# MGM INSTITUTE OF HEALTH SCIENCES

(Deemed to be University u/s 3 of UGC Act, 1956)
**Grade 'A++' Accredited by NAAC**
Sector-01, Kamothe, Navi Mumbai -410 209
Tel 022-27432471, 022-27432994, Fax 022 -27431094
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CHOICE BASED CREDIT SYSTEM (CBCS)

**(with effect from 2024-2025 Batches)**

# Curriculum for

# M.Sc. Health Informatics

Amended as per AC-51/2025, Dated 29/04/2025

# Amended History

1. Approved as per AC-46/2023 Resolution No. 6.25, Dated 28/04/2023.

2. Amended as per AC-49/2024, [Resolution No. 3.23]Dated 25/04/2024.

3. Amended as per AC-50/2024 (Post -Facto), Dated 27/11/2024.

4. Amended as per AC-51/2025, [Resolution No. 3.2, (Annexure -4A, 4B & 4C)]; Dated 29/04/ 2025.

Ref NO:- SBS/2024/12/4987

MGM Institute Of Health Sciences
INWARD NO. 06.
DATE: 01/01/25.
REF: 8

Dt. 31/12/24

**MGM SCHOOL OF BIOMEDICAL SCIENCES, NAVI MUMBAI**
**(A constituent unit of MGM INSTITUTE OF HEALTH SCIENCES)**
(Deemed University u/s 3 of UGC Act 1956)
Grade "A+" Accredited by NAAC

Ref: MGMSBS/24/12/4984

Date: 30/12/24

To,
Hon'ble Vice Chancellor,
MGMIHS, Kamothe,
Navi Mumbai

**Through Proper Channel**

**Subject: Regarding Post Facto approval for MSc. Health Informatics Program**

Respected Sir,

I am writing to request post facto approval for the MSc. in Health Informatics program, which has now been transferred to MGMSBS, as mentioned in the email we received from your office, dated 6th December 2024. Previously, this program was offered by MGM New Bombay College of Nursing, Kamothe, Navi Mumbai.

In line with the National Education Policy (NEP) 2020 & NCrF guidelines, we have modified the syllabus accordingly, in agreement with Dr. Partha. We kindly request post facto approval for the changes made to the MSc. Health Informatics Program (Resolution No. 6.18 AC/46-2023 dated 28.04.2023) for the AY 2024-25 onwards.

I kindly request your approval for the same.

Regards,

Dr. Mansee Thakur,
Director, MGMSBS,
MGMIHS, Navi Mumbai.

For administrative convenience the M.Sc. Health Informatics Program will be considered as started ab initio from beginning in MGM School of Biomedical Sciences, Navi Mumbai.

31/12/2024

MGM SCHOOL OF BIOMEDICAL SCIENCES
Inward No. MGM/SBS/6390
Date 31/12/24
Receiver Signature

Sector 1, Kamothe Navi Mumbai-410209, Tel.No.:022-27437631,27432890
Email. sbsnm@mgmuhs.com / Website :www.mgmsbsnm.edu.in

Dr. Shashank D. Dalvi
Vice Chancellor
MGM Institute of Health Sciences
Navi Mumbai - 410209

Registrar
Put up in Executive Council

# MGM SCHOOL OF BIOMEDICAL SCIENCES

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Grade "A$^{++}$" Accredited by NAAC
Sector 1, Kamothe, Navi Mumbai-410209, Tel. No.:022-2743763, 27437632, 27432890
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## CHOICE BASED CREDIT SYSTEM (CBCS)

## (Academic Year 2024 - 25)

## Curriculum for

## M.Sc. Allied Health Sciences

## M.Sc. Health Informatics

## Semester I & II

Verified by
Dr. Partha Hazarika

M.G.M. SCHOOL OF BIO-MEDICAL SCIENCES KAMOTHE NAVI MUMBAI

Director
MGM School of Biomedical Sciences
MGM Institute of Health Sciences
Kamothe, Navi Mumbai- 410 209. India

**DIRECTOR'S MESSAGE**

Dear Students,

Greetings!!!!!

I take this opportunity to welcome you on behalf of MGM family to the Master's Degree at MGM School of Biomedical Sciences (MGM SBS).

MGM School of Biomedical Sciences (MGM SBS) established in the year 2007, the MGM School of Biomedical Sciences envisaged building a progressive learning community and is committed to pursuit of excellence in higher education, total development of personality and shaping the students into sensitive, self-reliant citizens of the country imbued with the ideals of secularism and a scientific aptitude. We set global standards to make our students scientifically as well as ethically stronger. The college adopts the national qualification frame work for the post-graduate programs which has adopted Credit Base Choice System (CBCS) so that, we construct a value-based system of education that encourages critical thinking and creativity, a research platform as opposed to rote learning.

The P.G (M.Sc.) courses offered are; Medical Anatomy, Medical Physiology, Medical Biochemistry, Medical Microbiology, Medical Pharmacology, Biotechnology, Genetics, Molecular Biology, Masters in Hospital administration and Biostatistics, M.Sc. Cardiac Care Technology, M.Sc. Medical Radiology and Imaging Technology, M. Optometry, M.Sc. Health Informatics. Over time, the program has evolved, to meet the challenges of the ever-changing field of biomedical education system.

With Best Wishes,

Director

MGM School of Biomedical Sciences

## ABOUT MGM SCHOOL OF BIOMEDICAL SCIENCES

### Mission

To improve the quality of life, both at individual and community levels by imparting quality medical education to tomorrow's doctors and medical scientists and by advancing knowledge in all fields of health sciences though meaningful and ethical research.

### Vision

By the year 2020, MGM Institute of Health Sciences aims to be top-ranking Centre of Excellence in Medical Education and Research. Students graduating from the Institute will have the required skills to deliver quality health care to all sections of the society with compassion and benevolence, without prejudice or discrimination, at an affordable cost. As a research Centre, it shall focus on finding better, safer and affordable ways of diagnosing, treating and preventing diseases. In doing so, it will maintain the highest ethical standards.

### About – School of Biomedical Sciences

MGM School of Biomedical Sciences is formed under the aegis of MGMIHS with the vision of offering basic Allied Science and Medical courses for students who aspire to pursue their career in the Allied Health Sciences, teaching as well as research.

School of Biomedical Sciences is dedicated to the providing the highest quality education in basic medical sciences by offering a dynamic study environment with well-equipped labs. The school encompasses 21 courses each with its own distinct, specialized body of knowledge and skill. This includes 8 UG courses and 15 PG courses. The college at its growing years started with mere 100 students has recorded exponential growth and is now a full-fledged educational and research institution with the student strength reaching approximately 581 at present.

Our consistent theme throughout is to encourage students to become engaged, be active learners and to promote medical research so that ultimately, they acquire knowledge, skills, and understanding so as to provide well qualified and trained professionals in Allied Health Sciences to improve the quality of life.

As there is increased need to deliver high quality, timely and easily accessible patient care system the collaborative efforts among physicians, nurses and allied health providers become ever more essential for an effective patient care. Thus, the role of allied health professionals in ever-evolving medical system is very important in providing high-quality patient care.

Last but by no means least, School of Biomedical Sciences envisions to continuously grow and reform. Reformations are essential to any growing institution as it fulfills our bold aspirations of providing the best for the students, for us to serve long into the future and to get ourselves updated to changing and evolving trends in the health care systems.

## Introduction

Most healthcare leaders know that trustworthy data is critical to improving business performance and patient care. But it's still a challenge to put that data to work in service of better care and more informed decision making. The ability to effectively analyse and deploy this data is critical to the successful operation of healthcare organizations.

Health Informatics is an interdisciplinary field that combines healthcare, information science, and computer technology to optimize the acquisition, storage, retrieval, and use of health-related data. It focuses on improving patient outcomes, enhancing healthcare delivery systems, and fostering innovation in the use of data and technology in medicine.

Health Information Management (HIM), on the other hand, emphasizes the management of health records, ensuring their accuracy, confidentiality, and compliance with regulatory standards. HIM professionals are responsible for organizing and safeguarding patients' medical information to ensure it is readily available for effective decision-making and quality healthcare delivery.

The integration of these fields creates a robust foundation for addressing contemporary healthcare challenges, such as the rise of electronic health records (EHRs), telemedicine, big data analytics, and health information exchange. This Master's program is designed to equip students with the knowledge and skills necessary to become leaders in this transformative domain.

