Dissertation and Viva)

10.4. ALLOCATION OF EACH FORMAT TO DIFFERENT MODULES AND DETAILS

The format of the examination depends on the module as listed below

F1-Assignment: Module numbers M2, M3, M7, M10, M12, M15

F2-Theory paper: Module numbers M1, M4, M5, M6, M8, M9, M11, M13, M14

F3-Dissertation: M16, M17, M18, M19

F1-Details of Assignment Based Examination

Assignment of each identified module will be given one month duration for submission and each submission should comprise of at least 2000 words. Students should submit all assignments on or before the deadline given by the PGIM. All assignments should be submitted both as a hard copy and as a soft copy.

Each assignment will be marked out of 100 (Annex 8) and will be converted into a grade (Annex 9).

F2-Details of Theory Paper

- Shall consist of a Structured Essay (SEQ) paper pertaining to the identified modules not assessed using assignments.
- Each paper will consist of two SEQ questions and both questions needs to be answered within 1 hour.
- Each paper will be marked out of 100 by two examiners independently (50 marks per question) and will be converted into a grade.

F3-Details of the Dissertation based Examination

Assessment of the Dissertation – Dissertation should comprise of the work related to the last semester and should be in accordance with the provided guidelines **(Annex 6).** The dissertation should be submitted on or before the given deadline by the PGIM and should be signed by both the supervisors and the by the candidate. It should be submitted in two hard copies as well as in the electronic format (e.g CD/DVD) to the PGIM. The dissertation shall be assessed by two examiners appointed by the PGIM and would be marked out of 250 by each examiner and would be averaged to derive a mark out of 100**. (Dissertation marking scheme in Annex 10).** The marks will then be converted into a grade.

Following submission of the dissertation, candidates who achieve a C grade or above for the Dissertation assessment (acceptable dissertation in the present form or with minor corrections) are eligible to participate in the end of course viva. Those who have to re-submit

the dissertation with ‘major corrections’ shall do so before becoming eligible for the end of course viva which will be held at a later date as designated by the PGIM.

Dissertation based Viva – The viva shall comprise a 20 minute discussion based on the dissertation submitted by the candidate with a two examiner viva panel appointed by the PGIM. The candidates shall be given a raw mark out of 100 by each examiner (Annex 11) and the two marks shall be averaged to derive a common mark out of 100. The marks will then be converted into a grade.

10.5. REQUIREMENTS TO PASS EACH OF THE MODULES WITH THE ASSIGNMENT AND THEORY BASED ASSESSMENTS

A candidate should obtain a minimum of Grade C (equivalent to a grade point of 2.0) for each module Assignment /Theory paper to pass a module.

10.6. REQUIREMENTS TO PASS THE DISSERTATION BASED ASSESSMENTS

A candidate should obtain:

A minimum of Grade C (equivalent to a grade point of 2.0 or above) for each component (dissertation/ end of course viva)

11. FAILED CANDIDATES

Candidates who fail an examination are eligible to apply for a next repeat examination. The number of attempts for a one component is limited to 6 and should complete within 8 years.

11.1. REPEAT EXAMINATION

F1. Assignments

A candidate, who fails to complete the assessment successfully, should complete the modules for which he or she failed to achieve a grade ‘C’ or a grade point of 2.0 at the immediate repeat ‘end of semester examination’ or re-repeat examination with a junior batch by handing over a new assignment as designated by the PGIM on or before a given deadline, in order to become eligible to be considered for awarding the Master of Science degree.

F2. Theory Paper

Trainees who fail to achieve a minimum grade ‘C’ (or an overall GP 2.0 for the assessments pertaining to a particular semester) for a SEQ paper should repeat the SEQ paper(s) in a repeat end semester assessment for the same semester as designated by the PGIM. Failing to achieve a GP of 2.0 for the repeat assessment will require the candidate to re-repeat the assessment with a junior batch.

F3. Dissertation

Dissertation

A candidate who fails to achieve a minimum grade 'C' for the dissertation should re-submit the dissertation with a junior batch according to the recommendations made by the PGIM in order to face viva.

Dissertation viva

Candidates who fail to achieve a minimum grade 'C' or a GP of 2.0 for the viva should face a repeat viva held at a designated date by the PGIM. Failing to achieve a GP of 2.0 for the repeat assessment will require the candidate to re-repeat the assessment with a junior batch.

11.2. ALLOCATION OF MARKS AT REPEAT EXAMINATIONS

A candidate who becomes successful in a repeat examination will only receive a maximum grade point of 2.0 (equivalent to a grade 'C') for any repeated module or end of course assessments even if the candidate obtains a grade point above 2.0 in any of the evaluation components.

12. ELIGIBILITY FOR THE AWARD OF MASTER OF SCIENCE IN BIO-MEDICAL INFORMATICS

- A minimum of "C" grade or a GP of 2.0 for each module assessed through assignments and theory papers.
- A minimum of 'C' grade or a GP of 2.0 each for dissertation and dissertation viva.

13. AWARDING OF MEDALS

Four gold medals will be awarded in the categories of,

1. Best student in public health informatics
2. Best student in Bioinformatics
3. Best student in medical education informatics
4. Best overall student for the batch.

These awards aim to recognize outstanding performance at examinations and design and implementation of a research project during the MSc course in Biomedical Informatics and to encourage continued contributions to the field. The awarding of the medals will be made according to the guidelines stated in **Anne 12**.