## AIM of the Program

The Master's in Health Informatics program aims to:

- Prepare students to effectively integrate information technology and data analytics into healthcare practices.
- Develop competencies in managing and analysing health information to enhance clinical decision-making and operational efficiency.
- Foster a deep understanding of regulatory, ethical, and privacy issues associated with health information systems.
- Equip graduates with the skills to design, implement, and manage innovative health informatics solutions that address real-world challenges.
- Provide a strong foundation in interdisciplinary collaboration, leadership, and strategic planning for health informatics initiatives.
- Ensure proficiency in managing health information systems, focusing on data quality, security, and compliance with healthcare regulations.
- Train students in developing strategies for efficient healthcare documentation and coding, supporting better resource utilization and patient care delivery.

## Job Opportunities (Traditional and Non-traditional Settings)

Graduates of this program will have diverse career opportunities in both traditional and non-traditional healthcare settings:

**Traditional Settings:**

- **Hospitals and Healthcare Systems:** Roles such as Health Information Managers, Clinical Informatics Specialists, Nursing informatics specialist, Clinical analyst, EHR Implementation Consultants and Informatics director.
- **Public Health Agencies:** Positions like Public Health Data Analysts and Population Health Informatics Specialists.

- **Academic and Research Institutions:** Careers as Health Informatics Educators or Clinical Data Researchers.
- **Government Organizations:** Opportunities in policy-making and health informatics standard development.
- **Healthcare Facilities:** Roles like Medical Record Managers, Medical and Health Service Managers, Coding Specialists, and Data Quality Officers to ensure accurate and compliant health records management.

**Non-traditional Settings:**

- **Health Technology Companies:** Positions such as Product Managers, UX Designers for health applications, and Health IT Consultants.
- **Pharmaceutical and Biotech Industries:** Roles in clinical trial informatics, drug development analytics, and regulatory compliance.
- **Insurance Companies:** Careers as Healthcare Data Analysts or Actuarial Informatics Specialists.
- **Telemedicine and Remote Health Services:** Opportunities in designing and managing virtual care platforms.
- **Entrepreneurship:** Founding or leading start-ups focused on health IT solutions, wearable health devices, or patient engagement tools.
- **Data Science and Artificial Intelligence:** Roles in developing predictive models and machine learning applications for healthcare.
- **Consultancy Services:** Providing expertise in medical record audits, compliance reviews, and health information system optimizations.

**ELIGIBILITY FOR ADMISSION:**

Any health science graduates with MBBS/BAMS/BHMS/BDS/Nursing/Allied Health Sciences or equivalent with minimum aggregate of 50% marks.

**DURATION OF THE COURSE:** 2 (two) academic years/4 semesters

# M.Sc. Health Informatics

## Program Outcomes (PO)

| Program Code | Program Objective |
|---|---|
| PO1 | Apply foundational knowledge in health and medical sciences to develop informatics solutions |
| PO2 | Utilize biostatistics and research methodology to drive data driven healthcare innovations and conduct research |
| PO3 | Implement health information management practices in various healthcare settings |
| PO4 | Harness Advanced Computing Skills to Develop and Manage Innovative Health Informatics Projects |
| PO5 | Demonstrate effective communication skills within healthcare environments |
| PO6 | Integrate healthcare financing principles in health informatics initiatives |
| PO7 | Employ data analytics and machine learning techniques for improved healthcare outcomes |
| PO8 | Design and develop web and mobile applications for healthcare purposes and identify business opportunity. |

## OUTLINE OF COURSE CURRICULUM

### M.Sc. Health Informatics

#### Semester I

| Code No. | Core Course | Credits/Week | | | | | Hrs/Semester | | | | | Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture (L) | Tutorial (T) | Practical (P) | Clinical Posing/ Rotation (CP)/ Experiential | Total Credits (C) | Lecture (L) | Tutorial (T) | Practical (P) | Clinical Posing/ Rotation (CP)/ Experiential | Total (hrs.) | Internal Assement (IA) | Semester End Exam (SEE) | Total |
| **Discipiline Specific Core Theory** | | | | | | | | | | | | | | |
| MHIMT 101 L | Basics of Health Informatics & Health Information Management | 3 | - | - | - | **3** | 45 | - | - | - | **45** | **20** | **80** | **100** |
| MHIMT 102 L | Hospital Administration and Healthcare Financing | 3 | - | - | - | **3** | 45 | - | - | - | **45** | **20** | **80** | **100** |
| CC 001 L | Research Methodology & Biostatistics | 3 | - | - | - | **3** | 45 | - | - | - | **45** | **20** | **80** | **100** |
| **Discipiline Specific Core Practical / Experiential** | | | | | | | | | | | | | | |
| MHIMT 103 E | Fundamentals of Computer Application | - | - | - | 21 | **7** | - | - | - | 315 | **315** | - | **50** | **50** |
| MHIMT 104 P | Python Basics | - | - | 6 | - | **3** | - | - | 90 | - | **90** | **10** | **40** | **50** |
| CC 001 P | Research Methodology & Biostatistics (Core Course) | - | - | 4 | - | **2** | - | - | 60 | - | **60** | **10** | **40** | **50** |
| **Total** | | **9** | **0** | **10** | **21** | **21** | **135** | **0** | **150** | **315** | **600** | **80** | **370** | **450** |

## OUTLINE OF COURSE CURRICULUM

### M.Sc. Health Informatics

#### Semester II

| Code No. | Core Course | Credits/Week | | | | | Hrs/Semester | | | | | Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture (L) | Tutorial (T) | Practical (P) | Clinical Posing/ Rotation (CP)/ Experiential | Total Credits (C) | Lecture (L) | Tutorial (T) | Practical (P) | Clinical Posing/ Rotation (CP)/ Experiential | Total (hrs.) | Internal Assement (IA) | Semester End Exam (SEE) | Total |
| **Discipiline Specific Core Theory** | | | | | | | | | | | | | | |
| MHIMT 105 L | Advanced Health Informatics & HI Practicum | 3 | - | - | - | **3** | 45 | - | - | - | **45** | **20** | **80** | **100** |
| MHIMT 106 L | Clinical Workflow, Process Redesigning & Clinical Documentation Improvement (CDI) | 3 | - | - | - | **3** | 45 | - | - | - | **45** | **20** | **80** | **100** |
| MHIMT 107 L | Medical Lanaguage & International Classification of Disease Coding | 3 | - | - | - | **3** | 45 | - | - | - | **45** | **20** | **80** | **100** |
| MHIMT 108 L | Medical Transcription & Editing | 2 | - | - | - | **2** | 30 | - | - | - | **30** | **20** | **80** | **100** |
| **Discipiline Specific Core Practical / Experiential** | | | | | | | | | | | | | | |
| MHIMT 105 E | Advanced Health Informatics & HI Practicum | - | - | - | 15 | **5** | - | - | - | 225 | **225** | - | **50** | **50** |
| MHIMT 107 P | Medical Lanaguage & International Classification of Disease Coding | - | - | 4 | - | **2** | - | - | 60 | - | **60** | **10** | **40** | **50** |
| MHIMT 108 P | Medical Transcription & Editing | - | - | 4 | - | **2** | - | - | 60 | - | **60** | **10** | **40** | **50** |
| MHIMT 109 P | Web Development Basics | - | - | **6** | - | **3** | - | - | 90 | - | **90** | **10** | **40** | **50** |
| MHIMT 110 P | Advanced Python | | | | | | | | | | | | | |
| **Total** | | **11** | **0** | **14** | **15** | **23** | **165** | **0** | **210** | **225** | **600** | **110** | **490** | **600** |

# FIRST YEAR

## M.Sc. Health Informatics

### SEMESTER-I

| Code No. | Core Subjects |
|---|---|
| **Discipline Specific Core Theory** | |
| MHIMT 101 L | Basics of Health Informatics & Health Information Management |
| MHIMT 102 L | Hospital Administration and Healthcare Financing |
| CC 001 L | Research Methodology & Biostatistics (Core Course) |
| **Discipline Specific Core Practical** | |
| MHIMT 103 E | Fundamentals of Computer Application |
| MHIMT 104 P | Python Basics |
| CC 001 P | Research Methodology & Biostatistics (Core Course) |

| | |
|---|---|
| **Name of the Programme** | **M. Sc. Health Informatics** |
| **Name of the Subject** | **Basics of Health Informatics & Health Information Management** |
| **Subject Code** | **MHIMT 101 L** |

| | |
|---|---|
| **Learning Outcome** | • Understanding about healthcare delivery system and digital initiatives in India.<br>• Understanding about Health Information management in various settings, Good medical records and recent advances in HIM<br>• Understanding about Medical record management principles and techniques and applying them.<br>• Analyzing various organizational aspect of HIM Services<br>• Understanding and analyzing management of health data and Quality control<br>• Understanding and applying statistical techniques to process health data<br>• Understanding and analysis the need of computerized systems<br>• Understanding and applying of various record keeping techniques<br>• Understanding about Health Informatics and its impact on healthcare delivery<br>• Understanding and analysis of various Health Information Systems, interoperability among various HISs and regulatory issues<br>• Understanding and evaluating the emerging trends and future health informatics technologies<br>• Understanding and evaluate the future trends shaping the future of HI |
| **Course Outcomes** | • Develop a comprehensive understanding of healthcare systems and the role of health information in improving patient care.<br>• Gain proficiency in managing health records, including the legal aspects, documentation, and quality control.<br>• Demonstrate mastery in the use of health informatics technologies, such as EHRs, CDSS, and HIE, and ethical, legal, and regulatory issues associated with health information and informatics.<br>• Explore emerging trends in health informatics and their implications for future healthcare.<br>• Apply theoretical knowledge to practical scenarios in health information management and informatics. |

| Sr. No. | Topics | No. of Hrs. |
|---|---|---|
| 1 | **Healthcare delivery system – An Overview**<br>• Description of the organization and structure of healthcare in India<br>• Funding mechanisms in India (out of pocket, private insurance, public insurance)<br>• Digital health initiatives in India | 2 |
| 2 | **Introduction to Health Information Management**<br>• Definition, Goals & Objective, Characteristics, Purpose, Values of Health Information Management to the various users<br>• Definition, Characteristics & values of 'Good' Medical Record<br>• Required Characteristics of entries in medical Records | 3 |

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|---|---|---|
| | • Medical records in specific settings- emergency & outpatient records, Clinical Records in Long Term Care and Rehabilitation Facilities<br>• Recent Advances in Health Information Management | |
| **3** | **Medical Record Management**<br>• Numbering and Filing Systems<br>• Storage- Microfilming and Disk Storage<br>• Color Coding of Medical Records.<br>• Definition, Reason, Types, Advantages of various Storage mediums<br>• Retention of Medical Records<br>• Registers & Indexes<br>• Definition, Purpose, Contents & standard order of arrangement of various forms used to document the patient health information (including various rules involved in form designing)<br>• Types of medical records<br>• Principal Responsibilities and Duties of the Medical Record Administrator /Director | 5 |
| **4** | **Organizational Aspects of a Health Information Management Department/Services**<br>• Policies<br>• Functions<br>• Location, Space and Layout<br>• Equipment | 2 |
| **5** | **Management and Quality Control of Health Information Management**<br>• Movement and Control of various medical records in hospital and Health Information Management department & Tracking systems<br>• Various physical facilities required for the maintenance of Health Information Management,<br>• Basic rules for the handling of Health Information Management in health care facilities.<br>• Incomplete Record Control | 4 |
| **6** | **Heath Care Statistics, Data Collection & Presentation**<br>• Inpatient census and rates computed from it<br>• Ambulatory care statistics, Long term Care Statistics<br>• Processing and reporting of vital Statistics<br>• Reporting of Notifiable Diseases to Public Health Authorities | 2 |
| **7** | **Computerization of Health Information Systems**<br>• Needs of computerization<br>• Process involved in computerization<br>• Advantages and Disadvantages | 2 |
| **8** | **Introduction to Health Informatics**<br>**Overview of Health Informatics**<br>• Definition of health informatics and its evolution<br>• Importance of health information technology (IT) in modern healthcare<br>• Role of health informatics in improving patient care and organizational efficiency<br>**Key Players and Stakeholders**<br>• Identification of key stakeholders in health informatics<br>• Roles and responsibilities of healthcare providers, IT professionals, policymakers, and patients<br>• Inter professional Collaborative Practice (ICP) among stakeholders for effective health IT implementation<br>**Impact of Health Information Technology**<br>• How health IT supports patient care and enhances clinical workflows<br>• Case studies illustrating the impact of health IT on healthcare organizations | 4 |

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|---|---|---|
| | • Challenges and opportunities in adopting health IT solution | |
| **9** | **Core Topics in Health Informatics**<br>**Electronic Health Records (EHR)**<br>• Definition and components of EHR systems<br>• Benefits and challenges of EHR adoption in healthcare settings<br>• Regulatory requirements (e.g., HIPAA) and standards for EHR implementation<br>• PACS, LIS, RIS<br>**Health Information Exchange (HIE)**<br>• Importance of HIE in promoting interoperability and continuity of care<br>• Technical and policy considerations for successful HIE implementation<br>• Case studies on successful HIE initiatives and their impact on care coordination<br>**Clinical Decision Support Systems (CDSS) and Knowledge Management**<br>• Role of CDSS in enhancing clinical decision-making<br>• Knowledge management strategies for healthcare organizations<br>• Case studies on effective use of CDSS and knowledge management tools<br>**Quality of Care and Patient Safety**<br>• How health IT influences quality improvement initiatives<br>• Patient safety considerations in health IT implementation<br>• Strategies for mitigating risks associated with health IT systems<br>**Regulatory Issues and Compliance**<br>• Overview of regulatory frameworks governing health IT (e.g., GDPR, FDA regulations)<br>• Compliance requirements for healthcare organizations and technology vendors<br>• Emerging trends in health IT regulation and their impact on industry practices<br>**Systems Integration and Interoperability**<br>• Importance of systems integration in healthcare IT infrastructure<br>• Standards and protocols for achieving interoperability among healthcare systems<br>• Case studies on successful systems integration projects and their outcomes | 10 |
| **10** | **Emerging Trends and Innovations in Health Informatics**<br>**Big Data and Predictive Analytics**<br>• Definition and importance of big data in healthcare<br>• Applications of predictive analytics in clinical decision-making and population health management<br>• Ethical considerations and challenges in using big data for healthcare purposes<br>**Consumerism and Technology in Healthcare**<br>• Empowerment of patients through health IT tools (e.g., patient portals, wearable devices)<br>• Impact of consumerism on healthcare delivery and patient engagement<br>• Strategies for promoting patient-centered care through technology<br>**Virtual Health and Telemedicine**<br>• Definition and scope of virtual health and telemedicine<br>• Technologies enabling remote patient monitoring and teleconsultations<br>• Legal and regulatory considerations for virtual health services<br>**Emerging Technologies in Health Informatics**<br>• Exploration of cutting-edge technologies (e.g., artificial intelligence, blockchain) in healthcare<br>• Potential applications and benefits of emerging technologies in health informatics<br>• Ethical, legal, and social implications of adopting new technologies in healthcare | 6 |
| **11** | **Future Directions and Challenges in Health Informatics**<br>**Trends Shaping the Future of Health Informatics**<br>• Predictions for the future of health IT and informatics | 5 |

| | | |
|---|---|---|
| | • Emerging trends in research and development within the field<br>• Potential challenges and opportunities for health informatics professionals<br>**Case Studies and Practical Applications**<br>• Analysis of real-world case studies highlighting successful health IT implementations<br>• Practical applications of health informatics concepts in healthcare settings<br>• Group projects or presentations on innovative uses of health IT solutions<br>**Ethical and Social Considerations**<br>• Ethical dilemmas in health informatics practice (e.g., privacy, data security)<br>• Social implications of health IT adoption and usage<br>• Strategies for addressing ethical challenges in health informatics | |
| **Total** | | **45 hrs** |

**Bibliography:**

**Main Reference:**

1. Medical Informatics, e-Health: Fundamentals and Applications by Alain Venot, Anita Burgun, Catherine Quantin
2. Health Informatics: Multidisciplinary Approaches for Current and Future Professionals (HIMSS Book Series) by by Salvatore Volpe (Editor)
3. Demystifying Big Data and Machine Learning for Healthcare by By Prashant Natarajan, John C. Frenzel, Detlev H. Smaltz
4. Margaret A Skurka, Health Information Management
5. https://library.ahima.org/PdfView?oid=105

**Additional Reference:**

1. Edna K Huffman, Health Records Management
2. Health Information Technology, Marilyn Takahashi Fordney
3. Michelle A Green, Mary Jo Bowie, Essentials of Health Information Management – Principles and Practice
4. Fundamentals of Health Information Management 2nd Edition - Published by the Canadian Healthcare Association (CHA) in collaboration with the Canadian Health Information Management Association (CHIMA)

| | |
|---|---|
| **Name of the Programme** | **M.Sc. Health Informatics** |
| **Name of the Subject** | **Hospital Administration and Healthcare Financing** |
| **Subject Code** | **MHIMT 102 L** |