14. TRAINING SETTINGS, UNITS AND EDUCATIONAL RESOURCES

Following training units have been utilized by the Speciality Board in Biomedical Informatics for its various training purposes. The list of training units will be updated regularly.

- Information Unit, Ministry of Health
- National program for Tuberculosis control and Chest Diseases
- National Institute of Health Sciences, Kalutara.
- Offices of the Regional Directors of Health Services
- Family Health Bureau
- Human Genetics Unit, Faculty of Medicine, University of Colombo
- Medical Education Resource Center, PGIM.

15. DETAILS OF TRAINERS

Trainers of the program shall be recognized by the PGIM according to the criteria laid down by the PGIM regulations on selecting trainers for postgraduate programs. Given the multi-discipline nature of the program, specialists from relevant fields (e.g. computer science, bioinformatics, medical education, management...etc) shall be recognized by the PGIM on the recommendations of the speciality board in Biomedical Informatics.

16. RECOMMENDED READINGS

The list of text books, journals and websites are listed in annex 2.

ANNEX 1

Curriculum

Module M1: Object Oriented Programming and mathematics for software designing

- Data structures and algorithms
- Flowcharts and pseudo code and programming logic
- Functional vs OO programming
- Object Oriented Programming Concepts
- Classes, objects, variables and visibility
- Inheritance
- Modularity and abstraction
- Overloading and overriding
- Constructors
- Runtime polymorphism
- OOP with Java

Module M2: Database management and Web Programming

- Database Concepts
- Relational Model Model with ER/EER
- Object oriented Model
- Structured Query Languages
- Data warehousing and data mining
- MySql
- Database administration and data security
- Web programming with PHP

Module M3: Soft Skills, Professional Practice and Ethics

- Privacy
- Regulation of Cyberspace
- System reliability and related issues
- Contracting issues
- Intellectual Property Issues
- Employment issues
- Audit and Governance
- Computers and Society Professional Ethics
- Communications and team dynamics

Module M4: Networking, Computer Hardware, Operating Systems and Application Packages

- Introduction to computer hardware: Processing, memory and secondary storage, input output devices and portable computers.
- Operating systems: History, components, multitasking, disk access and file systems, device drivers, Windows operating system, Linux operating system
- Networking: History and networking media, communication protocols, scale of network, organizational scope, networking topologies, network hardware components, layered network model, IP addressing and sub-netting and routing protocols.
- Wireless networking and security
- Application packages: MS office and Open office

Module M5: Software Engineering and Software Project Management

- Software Processes
- Business Process Modeling
- Agile Development
- Requirements Engineering
- Architectural Design
- Design & Implementation
- Software project Management
- Socio-technical systems and Systems Engineering and Medicine.
- User interface design.
- Software reuse and open source
- Component-based software engineering
- Software testing
- Software cost estimation.
- Quality management

Module M6: Public Health, Basic Epidemiology and Statistics

- Principles of Public Health and Epidemiology
- Epidemiology of Infectious diseases
- Epidemiology of Chronic diseases
- National healthcare system
- Evidence based management of public health programmes
- Public health programme planning
- Economics of healthcare
- Statistics

Module M7: IT Law and security

Basic concepts of Information Security

1. Recognize Information Security vulnerabilities, threats, attack methods and cybercrime symptoms and factors that contribute to risk exposure of assets and methods to mitigate them.
2. Best practices of information security management.
3. International information security standards on information Security and latest ISO standard on information security.

4. International standards on Health Information Security and current standards and guidelines on Health Information Security in Sri Lanka
   Methods of defending information systems, networks and wireless devices and current ISO standards on Network Security
5. Basic concepts of computer forensics and importance of Computer forensics in relation to Health Information Systems.
6. Ethical hacking and penetration testing.
7. Implementing best information security practices

Module M8: Public Health Informatics

- Public Health Information Systems Evaluation
- Web-Based Public Health Information Systems
- Public Health Informatics Methods
- Public Health Information Systems
- Geographic Information System Application in Public Health
- Key sources of national public health data
- Health information exchange
- Mission and practice of public health and identify opportunities to advance public health using informatics methods and tools
- Fundamental informatics principles and their application to public health.
- Standards relevant to public health and create design artifacts to enable system interoperability.
- Current and evolving public health surveillance systems and perform a basic system analysis.
- Current and evolving relationship between clinical and public health systems, including needs, challenges, and opportunities.
- Roles required to develop and manage public health informatics projects and systems.

Module M9: Bioinformatics

- Introduction to biology
- Introduction to bioinformatics
- Introduction to biological databases
- Working with DNA and Protein Sequences – sequence alignment, mutation identification, mutation function prediction, phylogentic analysis and tools for designing genotyping assays.
- Big Data – tools for analysing exomes, genomes, and metagenomes

Module M10: IT for health education

- Introduction to Medical Education Informatics
- Principles of Medical Education