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|---|---|
| **Learning Outcome** | • Understanding the basics of Healthcare management and Economics<br>• To know the principles of organizational management in various healthcare settings<br>• Understanding and evaluating healthcare finance and budgeting<br>• To know the HR functions in a healthcare setting<br>• To know how the administrators manages clinical and no clinical services<br>• Understanding the various health insurance schemes and mechanism of financial protection<br>• Understanding the Quality Assurance (QA) and how to improve it<br>• Analyze the healthcare policies, regulations and ethical issues<br>• Understanding about the planning and maintenance of hospital infrastructure and managing support services<br>• Understanding hospital accounting |
| **Course Outcomes** | • Understand and apply healthcare management principles and policies.<br>• Analyze the financial management strategies and budgeting within healthcare organizations.<br>• Implement quality improvement and patient safety protocols.<br>• Navigate health economics, healthcare finance, and insurance systems.<br>• Develop skills in resource tracking, management, and financial auditing in the healthcare sector. |

| Sr. No. | Topics | No. of Hrs. |
|---|---|---|
| 1 | **Introduction to Healthcare Management and Economics**<br>• Definition and importance of management in healthcare<br>• Key concepts in health economics: demand, supply, production, & market models<br>• Principle of Management<br>• Roles and functions of healthcare managers<br>• Managerial skills and decision-making in healthcare<br>• Basic requirement of IT infrastructure in Hospital<br>• Health Information Management Systems (HIMS) requirements for hospitals and its components | 4 |
| 2 | **Organizational Management and Hospital Structures**<br>• Principles of organizational management in healthcare<br>• Organizational culture, values, and mission<br>• Hospital organizational structures: Government, private, and not-for-profit<br>• Management theories and their application in hospital settings<br>• Indicators in Hospital | 4 |
| 3 | **Healthcare Finance and Budgeting**<br>• Health financing functions and sources of revenue<br>• Revenue collection and government financing of health services<br>• Financial management and budgeting within healthcare organizations | 5 |

| | | |
|---|---|---|
| | • Risk pooling, financial protection, and equality in health financing | |
| **4** | **Human Resource Management in Healthcare**<br>• Overview of HR functions in healthcare settings<br>• Recruitment, training, & development of healthcare staff<br>• Leadership and team management in hospitals<br>• Legal issues and performance appraisal in healthcare HR | 4 |
| **5** | **Clinical and Non-Clinical Services Management**<br>• Overview of clinical departments: OPD, in-patients, ICU, surgical, and emergency services<br>• Management of nursing services, pharmacy, diagnostics, and patient services<br>• The role of hospital administrators in managing clinical and non-clinical services | 4 |
| **6** | **Health Insurance and Financial Protection**<br>• Concept and types of health insurance<br>• Government-funded health insurance schemes (e.g., PMJAY, Ayushman Bharat)<br>• Financial protection mechanisms through insurance<br>• The role of insurance in healthcare financing and accessibility | 4 |
| **7** | **Quality Assurance and Improvement in Healthcare**<br>• Concepts and standards of quality care<br>• Quality improvement tools and methodologies<br>• Quality assessment: Utilization management, peer review, and risk management<br>• Compliance with international standards like ISO and NABH<br>• Use of AI in Hospital Administration and in Quality Management of Healthcare | 5 |
| **8** | **Healthcare Policies, Law, and Ethics**<br>• Health law, regulations, and accreditation standards<br>• Role of IT infrastructure in Govt. policy making and healthcare data integration<br>• Ethical issues in healthcare, including patient autonomy, informed consent, and end-of-life care<br>• Medico-legal aspects in healthcare practice<br>• Compliance and auditing methods in healthcare | 5 |
| **9** | **Hospital Infrastructure and Support Services**<br>• Planning and maintaining hospital infrastructure<br>• Managing support services: Laundry, catering, cleaning, CSSD, transport, & security<br>• Biomedical engineering and equipment maintenance in hospitals<br>• Corporate governance and relationships with external institutions | 5 |
| **10** | **Accounting, Audit, and Healthcare Statistics**<br>• Accounting systems and audit procedures in healthcare<br>• Legal requirements for hospital financial reporting<br>• Hospital statistics: Analysis and reporting of hospital services and discharges<br>• Vital statistics: Collection, processing, & interpretation | 5 |
| **Total** | | **45 hrs** |

**Bibliography:**


1. Hospital Planning: Facilities Planning and Management by GD Kunders.
2. Principles Of Hospital Administration And Planning by Sakharkar
3. Hospital Administration and Human Resource Management by Sharma and Goyal
4. Hospital and Healthcare Accreditation (As Per the Guidelines of NABH, NABL, JCI) by Brajkishore Rajoriya
5. Quality Management in Hospitals by SK joshi
6. Standard Operating Procedures: For Hospital in India by Arun Agarwal
7. A Primer of Health System Economics-V.Raman Kutty

8. Guinness, Lorna, Wiseman, Virginia (2011), Introduction to Health Economics. McGraw-Hill Education (UK)
9. Dewar, D. M. (2011). Essentials of health economics. Jones and Bartlett Publishers.
10. Gottret, P. E., & Schieber, G. (2006). Health financing revisited: A Practitioner's Guide. World Bank Publications.

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| **Name of the Programme** | **M.Sc. Health Informatics** |
| **Name of the Subject** | **Fundamentals of Computer Application (Experiential)** |
| **Subject Code** | **MHIMT 103 E** |

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| **Learning Outcome** | • Understanding the fundamentals of computers<br>• To the know word processing using MS Word<br>• Understanding various functionalities of Excel<br>• To know how to make presentation using MS PowerPoint<br>• Understand the basics of DBMS<br>• To know the various functionalities of Microsoft Access database<br>• Understand the basics of computer network<br>• Understand various advanced computing technologies |
| **Course Outcomes** | • Understand the basics of computer hardware and software, various windows accessories and the functioning of the control panel<br>• Demonstrate Skill in essential Microsoft Office applications<br>• Apply database management system concepts when designing the different database objects.<br>• Demonstrate Skill in Using Computer Networks, network topologies and Devices.<br>• Understanding about emerging computer technologies like Block chain, Machine Learning. |

| Sr. No. | Topics | No of Hrs. |
|---|---|---|
| **1** | **Fundamentals of Computer**<br>• What is a Computer?<br>• Components of Computer System<br>• Types of Computers<br>• Generations of Computers<br>• Basic Operations<br>• Concept of Hardware and Software<br>• Basics of Operating System<br>• File and Directory Management<br>• Concepts of Programming Languages<br>• Introduction to Algorithms and Flowcharts | 40 |
| 2 | **Understanding Word Processing (MS Word)**<br>• Word Processing Basics<br>• Text Creation and manipulation<br>• Formatting the Text<br>• Table Manipulation<br>• Track and Accept/Reject Changes to a Document | 40 |
| **3** | **Using Spread Sheet (MS Excel)**<br>• Elements of Electronic Spread Sheet<br>• Manipulation of Cells<br>• Insert data<br>• Formulas and Function<br>• Analysis of Data<br>• Data Visualization | 45 |

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| **4** | **Making Presentation (MS PowerPoint)**<br>• Basics<br>• Creation of Presentation<br>• Preparation of Slides<br>• Presentation of Slides<br>• Slide Show | 35 |
| **5** | **Introduction to Database Management System**<br>• Introduction to databases (Definition, Importance, Applications)<br>• Types of Databases<br>• DBMS components<br>• Data Models<br>• SQL Basics<br>• Compare the flat file with the relational database management system | 40 |
| **6** | **Microsoft Access**<br>• Introduction to MS Access<br>• Filters, Forms, and Reports<br>• Writing and modifying queries<br>• Charts and Import Data<br>• Introduction to SQL | 40 |
| **7** | **Network Infrastructure**<br>• Introduction to Networking<br>• Types of Network<br>• Network Topologies<br>• Networking Devices<br>• Internet Basics | 40 |
| **8** | **Emerging Technologies**<br>• Cloud Computing concepts and models<br>• Internet of Things (IoT)<br>• Blockchain Technology basics<br>• Introduction to Artificial Intelligence and Machine Learning | 35 |
| **Total** | | **315 hrs** |

**Main reference:**


1. Easy Computer Basics- Michael Miller
2. Teach Yourself Basic Computer Skills - Moira Stephen
3. Mike McGrath, “Access in easy steps.” 2019
4. Steven Roman, “Access Database Design & Programming”,1st edition
5. “Computer Organization and Design: The Hardware/Software Interface” by David A. Patterson and John L. Hennessy
6. “Introduction to Computing Systems: From Bits & Gates to C & Beyond” by Yale N. Patt and Sanjay J. Patel
7. “Database System Concepts” by Abraham Silberschatz, Henry F. Korth, and S. Sudarshan
8. “Fundamentals of Database Systems” by Ramez Elmasri and Shamkant B. Navathe
9. “Computer Networking: A Top-Down Approach” by James F. Kurose and Keith W. Ross
10. “Data Communications and Networking” by Behrouz A. Forouzan
11. “The Art of Computer Programming” by Donald E. Knuth

**Additional reference:**

1. Microsoft Office for Dummies-Wallace Wang
2. New Perspectives Microsoft Office 365 & Excel 2019 Comprehensive
3. Andrew Couch, “Microsoft Access 2013 Plain and Simple”
4. Joyce Cox, Joan Lambert, “Step by Step Microsoft Access 2013”
5. “Computer Science: An Overview” by J. Glenn Brookshear and Dennis Brylow

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| **Name of the Programme** | **M.Sc. Health Informatics** |
| **Name of the Subject** | **Python Basics** |
| **Subject Code** | **MHIMT 104 P** |

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| **Learning Outcome** | • Understanding the basics of python programming.<br>• Understanding and using the list, ranges and tuples<br>• Understanding and using the python dictionaries and sets<br>• Understanding and using the input/ output functionalities of python<br>• Understanding and using python functions<br>• Understanding and using the concepts of Object-oriented programming<br>• Understanding and using the python exception handling functionalities<br>• Understanding and using the concept of regular expression in python |
| **Course Outcomes** | • Develop a solid understanding of Python's syntax and semantics, including data types, variables, operators, and basic control structures.<br>• Demonstrate Competency in working with Python's core data structures, including lists, ranges, tuples, dictionaries, and sets.<br>• Handle input and output operations in Python, including reading from and writing to files, and interacting with user input in a robust manner.<br>• Apply the principles of modular programming by defining and using functions, including the use of parameters, return values, and variable scope.<br>• Acquire the ability to implement object-oriented programming concepts in Python, such as classes, objects, inheritance, and polymorphism, to create reusable and maintainable code.<br>• Master the techniques for managing errors and exceptions in Python, ensuring that programs can handle unexpected situations gracefully and continue to operate correctly.<br>• Explore the use of regular expressions in Python for pattern matching and text processing, gaining the ability to handle complex string manipulation tasks. |

| Sr. No. | Topics | No. of Hrs. |
|---|---|---|
| 1 | **Introduction to Python**<br>• What is Python & the history of Python?<br>• Unique features of Python<br>• Install Python and Environment Setup<br>• First Python Program<br>• Python Identifiers, Keywords & Indentation<br>• Comments and document interlude in Python<br>• Command line arguments<br>• Getting User Input<br>• Python Data Types<br>• Python variables<br>• Python Core objects and Functions | 15 |
| 2 | **List, Ranges & Tuples in Python**<br>• Introduction<br>• Lists in Python<br>• Understanding Iterators | 10 |

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| | • Generators, Comprehensions & Lambda Expressions<br>• Understanding and using Ranges<br>• Ordered Sets with tuples | |
| **3** | **Python Dictionaries and Sets**<br>• Python Dictionaries<br>• Sets & Python Sets Examples | 10 |
| **4** | **Input and Output in Python**<br>• Reading and writing text files<br>• Writing Binary Files Manually<br>• Using Pickle to Write Binary Files | 10 |
| **5** | **Python functions**<br>• Python user-defined functions<br>• Python packages functions<br>• Defining and calling Function<br>• The anonymous Functions<br>• Loops & statements in Python<br>• Python Modules & Packages | 10 |
| **6** | **Python Object Oriented**<br>• Overview of OOP<br>• Creating Classes and Objects<br>• Accessing attributes<br>• Built-In Class Attributes<br>• Destroying Objects | 15 |
| **7** | **Python Exceptions Handling**<br>• What is an Exception?<br>• Handling an exception<br>• try….except…else<br>• try-finally clause<br>• Argument of an Exception<br>• Python Standard Exceptions<br>• Raising an exception<br>• User-Defined Exceptions | 10 |
| **8** | **Python Regular Expressions**<br>• What are regular expressions?<br>• The match Function<br>• The search Function<br>• Matching vs. searching<br>• Search and Replace<br>• Extended Regular Expressions<br>• Wildcard | 10 |
| **Total** | | **90 hrs.** |

**Bibliography:**

1. Core Python Programming, 3rd edition: Covers fundamentals to advanced topics like OOPS, Exceptions, Data structures, Files, Threads, Net by R. Nageswara Rao
2. Python: The Complete Reference by Martin C. Brown

| Name of the Programme | M.Sc. Health Informatics |
|---|---|
| Name of the Subject | Research Methodology & Biostatistics (Core Course) |
| Subject Code | CC 001 L |

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| **Learning Outcomes** | • The course is intended to give an overview of research and statistical models commonly used in medical and bio-medical sciences. The goal is to impart an intuitive, understanding and working knowledge of research designs and statistical analysis. The strategy would be to simplify, analyses the treatment of statistical inference and to focus primarily on how to specify and interpret the outcome of research. |
| **Course Outcome** | • Student will be able to understand develop statistical models, research designs with the understating of background theory of various commonly used statistical techniques as well as analysis, interpretation & reporting of results and use of statistical software. |

| Sr. No | Topic | No. of Hrs. |
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| **A** | **Research Methodology:** | **23** |
| 1 | Scientific Methods of Research: Definition of Research, Assumptions, Operations and Aims of Scientific Research. Research Process, Significance and Criteria of Good Research, Research Methods versus Methodology | 4 |
| 2 | Research Designs: Observational Studies: Descriptive, explanatory, and exploratory, Experimental Studies: Pre-test design, post-test design, Follow-up or longitudinal design, Cohort Studies, Case – Control Studies, Cross-sectional studies, Intervention studies, Panel Studies. | 5 |
| 3 | Sampling Designs: Census and Sample Survey, Need and importance for Sampling, Implications of a Sample Design, Different Types of Sample Designs (Probability sampling and non-probability sampling), How to Select a Random Sample?, Systematic sampling, Stratified sampling, Cluster sampling, Area sampling, Multi-stage sampling, Sampling with probability proportional to size, Sequential sampling. | 5 |
| 4 | Measurement in research: Measurement Scales, Sources of Error in Measurement, Tests of Sound Measurement | 3 |
| 5 | Methods of Data Collection: Types of data, Collection of Primary Data, Observation Method, Interview Method, Collection of Primary Data | 4 |
| 6 | Ethics and Ethical practice in research and plagiarism | 2 |
| **B** | **Biostatistics** | **22** |
| 7 | Data Presentation: Types of numerical data: Nominal, Ordinal, Ranked, Discrete and continuous. Tables: Frequency distributions, Relative frequency, Graph: Bar charts, Histograms, Frequency polygons, one-way scatter plots, Box plots, two-way scatter plots, line graphs | 3 |
| 8 | Measures of Central Tendency and Dispersion: Mean, Median, Mode, Range, Inter quartile range, variance and Standard Deviation, Coefficient of variation, grouped mean and grouped standard deviation (including merits and demerits). | 3 |
| 9 | Testing of Hypotheses: Definition, Basic Concepts, Procedure for Hypothesis Testing, Measuring the Power of a Hypothesis Test, Normal distribution, Important Parametric Tests including Z-test, t-test, and ANOVA | 4 |
| 10 | Chi-square Test: Chi-square as a Non-parametric Test, Conditions for the Application Chi-square test, Steps Involved in Applying Chi-square Test, Alternative Formula, Yates' Correction, and Coefficient by Contingency. | 2 |

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| 11 | Measures of Relationship: Need and meaning, Correlation and Simple Regression Analysis | 3 |
| 12 | Non-parametric or Distribution free Tests: Important Non-parametric or Distribution-free Test Sign test, Wilcoxon signed-Rank Test, Wilcoxon Rank Sum Test: Mann-Whitney U test, Kruskal Walli's test, Friedman's test, and Spearman Correlation test. | 3 |
| 13 | Vital Health Statistics: Measurement of Population: rate, crude rate, specific rate, Measurement of fertility: specific fertility rate, Total fertility rate, Reproduction rate, Gross Reproduction Rate, Net Reproduction Rate, Measures related to mortality: Crude Death Rate (CDR), Age-specific death Rate, Infant and child mortality rate, Measures related to morbidity. | 4 |
| **Total** | | **45 hrs** |