- Educational Theories: Adult learning theory, types of Learning Theories (Behaviorism, cognitivism, constructivism, connectivism, humanists theory), Kolb's learning cycle, learning domains (Blooms Taxonomy), learning modalities (Auditory, visual, kinesthetic and tactile), Introduction to Instructional Design Theories (ADDIE, KEMP and Rapid Prototyping) and learning communities (Communities of Practice, Online Learning Communities)
- Assessments: Overview, competence assessment (Millar's pyramid), assessment tools, simulation based assessments, workplace based assessments, online assessment strategies, challenges in assessments.
- Technology in medical education:
- Principles of Multimedia Designing for Medical/Health professional Education
- Interactive Multimedia for Education: Overview of Multimedia technologies, Multimedia Learning, multimedia Instructions and theoretical foundation, overview of SCORM, Components of SCORM and overview of m-Learning (Uses, technologies, challenges, authoring tools…etc).
- Web 2.0 in education: Overview, transition from Web 1.0 to Web 2.0, principles of Web 2.0, Web 2.0 technologies for Education (Blogs, Wiki, Social Bookmarking, Media Sharing, Social Networking, Collaborative tools, Bricolage and Mashups…etc)
- Moodle: Installing Moodle, design basics in Moodle, enrolling students and assigning roles to students, using quizzes and questionnaires, conducting an online discussion, assessment tools in Moodle and tracking activity and reporting.

Module M11: Management

- Management Planning
- Stratergic Management
- Financial Management
- Internal analysisn
- Management challenges
- Organizational structure and change management
- Managerial quality control
- HRM
- General competencies.
- Differing approaches to defining management and the standard cycle of the management process.
- Delegating
- Leadership styles of managers.
- Motivating employees/users and project staff.
- Leadership and motivation theories.
- Use of roles when working as a team.
- Communication process.
- Successful communication.
- Predominant decision making style.
- Planning and organization's goals.
- Organizational structure.
- Organizational design options.
- Contingency variables.
- 'Boundaryless organization'.

- 'Learning organization'.
- Control as a function of management.
- Monitoring and modifying plans.
- Creativity in organizations.

Module M12: HMIS, IT governance and Organizational Management

- Health Information and Electronic Records
- Cognitive Science and Health Informatics
- System Design in Healthcare
- Consumer Health Informatics and Telehealth
- Information Retrieval and Digital Libraries
- Patient-Centered Health, Personal Health Records
- Basic of IT governance
- HMIS project governance and change management
- Health Information Architecture
- HIS Audit

Module M13: Medical data and information management

- Importance of Information in Healthcare Delivery, importance of Information Management in Healthcare and evidence Based Medicine
- Information flow in the Curative Healthcare Sector, information flow in the Preventive Healthcare Sector and various forms used in the State Healthcare System
- Introduction to Medical Record, integrated view of Patient data and patient Cantered and Problem Oriented Records.
- Introduction to electronic health records (EHR), how does an EHR differ from the Paper – Based Medical Record and functional components of an EHR and impediments to the implementation of an EHR.
- Introduction to Ontological standards and specific Terminologies.
- ICD 10: History, fundamentals, volumes and chapters
- SNOWMED: History, fundamentals, elements and making SNOMED Usable
- Data Interchange Standards in Healthcare
- HL7: Introduction to HL 7, HL 7 V2.X, HL7 V3, HL7 CDA

Module M14: Disease Surveillance

- Core Surveillance Concepts
- National Surveillance Systems & Notifiable Disease Reporting
- Disease surveillance and reporting
- Outbreak investigation
- Situational Awareness Surveillance
- Data Collection & Interpretation
- Population genomics

Module M15: Logic, clinical reasoning and decision making

Artificial Intelligence, components of AI, uses of AI in other sectors and uses of AI in medicine
Prepositional logic, first Order logic and applications of logic in medicine
Ontologies – OWL, controlled Vocabularies and semantic nets
Uncertainty and probability in medicine, basic probability, Baye's rule, Baysian networks and probabilistic Reasoning
Expert systems, components of ES, how to build a ES and applications of ES
Value of information, decision trees and neural Networks
Regression and Classifications
Genetic Algorithms
Introduction to NLP, NLP methods
Introduction to CDSS
Introduction to e-clinical guidelines
Introduction to WEKA and decision making using WEKA.

Module M16: Science and ethics

- Present and discuss different theoretical perspectives on the relations between science, technology, society, and ethics
- Present different perspectives on knowledge and knowledge production
- Analyse social and ethical challenges in information technology design and use
- Discuss different perspectives on the social and ethical responsibility of the information technology designer and user
- Apply different methods to explore and discuss theoretical concepts and social and ethical challenges
- Understand and apply concepts of ethics in conducting research.

Module M17: Literature Review

- Formulate key questions for a review.
- Organize a literature search; identify which literature bases to search.
- Abstract relevant information from appropriate studies in a systematic manner.
- Rate the scientific quality of each study and the level of evidence for each question.
- Create evidence tables and summary tables.
- Summarize the studies' findings.
- Interpret the pattern of evidence in terms of strength and consistency.
- Describe the elements of a meta-analysis and when such a step is appropriate

Module M18: Research Methodology

- Understand basic concepts of research and research methodologies
- Critical analysis and identify research topics
- Select and define appropriate research problem and parameters
- Preparing a project proposal (to undertake a project)
- Organize and conduct research
- Write a research report and thesis

Module M19: Scientific Writing, Presentation and Publication Skills

- Distinguish different types of research, their audiences and how research material might be effectively presented
- Prepare scientific and technical papers, and presentations.
- Format documents and presentations to optimize their visual appeal when viewed in-press, as a podcast or audio/video file format on the internet, or through personal presentations to an audience
- Effectively use features of Microsoft Office to create eye-catching professional documents and presentations.
- Effectively use features of Microsoft Word, Powerpoint, and Excel to create professional looking tables, graphs and figures.
- Accept constructive criticism and use reviewers' comments to improve quality and clarity of written reports and presentations.