## CC 001 P–Research Methodology & Biostatistics

| Sr. No. | Topics | No. of hrs. |
|---|---|---|
| **A** | **Research Methodology** | |
| 1 | Research Article Presentation (Seminar) | 5 |
| **B** | **Biostatistics** | |
| 2 | Data Presentation | 4 |
| 3 | Measures of Central Tendency and Dispersion | 6 |
| 4 | Testing of Hypotheses | 16 |
| 5 | Chi-square Test | 4 |
| 6 | Measures of Relationship | 6 |
| 7 | Analysis of Variance | 5 |
| 8 | Non-parametric or Distribution-free Tests | 8 |
| 9 | Computer Application Using Statistical Software including SPSS | 6 |
| **Total** | | **60 hrs** |

# FIRST YEAR

## M.Sc. Health Informatics

## SEMESTER- II

| Code No. | Core Subjects |
|---|---|
| **Discipline Specific Core Theory** | |
| MHIMT 105 L | Advanced Health Informatics & HI Practicum |
| MHIMT 106 L | Clinical Workflow, Process Redesigning & Clinical Documentation Improvement (CDI) |
| MHIMT 107 L | Medical Language & International Classification of Disease Coding |
| MHIMT 108 L | Medical Transcription & Editing |
| **Discipline Specific Core Practical** | |
| MHIMT 105 E | Advanced Health Informatics & HI Practicum |
| MHIMT 107 P | Medical Language & International Classification of Disease Coding |
| MHIMT 108 P | Medical Transcription & Editing |
| MHIMT 109 P | Web Development Basics (Optional 1) |
| MHIMT 110 P | Advanced Python (Optional 2) |

| Name of the Programme | M.Sc. Health Informatics |
|---|---|
| Name of the Subject | Advanced Health Informatics & HI Practicum (Theory + Experiential) |
| Subject Code | MHIMT 105 L |

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| **Learning Outcomes** | • Understanding of various applications of Health Informatics<br>• Understanding of the consumer health informatics applications and role of health informatics professionals in protecting the privacy and confidentiality of consumers<br>• Understanding the concepts of Knowledge Base and Expert System<br>• Understand how to protect health data legally and ways of information getting released from the hospital<br>• Understanding the role of mHealth applications in healthcare and technologies/ platforms available to make robust mHealth solutions<br>• Understanding the concept of cyber security threats and vulnerabilities in healthcare and its impact on data<br>• Understanding the role of informatics in public health context<br>• Understanding the role of informatics in disaster preparedness and planning<br>• Understanding and analysis of future direction of Health informatics<br>• Understanding the work culture within Medical Record department<br>• Understanding the work culture within Quality department<br>• Understanding the work flow of insurance and claims processing<br>• Understanding the workflow of Registration and billing<br>• Understanding the work culture within IT/HIS department<br>• Understand how to process and do the analysis of healthcare data<br>• Understanding the work culture within OPD, Emergency room, Radiology Dept, Labs and In-patient wards |
| **Course Outcome** | • Understand the management of various advanced health informatics applications<br>• Interpret the application of health informatics for managing patient data and supporting healthcare professionals in making a quality decision<br>• Describe the content and features to be included in the informatics application to the application developer in making advance and expert informatics application<br>• Identify the trends and emerging technology for informatics application in healthcare settings.<br>• Recognize the future requirement using various approaches and prediction tools<br>• Develop awareness, understanding and capacity in the specific roles and responsibilities of a health information management professional<br>• Understand through an intensive experience the nature of hospitals and health care settings as workplaces and their associated values, routines and cultures<br>• Develop skill and professional capacity for managing the health information system of a health care setting<br>• Develop competency to plan, implement, and carry out a clinical audit |

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| | in the quality assurance cell<br>• Demonstrate competency to plan, implement, and carry out a claims processing in the health insurance department |

| Sr. No. | Topics | No. of Hrs. |
|---|---|---|
| 1 | **Applications of Health Informatics**<br>• Features and functionality of the administrative, clinical, and nursing modules of the hospital information system<br>• EHR adoption model<br>• Strategies for implementing various electronic health records for the management of patient clinical data<br>• Analyze the global scenario of telemedicine in providing healthcare to the outreach community<br>• Barriers in implementing telemedicine in Indian Scenario<br>• Understanding eHealth market segments using examples and case studies<br>• Benefits and current trends of eHealth Applications<br>• Role of health informatics professionals in implementing eHealth applications and Telemedicine | 5 |
| 2 | **Consumer Health Informatics**<br>• Role of informatics application in the empowerment of healthcare consumers<br>• Methodology used for the assessment of validity and reliability of online health information<br>• Role of health informatics professionals in protecting the privacy and confidentiality of consumer health information | 5 |
| 3 | **Knowledge Base and Expert System**<br>• Role of Artificial Intelligence (AI) in managing patient data<br>• Classification and comparison of the various Knowledge-Based Expert Systems, highlighting the features and functionality<br>• Rationale for a knowledge-based expert system in healthcare<br>• Functions of a clinical decision support system<br>• Advantages and disadvantages of clinical decision support system | 5 |
| 4 | **Protection of Healthcare Information**<br>• Legal implication in implementing informatics application in healthcare<br>• Various methodologies for legally protecting the health information maintained in an automated system<br>• Ways in which information is getting released from a hospital to various stakeholders<br>• Role of HIPPA in releasing and protecting patient data<br>• Analysis of various reengineering processes a hospital should comply with in protecting the patient data<br>• Role of a Health Information Management Professional in protecting patient data | 5 |
| 5 | **mHealth Applications in Healthcare**<br>• Introduction to mHealth<br>  • Definition and scope of mHealth<br>  • Historical evolution of mHealth<br>  • Benefits and challenges of mHealth applications<br>• mHealth Technologies and Platforms<br>  • Overview of mobile devices and platforms<br>  • Sensors and wearables in mHealth | 5 |

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| | • Mobile applications and software development kits (SDKs)<br>• Integration with electronic health records (EHRs)<br><br>• Design and Development of mHealth Applications<br>• User-centered design principles<br>• Usability and accessibility in mHealth apps<br>• Prototyping and development tools<br>• Testing and evaluation methods<br><br>• Implementation and Evaluation of mHealth interventions<br>• Implementation strategies and frameworks<br>• Monitoring and evaluation metrics<br>• Data collection and analysis methods | |
| **6** | **Cybersecurity in Healthcare**<br>• Introduction to Healthcare Cybersecurity<br>• Overview of cybersecurity in healthcare<br>• Common cybersecurity threats and vulnerabilities<br>• Impact of cyber-attacks on healthcare organizations<br>• Regulatory and compliance requirements (HIPAA, GDPR)<br><br>• Risk Management and Mitigation Strategies<br>• Risk assessment methodologies<br>• Developing a risk management plan<br>• Incident response and disaster recovery<br>• Best practices for mitigating cybersecurity risks<br><br>• Emerging Trends and Future Directions in Healthcare Cybersecurity<br>• Artificial Intelligence (AI) and Machine Learning (ML) in cybersecurity<br>• Blockchain technology for securing health data management<br>• Future challenges and opportunities | 5 |
| **7** | **Informatics in Public Health Practice**<br>• Introduction to public health informatics<br>• Definition and significance of public health informatics<br>• Historical development and evolution of the field<br>• Key theories and models in public health informatics<br>• Health Information Systems for Public Health<br>• Design and implementation of public health information systems<br>• Integration of public health and clinical data<br>• Geographic Information Systems (GIS) in Public Health<br>• Applications of GIS in public health research and practice<br>• Mapping and spatial analysis of health data | 5 |
| **8** | **Informatics in Emergency Preparedness and Response**<br>• Disaster Preparedness and Informatics<br>• Informatics tools for disaster preparedness and planning<br>• Case studies of informatics in disaster response<br>• Real-time Data Systems in Emergencies<br>• Real-time data collection and analysis during public health emergencies<br>• Role of informatics in emergency decision-making<br>• Communication and Coordination<br>• Informatics solutions for improving communication and coordination during | 5 |

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| | emergencies<br>• Use of social media and digital platforms in emergency response | |
| **9** | **Future Direction of Healthcare Informatics**<br>• Trends used in predicting the development of healthcare informatics<br>• Reasons and types of future study for predicting the growth and impact of health informatics application | 5 |
| | **HI Practicum** | |
| **10** | **Medical Records Department**<br>• To carry out diagnostic coding of the files in the department<br>• Evaluate the accuracy of diagnostic and procedural coding<br>• Analysis of statistical data for decision making<br>• Implement provider querying techniques to resolve coding discrepancies<br>• Verify, analyze and validate the accuracy and completeness of health records data.<br>• To know the process of transition from paper to electronic health records | 40 |
| **11** | **Quality Management Department**<br>• Apply quality management tools to analyse data<br>• Perform quality assessment including quality management, data quality<br>• Manage coding audits<br>• Construct and maintain the standardization of data quality to meet the needs of the enterprise<br>• Demonstrate compliance with internal and external data quality requirements<br>• Carry out procedures to monitor abuse or fraudulent trends | 30 |
| **12** | **Insurance and Claims Processing**<br>• Manage the use of clinical data required by various payment and reimbursement systems<br>• Take part in selection and processes for insurance claims management<br>• Apply information operability and information exchange with other sections of the enterprise | 40 |
| **13** | **Registration and Billing**<br>• Communicate with patients about details on patient-centered health information<br>• Assist in the processes for revenue cycle management and reporting | 30 |
| **14** | **Information Technology (IT) / Hospital Information System (HIS) Department**<br>• Determine the requirement of Health Information Technology in the Healthcare setups for their practice<br>• Carry out assessment of information need among the end users<br>• Evaluate the types of information and software platform required for developing the Healthcare IT Solution<br>• Validate the developed IT solution based on the standards technical criteria<br>• Implement the hand-on training program to make end users understand about the IT solution for successful implementation<br>• Take part in the implementation process of the IT system<br>• Design, Develop and Implement the tool for post-implementation satisfaction survey<br>• Create a channel or system to conduct frequent audits and collect the periodic requirement of end users | 40 |
| **15** | **Processing and Analytics of Healthcare Data**<br>• Identify the requirement of data analytics among the end users<br>• Apply data analytics concepts to identify the best analytics tool required for satisfying the analytics requirement<br>• Create a platform to integrate and implement the analytics tool into the Healthcare IT Solution | 20 |

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| | • Construct and Validate the analytic techniques to ensure quality analysis of collected data<br>• Demonstrate compliance with internal and external data and statistical requirements<br>• Implement a channel to collect the future requirement of analytics from the end users | |
| **16** | **OPD, Emergency room, Radiology Dept, Labs and In-patient wards**<br>• To familiarize with the clinical workflow and the process of documentation of medical records<br>• To understand implementation of EMR, PACS, LIS, RIS and other health informatics tools | 25 |
| **Total** | | **270 hrs** |

**Main Reference:**


1. Michelle A Green, Mary Jo Bowie Essentials of Health Information Management – Principles and Practice. Thomson Delmer Learning
2. Englebardt & Nelson, Healthcare Informatics- An interdisciplinary Approach
3. Marison J Ball, Morris F Collen, Aspects of the Computer Based Patient Record. Springer-Verlag
4. Mohan Bansal. Medical Informatics: A Primer. TMH 2003.


**Additional Reference:**


1. Paul Taylor. From Patient data to medical knowledge: The principles and Practice of Health Informatics. Blackwell Publication
2. Sue Whetton. Health Informatics – A socio technical Perspective. Oxford University Press
3. Susan H, Sue Biedermann. Introduction to Health Informatics. AHIMA
4. "mHealth: New horizons for health through mobile technologies" - World Health Organization
5. "The impact of mobile health interventions on chronic disease outcomes in developing countries" - Journal of Telemedicine and Telecare
6. "Mobile Health (mHealth) Technologies and Applications" - Health Information Science and Systems
7. "Integration of Mobile Health Applications in Health Information Systems: Challenges and Solutions" - Journal of Medical Internet Research
8. "User-Centered Design of mHealth Apps: Perspectives from Healthcare Professionals and Patients" - JMIR mHealth and uHealth
9. "Evaluating Mobile Health Applications: Enhancing the Quality and Impact of mHealth Solutions" - Journal of Biomedical Informatics
10. "Implementing mHealth Interventions: Successes, Challenges, and Lessons Learned" - Global Health Action
11. "Evaluation Framework for mHealth Interventions: A Systematic Review" - Journal of Medical Internet Research
12. "Cyber security in Healthcare: A Comprehensive Review of Threats and Solutions" - Health Services Management Research
13. "Understanding the Cyber security Threat Landscape in Healthcare" - Healthcare Informatics Research
14. "Risk Management in Healthcare Cyber security: A Guide for Healthcare Organizations" - Journal of Healthcare Risk Management
15. "Mitigating Cyber security Risks in Healthcare: Strategies and Solutions" - Journal of Cyber security
16. "The Role of Artificial Intelligence in Healthcare Cyber security" - Journal of Artificial Intelligence Research
17. "Blockchain for Health Data and Its Potential Use in Health IT and Health Care Related Research" - ONC Report

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|---|---|
| **Name of the Programme** | **M.Sc. Health Informatics** |
| **Name of the Subject** | **Clinical Workflow, Process Redesigning & Clinical Documentation Improvement (CDI)** |
| **Subject Code** | **MHIMT 106 L** |

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| **Learning Outcomes** | • Understand the basics of clinical workflow and process redesign and its impact on healthcare delivery<br>• Understand the workflow analysis methods and tools<br>• Analyze the root causes of clinical workflow problems<br>• Understand the impact of change within a healthcare organization<br>• Understand the role of technology in clinical workflow optimization<br>• Design an action plan for clinical process redesign<br>• Understand the Lean and Six Sigma tools for process improvement<br>• Understand the CDI program<br>• Understand the main focus areas of CDI specialist and required competencies<br>• Understand the general process of CDI<br>• Understand the implication of CDI in an inpatient setting<br>• Understand the association between CDI an PSI<br>• Understand the implication of CDI in an outpatient setting<br>• Understand the different types of CDI metrics |
| **Course Outcome** | • Understand the concepts and importance of clinical workflow and process redesign, including the role of Clinical Documentation Improvement (CDI) programs and CDI specialists.<br>• Identify focus areas for medical documentation improvements and the benefits of CDI programs.<br>• Apply workflow analysis techniques to evaluate and document clinical processes, creating process maps to visualize workflows.<br>• Identify bottlenecks, inefficiencies, and areas for improvement in clinical processes, and apply knowledge of CDI metrics to measure improvement outcomes.<br>• Develop & Implement a plan for clinical process redesign, incorporating change management strategies to facilitate workflow optimization.<br>• Apply various processes of a CDI program in both inpatient and outpatient settings, leveraging technology to enhance clinical workflow.<br>• Evaluate the role of technology in clinical workflow enhancement and apply CDI principles to improve documentation practices and quality metrics. |

| Sr. No. | Topics | No. of Hrs. |
|---|---|---|
| 1 | **Introduction to Clinical Workflow and Process Redesign**<br>• Overview of clinical workflow and its impact on healthcare delivery<br>• Principles of process improvement and redesign<br>• Ethical considerations in workflow redesign | 3 |
| 2 | **Workflow Analysis Techniques** | 4 |

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| | • Workflow analysis methods and tools<br>• Process mapping and value stream mapping<br>• Time-motion studies and observation techniques<br>• Data collection and analysis for workflow assessment | |
| **3** | **Identifying Inefficiencies and Bottlenecks**<br>• Identifying common bottlenecks and inefficiencies in clinical workflows<br>• Analyzing root causes of workflow problems<br>• Human factors and ergonomics in workflow redesign | 3 |
| **4** | **Change Management in Workflow Redesign**<br>• Understanding change management principles and frameworks<br>• Strategies for engaging stakeholders and managing resistance to change<br>• Communication and training in workflow redesign initiatives | 3 |
| **5** | **Technology and Workflow Optimization**<br>• Role of technology in clinical workflow optimization<br>• Electronic health records (EHR) and clinical decision support systems<br>• Mobile health technologies and their impact on workflow<br>• Integration of technology with clinical processes | 3 |
| **6** | **Implementation of Workflow Redesign**<br>• Developing an action plan for clinical process redesign<br>• Pilot testing and evaluation of redesigned workflows<br>• Monitoring and sustaining workflow improvements<br>• Measuring outcomes and evaluating the impact of redesign efforts | 4 |
| **7** | **Lean and Six Sigma Methodologies**<br>• Introduction to Lean and Six Sigma principles<br>• DMAIC (Define, Measure, Analyse, Improve, Control) framework<br>• Applying Lean and Six Sigma tools for process improvement | 4 |
| **8** | **Introduction to Clinical Documentation Improvement (CDI)**<br>• Define a CDI program<br>• Main requirements of CDI<br>• CDI Program outcomes<br>• Outline the impact of CDI and the role of a CDI specialist | 3 |
| **9** | **Focus areas of a CDI specialist**<br>• Nine focus areas of a CDI program<br>• Important aspects of each focus areas: Laterality, Disease pathophysiology, Combination codes, Encounter timing, Identification of trimester, disease specificity, alcohol and drug abuse, expansion of injury codes and post-procedural disorders<br>• Competency required for CDI specialist | 3 |
| **10** | **CDI program general process**<br>• CDI program general process: Assessment, Implementation, Maintenance, track results<br>• Medical record Audit areas in CDI | 3 |
| **11** | **CDI in an Inpatient setting**<br>• Overview of glossary terms<br>• Overview about DRGs and CMI<br>• Overview about Comorbidities and complications<br>• Overview about severity of illness and Risk of mortality<br>• CDI responsibilities | 3 |
| **12** | **CDI and Patient Safety indicators**<br>• Overview of patient safety indicator (PSI) module<br>• Demonstrate the applications of patient safety and adverse event composite<br>• Association of CDI and PSI | 3 |