ANNEX 2

Recommended reading

The following are the core-text books recommended for the course:

1. Introduction To Computer Information Systems by Geoffrey Steinberg and Kamaljeet Sanghera, 2008.

2. Biomedical Informatics: Computer Applications in Health Care and Biomedicine (Health Informatics) by Edward H. Shortliffe and James J. Cimino, 2006.

3. Medical Informatics: Practical Guide for the Healthcare Professional 2007 by Robert Hoyt, Melanie Sutton, and Ann Yoshihashi, 2007

4. Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins by Andreas D. Baxevanis and B. F. Francis Ouellette, 2004.

5. Public Health Informatics and Information Systems by D.A. Ross, A.R. Hinman, K. Saarlas, and W.H. Foege, 2002.

6. Introduction to Telemedicine by Richard Wootton, D. J. C., Victor Patterson (Ed.) (2006). Royal Society of Medicine Press Ltd.

7. Telehealth in the Developing World by Richard Wootton, N. G. P., Richard E. Scott and Kendall Ho (Ed.). (2009) Royal Society of Medicine Press Ltd.

8. Intelligent Technologies for Bridging the Grey Digital Divide by Soar, J., Swindell, R., & Tsang, P. (2011) (Vol. Hershey, PA, USA) IGI Global.

9. Human resources in healthcare, health informatics and healthcare systems by Kabene, S. M., Shukla, A., & Tiwari, R. (Eds.). (2011). Hershey, PA, U.S.A. Medical Information Science Reference.

10. Fostering Self-Regulated Learning through ICT by Dettori, G., & Persico, D. (2011). (Vol. Hershey, PA, USA). IGI Global.

ANNEX 3

Log book

(The log book should be prepared according to the following format)

Name of Trainee: .....

Name of Trainer: .....

Unit / Department / Institution: …….....

Period of Training: From …..... To …….....

General Objectives

Specific Objectives

These will be specified by the Speciality Board depending on the visit / attachment / tour

Comments of the Trainee:

Organizational structure:

Resources available:

Functions of the Unit / Department / Institution in relation to Medical Informatics:

Objectives that were achieved:

Usefulness of your visit / attachment / tour:

Suggestions to improve the appointment:

Signature of the Trainee: .....

Date: .....

Consultant in charge / Supervising officer / Head : ……

Signature of the above: ……...

Date: .....

ANNEX 4

Guidelines for preparation of the research proposal

Dissertation proposals vary according to topic, methods, and preferences of the supervisors and the Board. Most share the following elements, though not necessarily in this order.

1. The Introduction

A short section (maybe three paragraphs to three or four pages) gently introduces the problem or question that you'll be exploring and draws the reader into the material. It's probably best not to start with abstruse concepts. You might open with a general problem in communication, issues surrounding some texts, or the policy implications of the phenomenon you're studying.

2. Research Questions

Most research projects are guided by a general research question. Normally, you want to state your question(s) relatively early in your proposal, perhaps toward the end of your introduction. Alternatively, you can introduce your questions at the end of the Literature Review, discussed below, though you may wish to mention them briefly at the end of the introduction.

Overarching questions often subsume subordinate questions or hypotheses and these might be stated explicitly and precisely as H1 (first hypothesis), RQ1 (research question 1) and so forth. A statement of the research questions might also include any of the study's boundaries—time, place, and topics. Terms with unusual meanings should be defined. Rather than specifying research questions and hypotheses in formal terms, some qualitative proposals explicate theoretical issues, critical questions, and general themes for investigation.

3. Literature Synthesis or Review

The proposal should locate your dissertation in the broader scholarly literature. This is intimately connected with establishing the significance of your research. For instance, the discussion of literature typically shows how your project will extend what's already known.

In writing your literature review, think about the key theories and concepts related to your project and organize your discussion accordingly; you usually want to avoid a strictly chronological discussion (i.e., earliest study, next study, etc.). What research is directly related to your topic? Discuss it thoroughly. What literature provides context for your research? Discuss it briefly. In your proposal you should avoid writing a genealogy of your field's research. For instance, you don't need to tell the Board about the development of research in the field of Bio medical informatics in order to justify the particular project you propose. Instead, isolate the major streams of research within your field that are relevant to your project.

Be sure to make use of recent state-of-the-literature summaries that are increasingly common. Also, don't forget to discuss literature that pertains to the methodological issues relevant to your study. This might fit best in the Research Method section.

4. Significance of your Research Question

Good proposals leave readers with a clear understanding of the dissertation project's overall significance. Why bother to undertake this research? What contribution—to scholarly understanding, to the practice of communication, to public policy—will it make? Answering these questions underscores a project's significance. The significance of most dissertations comes through advancing scholarly understanding of communication phenomena. This can take many forms: advancing theoretical understandings; introducing new interpretations; explicating the relationship between variables; testing a theory; replicating earlier studies; exploring the generalizability of earlier findings in new times, places, or circumstances; refining a method of inquiry; and more.

5. Research Method

The research method that will be used in undertaking the dissertation research involves three levels of concern—overall research design, delineation of the method, and the procedures for executing it.

At the outset you have to show that your overall design is appropriate for the questions you're posing. Next, you need to outline your specific research method. What data will you analyze? Your data could be a set of key texts, particular cultural artifacts, accounts of historical events, preexisting survey research data, new experimental data, or any combination of these and other data.

How will you collect the data? Board sometimes expect proposals to sketch instruments (e.g., coding sheets, questionnaires, protocols) central to the project.

Third, what procedures will you follow as you conduct your research? What will you do with your data? A key here is your plan for analyzing data. You want to gather data in a form in which you can analyze it. If appropriate, you should indicate what rules for interpretation or what kinds of statistical tests that you'll use.

6. Tentative Dissertation Outline

Give the Board a sense of how your dissertation will be organized. You can list your chapters in outline form. Or you can write a short (two- or three-sentence) paragraph summarizing what you expect to include in each chapter.

7. Tentative Schedule for Completion

Be realistic in projecting your timeline.

8. References

If you didn’t use footnotes or endnotes throughout, you should include a list of references to the literature cited in the proposal.

9. Selected Bibliography of Other Sources

You should append a substantial list of references in your bibliography.

The proposal can be formatted according to the following layout:

Section 1

1. Name of trainee
2. Name(s) of supervisor(s)
3. Training centre

Section 2

1. Project title
2. Background and justification
3. Objectives of study
4. Research plan
    a. Design
    b. Setting
    c. Method
    d. Outcome measures
    e. Plan of presentation of results
    f. Ethical considerations
    g. Work plan and time lines
5. References
6. Funding for study
7. Signature of trainee

Section 3

Recommendation of supervisor(s)

Signature of Supervisor 1 Signature of Supervisor 2

ANNEX 5

Guidelines for the dissertation supervisors

- The dissertation is based on a 1-2 year research project.
- Acceptance of the dissertation is a requirement for awarding the Masters degree in Biomedical informatics. The trainee should write up the project work as a dissertation conforming to the format approved by the Speciality Board in Biomedical Informatics.
- The supervisor should guide the student in planning and designing, carrying out the research and in presentation of the work.
- The supervisor should obtain recommendation of the research proposal from a reviewer.
- The objective of the dissertation is to prove the trainee's capability to plan, carry out and present his / her own research. The purpose of this training is to ensure maturity, discipline and scholarship in research.
- The dissertation should comprise the trainee's own account of his / her research.
- It must contribute to existing knowledge of biomedical informatics relevant to Sri Lanka and afford evidence of originality as shown by independent, critical assessment and / or discovery of new facts in the area under study.
- It should be satisfactory as regards literary presentation.
- The dissertation should be certified by the supervisor as suitable for submission.
- General Comments on the contents: The objectives should be clearly stated and should be feasible to achieve within the time frame. Other published work relevant to the problem (both international and local) should be comprehensively covered and critically evaluated. An appropriate study design and method should be used to achieve the objectives stated. The results should be appropriately analyzed, interpreted and presented effectively. Theoretical / practical applications of the results, if any should be given. The conclusions should be valid and be based on the results obtained on the study.
- Ethics: The candidate should confirm and document that procedures followed were approved by the Ethical Committee of the institution where the work was carried out and ethical approval was obtained by a recognized Ethical Review Committee where necessary.
- If at any time the supervisor is not satisfied with the work progress of the trainee, the trainee should be made aware of the deficiencies and corrective measures suggested. This should be conveyed in writing to the trainee with a copy to the Speciality Board in Biomedical Informatics. In such instances, a follow-up report should be forwarded within two months or earlier if necessary to the Speciality Board.

ANNEX 6

Guidelines for preparation and submission of the Dissertation

Your dissertation must be prepared according to the following instructions. It includes general guidelines, assembling of pre pages and structuring the body of the manuscript. Note also that since the structure of a dissertation is dependant on the nature of the project, you must always get the consent of your supervisor when deciding on the final structure.

- Two soft bound hard paper copies of the dissertations must be submitted for the examination purpose.

- The dissertation should consist of a minimum of 10,000 words and a minimum of 20 relevant recent references from the literature.

The following guidelines should be used in planning and preparation of the dissertation.

1. The manuscript should be submitted ring bound or plastic edge bound form. This facilitates corrections which may be recommended by the assessors. The final form of the book may be in the sewn and bound form with a hard cover and this final book should be handed over to the PGIM at least fourteen days before the commencement of the examination.

2. The script should be prepared in English (UK) format in Microsoft WORD. Please DO NOT prepare it in English (US). The trainees are strongly advised to ensure that correct grammar is used and to check the text in the script and correct spelling mistakes, typographical errors etc.

3. The manuscript should be prepared on white A4 paper and typed on one side of the paper only, with minimum margins of 40mm on the left hand side (binding edge) and 20mm on the other three edges (free edges). Use 1.5 spacing throughout the book. Times New Roman type of lettering with font size 12 should be used and the same style and size should be used consistently throughout the script except when bold type for headings and italics for emphasis are used.

4. Pages, subsections, tables and figures should be numbered using Arabic numerals.

5. Pages should be numbered consecutively.

6. Subsections should be numbered as indicated here.

1
1.1
1.2
1.2.1
1.2.2
1.3
1.4

2
3

7. Tables and figures should be numbered sequentially and arranged in appropriate places in the text. These should not be supplied as separate entities at the end.

8. The only exception to use Arabic numerals is when quoting from other sources where Roman numerals may be used.

9. The content and the arrangement of the pages

The content should be given under the following headings :-

Cover page
Title page
Declaration by the candidate
Dedication – optional
Abstract
Table of contents
List of symbols, abbreviations (if any)
List of tables
List of figures
Rationale
Introduction (*or Problem domain**)

Review of literature (*and Technology adapted/Approach**)
General and specific objectives
Materials and methods (*or Analysis, design and Implementation**)
Results (*or Evaluation**)
Discussion (including limitations)
Conclusions
Recommendations
Acknowledgements
References

* due to the diverse nature of projects, students can choose between these subsections

Cover Page

Print the following information by leaving appropriate line spacing

Title of the Project (16pt, bold, centered)
Names of the student (14pt, centered)
Registration number (14pt, centered)
Post Graduate Institute of Medicine (12pt, centered)
University of Colombo (12pt, centered)
January <YEAR> (e.g. 2011) (12pt, centered)

Title page

Print the following information by leaving appropriate line spacing

Title of the Project (16pt, bold, centered)
Names of the student (14pt, centered)
Registration number (14pt, centered)
Type the following (12pt, centered)

Dissertation submitted to the Post Graduate Institute of Medicine, University of Colombo, Sri Lanka for the partial fulfilment of the requirements of the Degree of MSc in Biomedical Informatics.

January <year> (12pt, bold, centered)

Title: a brief and specific statement

Declaration: use following format for the declaration.

Declaration

I declare that this dissertation does not incorporate, without acknowledgment, any material previously submitted for a Degree or a Diploma in any University and to the best of my knowledge and belief, it does not contain any material previously published or written by another person or myself except where due reference is made in the text. I also hereby give consent for my dissertation, if accepted, to be made available for photocopying and for interlibrary loans, and for the title and summary to be made available to outside organization.

Name of Student Signature of Student

Date

Supervised by

Name of Principal Supervisor Signature of Principal Supervisor

Date

Abstract: This should be a single page description that consists of problem that you have addressed, your approach, analysis & design, implementation, evaluation and conclusion. Write more about your work. Do not use citations, abbreviations and further works in an abstract. An abstract of a research project must include brief description of the problem domain, research methodology, experimental design, data collection, data analysis and conclusion.

Rationale: justification of why this problem is important to the selected domain/institution etc.

Introduction (or Problem Domain): State the information and facts known on the topic/problem selected for study. This would include a literature review survey and a critical comment on the various aspects of the studies. The objectives of the study should then be presented.

Technology adapted/Approach: A thorough explanation and justification for your selected approach, comparing it to alternate approaches should be given. If applicable a *Feasibility Study* may be included in this section.

Materials and methods: Describe exactly what was done in specific terms and in sufficient details so that the study could even be repeated by another investigator. The section to be included are:

Study design

Materials

Procedures and protocols

Method of data analysis (if applicable)

If software customization or software development project is considered,

Analysis

Design

Implementation

Results and inferences (or Evaluation): Summarize the data with figures, tables or graphs whenever necessary. If a software customization or software development project is considered, evaluation of the software based on acceptance testing etc., should be included.
It is absolutely essential to provide usage data in the dissertation. Dissertations of just a "concept" nature without usage data will not be accepted.

Discussion: Interpret the results so as to provide answers to the study question(s). Comment on the relevance of these answers to present knowledge of the subject. And consideration of alternate interpretations should be provided. Comment on interesting or unexpected observations and about the method. Always comment on further follow up research which could be undertaken on the subject.

Conclusion: List the main points in the discussion section as conclusion.

Acknowledgements: Thank people for funding, facilities, equipments, materials or assistance. This statement should be brief. Acknowledgements should be limited to those who have significantly contributed to the training of the postgraduate and the preparation of the dissertation. The text should be limited to one single page.

References: List all references that are cited in the text. The Vancouver System of listing reference should be used.

Type the references double – spaced in the Vancouver Style (using super script numbers in parentheses tocite them in the main text and list the full references at the end of the paper in the order in which they are cited in the text). Online citations should include date of access at the end of each such reference. Use Index Medicus for journal names. If necessary, cite personal communications in the text but do not include in the reference list. Unpublished work will not be accepted. Reference should be listed in the following style:

Journal

Koreth J, Blakkenist CJ, McGee JO'D. Chromosomes, 11q and cancer: a review. *J Pathol* 1999; **187**:28-28.

Book

Sadler TW. *Langman's Medical Embryology* (5^{th} edn). Williams & Wilkins: Baltimore, 1987;224-226

Chapter in a book

Desimer VJ, Caller F. Cholestetic syndrome in infancy and childhood. In *Hepatology: a Text Book of Liver Disease*, Zakim D, Boyer TD (eds), vol 2. W.B. Saunders: Philadelphia, 1990; 1335-1395.

Website

The Ontology Website. http://www.mit.com/ontology/ [Accessed 24 April 1999]

Dedication of the dissertation to a person(s) is optional

Table of contents:All sections of the book should be listed using Arabic numerals. The starting and end page numbers should be listed along the right margin.

List of symbols and abbreviations: Trainees are advised to use only symbols and abbreviations which are accepted for use in scientific and medical literature. All symbols and abbreviations with the complete terms or wording should be given in the respective lists in alphabetical order.

Appendices: Appendices must be named in alphabetical order as Appendix A, Appendix B and so on, and also give a Title for each appendix. All Appendices must be cited inside the text through its name.

Table and figures: All tables and figures must be numbered, named with captions, and cited inside the text.

10. **Printing:** Laser quality Black and White printing should be done. Do not use colour printing except where the use of such coloured figures and charts are essential.
11. **Evaluation of the dissertation :** A panel nominated by the Specialty Board of MSc Biomedical Informatics will assess the candidate's dissertation and its acceptance will determine the eligibility to sit for the Viva Voce examination.

    In the event of a dissertation not being accepted the candidate will be notified whether a completely new dissertation is to be prepared or whether modification of existing one will suffice for re-submission.

    After the *Viva* the student should incorporate comments suggested by the examiners and show the supervisor the corrected version and do the submission of the final dissertation to the PGIM. The back of the front cover of the dissertation should include Source Code (when applicable) and editable version of the dissertation in a CD. Source Code should not be the dissertation.

12. Evaluation by the Principal Supervisor

Each student should submit a brief report (evaluation) by the Principal Supervisor, along with the dissertation. The report should highlight student's understanding about the problem domain, time spent/interactions with the supervisor and the genuineness and adequacy of the deliverables to address the requirements.

ANNEX 7

Progress reports

A) To be completed by the trainee

1. Name of trainee:

……

2. Institution where research is being carried out:

……

3. Supervisor names

Supervisor 1:

……

Supervisor 2:

……

4. Title of research project:

……

……

5. Description of work carried out to date including progress in dissertation writing (250 words)

(Annex 1).

6. Have you and/or your supervisors identified any issues which are affecting your progress? If yes, please give details of the issues identified and how these will be resolved.

……

……

……

……

7. Please describe your supervisory arrangements. (You may wish to refer to frequency of contact, timing and content of feedback on your work etc.)

……

……

……

B) Supervisors' report (To be filled separately by both supervisors after completion of Section A by the trainee)

Supervisor 1

7. Is the student in regular contact with you? Please give approximate frequency, nature (e.g. email, face to face, telephone) and extent of your contact with the student.

……

8. Is the work on schedule?

……

9. Please specify constraints (if any)

……

10. Recommendation of supervisor:

……

Signed: …….
Name: ……..
Date: …….

Supervisor 2

11. Is the student in regular contact with you? Please give approximate frequency, nature (e.g. email, face to face, telephone) and extent of your contact with the student.

……

12. Is the work on schedule?

……

13. Please specify constraints (if any)

……

14. Recommendation of supervisor:

……

Signed: …….
Name: ……..
Date: …….

15. Date of review by the Specialty Board:

16. Recommendation of the Specialty Board:

ANNEX 8

Assignment marking scheme

Marking scheme for programming assignments

1. Correctness of the programming code - 60 marks
   (The assessed components will depend on the each assignment requirement)
2. Structure of the programming code - 20 marks
3. Simplicity of its implementation - 10 marks
4. Style and commenting - 5 marks
5. Program execution - 5 marks

   Total 100 marks

Marking scheme for other assignments
(Adapted with modifications from University of Technology, Sydney)

	Content knowledge (60%)	Ability to communicate (20%)	Academic discourse skills (10%)	Basic language skills (10%)
5	The writer shows outstanding understanding and content knowledge beyond the scope required by the assignment task	The reader understands the essay completely; if there are any mistakes they do not interfere with the meaning.	There is a clear logical argument, with the points well ordered and fully supported. It responds appropriately to the question asked.	Pleasingly broad range of sentence structure and vocabulary is used. Mathematical vocabulary is used correctly
4	The writer demonstrates sound basic knowledge and understanding of the relevant area.	The reader understands the essay, although some sections need to be read more than once.	The answer responds more or less to the question asked. The use of supporting evidence, Illustration and argument is relevant but not necessarily sufficient.	There is a good range of sentence structure and vocabulary with a number of minor errors in word formation or spelling.
3	The writer exhibits adequate basic knowledge of the topic area.	The reader mostly understands the essay, despite occasional difficulty.	A point of view is presented, but it is not always clear. Attempts to include supporting evidence, illustration or argument are made	While there are noticeable language errors, these do not significantly interfere with the reader understanding the essay.
2	The writer's apparent knowledge and understanding of relevant content is limited.	The reader has difficulty understanding the essay, although there are signs of meaning breaking through.	The argument does not progress smoothly. Main points and supporting material are not clearly distinguished from each other.	The range of sentences expressed correctly is limited. Errors in grammar, word choice, word formation and spelling cause difficulty for the reader.
1	The writer shows little evidence of knowing the relevant content	The reader can hardly understand the essay at all.	The ideas or facts presented have little apparent relation to each other or to the question asked.	Errors in sentence structure, word choice, word forms and spelling predominate and prevent communication.
0	1. The answer is copied or substantially copied from materials or other sources. 2. Non-attempt			

ANNEX 9

Calculation of grade points and GPA

When determining the 'grades' and the 'grade points', following table is being used.

Marks range	Grade	Grade point value
85-100	A +	4.0
80-84	A	4.0
75-79	A -	3.7
70-74	B +	3.3
65-69	B	3.0
60-64	B -	2.70
55-59	C +	2.30
50-54	C	2.0
45-49	C-	1.7
35-44	D+	1.3
25-34	D	1.0
00-24	E	0.0

In order to calculate the grade points obtained for a specific module, the grade point value pertaining to the grade received for the module should be used according to the following formulae.

Grade points = Grade point value x the number of credits allocated for the module

In order to calculate the grade point average (GPA) for any number of modules,

The total grade points derived from a designated number of modules should be divided from the total number of credits allocated for the same modules.

Example:
Student 'X' obtains C, C+, A-, A and C grades for the five modules attempted during the 1st semester which also derives 2,2,3,2 and 2 credits respectively. Thus, the total number of grade points received by student 'X' can be derived from the above table.

Total grade points for semester 1 **= (2.0 x 2) + (2.5 x 2) + (3.5 x 3) + (3.75 x 2) + (2.0 x 2)**
= 4 + 5 + 10.5 + 7.5 + 4
= 31
Thus, the GPA for semester 1 **= 31 / total number of credits**
= 31 / 10
= 3.1

ANNEX 10

Dissertation marking scheme

During the assessment of dissertations, examiners will arrive at the following conclusions.

is suitable for acceptance in its present form

is suitable for acceptance, but requires minor revisions

is suitable for acceptance, but requires major revisions

is not suitable for acceptance and is rejected

Marking schemes:

For projects that involve development of new systems (e.g. Public Health; Medical Education Informatics)

Item	Marks Allocated
Abstract	20
Rationale and Objectives	15
Literature Review	25
System Analysis and Design	60
Design	70
Implementation	30
Recommendations	10
Overall Presentation	20
Total	250

For projects that does not involve development of new systems (e.g. Biomedical Informatics; Health Policy)

Item	Marks Allocated
Abstract	20
Rationale and Objectives	15
Literature Review	25
Methodology	50
Results	50
Discussion	70
Overall Presentation	20
Total	250

ANNEX 11

Dissertation viva marking scheme

Mark Range	Dissertation viva Performance
75 - 100	In depth knowledge and a thorough understanding of all aspects which allows questions to be answered accurately and fluently and the discussion to be extended with confidence into difficult or unfamiliar areas.
60 - 74	Outcome at excellent level. In depth knowledge and a thorough understanding of most aspects, with some ability to extend the discussion into difficult or unfamiliar areas.
50 - 59	Outcome at focal level. Knowledge and understanding of most aspects in some depth, with the ability to extend the discussion so as to make relevant links between theory and clinical practice.
40 - 49	Adequate knowledge and understanding of most aspects, with some ability to extend the discussion so as to make relevant links between theory and practice.
30 - 39	Outcome at threshold level. Demonstrates a relatively superficial knowledge and understanding of most aspects, with the ability to make relatively simple links between theory and practice.
20 - 29	Little knowledge or understanding shown. Unable to make relevant links between theory and practice.
0 - 19	No knowledge or understanding demonstrated.

ANNEX 12

Award of medals

Award of Gold Medals for students in the MSc in Biomedical Informatics Course

1. Eligibility Criteria

Four gold medals will be awarded, the eligibility criteria of which will be as follows:

1.1.Gold Medal for the Best Student in Public Health Informatics

He/she should satisfy all of the following
- selected the Public Health Informatics elective track for semester 3
- conducted a research project in Public Health Informatics during semester 4 and submitted a dissertation based on the project for the semester 4 examination
- passed all examinations in the first attempt
- obtained a minimum mark of 60% at each of the semester 1, 2 and 3 examinations
- obtained a minimum mark of 70% at the semester 4 examination
- obtained the highest mark at the semester 4 examination from among students who conducted research projects in Public Health Informatics.

1.2.Gold Medal for the Best Student in Bioinformatics

He/she should satisfy all of the following
- selected the Bioinformatics elective track elective track for semester 3
- conducted a research project in Bioinformatics during semester 4 and submitted a dissertation based on the project for the semester 4 examination
- passed all examinations in the first attempt
- obtained a minimum mark of 60% at each of the semester 1, 2 and 3 examinations
- obtained a minimum mark of 70% at the semester 4 examination
- obtained the highest mark at the semester 4 examination from among students who conducted research projects in Bioinformatics

1.3.Gold Medal for the Best Student in Medical Education Informatics

He/she should satisfy all of the following
- selected the Medical Education Informatics elective track for semester 3
- conducted a research project in Medical Education Informatics during semester 4 and submitted a dissertation based on the project for the semester 4 examination
-should have passed all examinations in the first attempt
-should have obtained a minimum mark of 60% at each of the semester 1, 2 and 3 examinations
- should have obtained a minimum mark of 70% at the semester 4 examination
-obtained the highest mark at the semester 4 examination from among students who conducted research projects in Medical Education Informatics

1.4.Gold Medal for the Most Outstanding Student in Biomedical Informatics

He/she should satisfy all of the following
- should have passed all examinations in the first attempt.
- should have obtained a minimum mark of 70% at each of the semester 1, 2, 3 and 4 examinations
- obtained the highest overall aggregate from semester 1, semester 2, semester 3 and semester 4 examinations among all students (25% from the total marks at each exam will contribute to calculation of the overall aggregate)

2. Process

The above gold medals will be awarded annually to students selected from amongst those who followed the MSc in Biomedical Informatics in the given year. Recipients will be chosen by the examiners appointed for the semester 4 examination and will be ratified by the Specialty Board.

Rs. 500,000/= will be deposited for each medal from the NOMA grant to make the award. 75% of the interest will be used to make the award annually and the balance reinvested with the capital to ensure long term sustainability of the award of the medal.

3. Description and award of medals

Each award will comprise of a gold medal and a book token to the value of Rs 25,000/-. The awards will be presented at the annual postgraduate convocation.