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| **13** | **CDI in an outpatient (OP) setting**<br>• Overview of outpatient CDI<br>• Relevance and benefits of OP CDI<br>• Different aspects of HCC coding and risk adjustment factor<br>• CDI for an emergency department | 3 |
| **14** | **CDI Metrics**<br>• Introduction on CDI metrics<br>• Different types of CDI metrics<br>• CDI Metrics for success<br>• Common key performance of CDI metrics | 3 |
| **Total** | | **45 hrs** |

**Main Reference:**


1. Clinical Informatics Study Guide by John T. Finnell, Brian E. Dixon (Chapter – 10)
2. Cognitive Informatics: Reengineering Clinical Workflow for Safer and More Efficient Care by Kai Zheng, Johanna Westbrook, Thomas G. Kannampallil, Vimla L. Patel
3. Clinical Documentation Improvement, Principle and Practice. Pamela Carroll Hess, MA, RHIA, CCS, CDIP, CPC, AHIMA Press, ISBN 978-1-58426-502-3.
4. Clinical Documentation Improvement Toolkit, AHIMA Product No.: ONB201016, ISBN: 9781584265382


**Additional Reference:**


1. The Essential CDI Guide to Provider Queries. Marian Kruse, Jennifer Cavagnac. Acdis product: ISBN-13: 978-1683080848
2. Bridging the Gap between Coding and Clinical Documentation Improvement (CDI). Anneleah W Bridges. Kindle edition.

| Name of the Programme | M.Sc. Health Informatics |
|---|---|
| Name of the Subject | Medical Language & International Classification of Disease Coding (Theory + Practical) |
| Subject Code | MHIMT 107 L |

| | |
|---|---|
| **Learning Outcomes** | • Understand the basics of medical terms<br>• Understand the stem words/Root<br>• Understand the prefix and suffix<br>• Understand the terms related to the human body<br>• Understand the Muscular system<br>• Understand the skeletal system<br>• Understand the cardiovascular system<br>• Understand the integumentary system<br>• Understand the respiratory system<br>• Understand the gastro intestinal system<br>• Understand the Genito-urinary system<br>• Understand the Endocrine System<br>• Understand the Nervous System<br>• Understand various psychiatric disorders<br>• Understand about the sensory organs<br>• Understand the multi-system diseases<br>• Understand and apply the ICD coding<br>• Understand various nomenclatures and classification systems<br>• Understand about the common healthcare procedure coding system |
| **Course Outcome** | • Identify standard medical abbreviations and clinical terminologies.<br>• Describe medical terminologies and their components, including stem words/root, prefixes, and suffixes.<br>• Explain the concepts of body systems and identify the terminologies related to body systems, diseases, diagnostic, therapeutic tests, and procedures.<br>• Enumerate surgical procedures, diseases, disorders, and dysfunctions.<br>• Develop competency in writing medical terms correctly.<br>• Identify appropriate clinical classification systems, including the International Classification of Diseases (ICD) coding system.<br>• Apply the disease classification system effectively within health information systems.<br>• Explain how the disease classification system integrates with health information systems and supports healthcare data management. |

| Sr. No. | Topics | No. of Hrs. |
|---|---|---|
| 1 | **Introduction**<br>Origin of medical terms historical perspective<br>Various uses and application of medical terms<br>Purpose of learning medical terminology | 2 |

| | | |
|---|---|---|
| | Components of Medical Terms (Prefixes & Suffixes)<br>Roots and Combining forms<br>External Anatomy and Internal Anatomy<br>Additional Lists and their combining forms grouped as:<br>• Verbs<br>• Adjectives<br>• Body Fluids<br>• Body Substances<br>• Chemicals<br>• Colors<br>• Phobias | |
| 2 | **Stem Words/Root**<br>• Musculo-skeletal system<br>• Respiratory system<br>• Cardiovascular system<br>• Digestive system<br>• Endocrine system<br>• CNS system<br>• Urinary system<br>• Reproductive system<br>• Organs of special sense<br>• Integumentary system | 2 |
| **3** | **Prefix and Suffix**<br>Prefixes<br>• Definition, Various Prefixes, meaning and example terms<br>• Pseudo Prefixes – meaning & Example terms<br>Suffixes<br>• Definition & Types of suffixes<br>• Various Suffixes, meaning and example terms | 2 |
| **4** | **Terms Relating to the Body as a Whole**<br>• Study of the Body<br>• Basic Structures<br>• Cells<br>• Tissues<br>• Organs<br>• Systems<br>• Directions<br>• Anatomic Planes and Position | 2 |
| **5** | **The Skeletal System**<br>• Pathologic conditions (Inflammations and Infections)<br>• Hereditary, Congenital and Developmental Disorders<br>• Fractures<br>• Metabolic and Deficiency Diseases<br>• Symptomatic Terms<br>• Diagnostic Terms<br>• Oncology Terms<br>• Operative Terms<br>• Laboratory Tests and Procedures<br>• Standard Abbreviations | 5 |
| **6** | **The Muscular System**<br>• Pathologic Conditions | 3 |

| | | |
|---|---|---|
| | • Degenerative and Neurological Disorders<br>• Hereditary, Congenital and Developmental Disorders<br>• Symptomatic Terms<br>• Diagnostic Terms<br>• Oncology Terms<br>• Operative Terms<br>• Laboratory Tests and Procedures.<br>• Standard Abbreviations | |
| **7** | **Integumentary System**<br>• Pathologic Conditions<br>• Fungal, Viral and Parasitic Infections<br>• Hereditary, Congenital and Developmental Disorders<br>• Symptomatic Terms<br>• Diagnostic Terms<br>• Oncology Terms<br>• Operative Terms<br>• Laboratory Tests and Procedures | 3 |
| **8** | **The Cardiovascular system**<br>• Pathological Conditions<br>• Hemorrhages and related Conditions<br>• Hereditary, Congenital and Developmental Disorders<br>• Symptomatic Terms<br>• Diagnostic terms<br>• Oncology Terms<br>• Operative Terms<br>• Laboratory Tests and Procedures<br>• Standard Abbreviations | 3 |
| **9** | **The Respiratory System**<br>• Pathologic Conditions<br>• Symptomatic Terms<br>• Diagnostic Terms<br>• Oncology Terms<br>• Operative Terms<br>• Laboratory Tests and Procedures<br>• Standard Abbreviations | 3 |
| **10** | **The Gastro-Intestinal System**<br>• Pathologic Conditions<br>• Hereditary, Congenital and Developmental Disorders<br>• Symptomatic Terms<br>• Diagnostic Terms<br>• Oncology Terms<br>• Surgical Procedures<br>• Laboratory Tests and Procedures<br>• Standard Abbreviations | 3 |
| **11** | **The Genito-Urinary System**<br>Urinary Tract<br>• Pathologic Conditions<br>• Hereditary, Congenital and Developmental Disorders<br>• Symptomatic Terms | 3 |

| | | |
|---|---|---|
| | • Diagnostic Terms<br>• Oncology<br>• Surgical Procedures<br>• Laboratory Tests and Procedures<br>• Standard Abbreviations<br>Male Reproductive Organs<br>• Hereditary, Congenital and Developmental Disorders<br>• Sexually Transmitted Disorders (STD)<br>• Symptomatic Terms<br>• Diagnostic Terms<br>• Operative Procedures<br>Female Reproductive Organs<br>• Hereditary, Congenital and Developmental Disorders<br>• Sexually Transmitted Disorders (STD)<br>• Symptomatic Terms<br>• Diagnostic Terms<br>• Operative Procedures<br>• Laboratory tests and Procedures | |
| **12** | **The Endocrine System**<br>(Pituitary-Anterior & Posterior: Hypothalamus; Thyroid; Parathyroid; Adrenal-Cortex and Medulla; Pineal body; Pancreas; Gonads-Ovaries & Testes & Thymus)<br>• Pathologic Conditions<br>• Hereditary, Congenital and Developmental Disorders<br>• Symptomatic Terms<br>• Diagnostic Terms<br>• Oncology<br>• Surgical Procedures<br>• Laboratory Tests and Procedures Standard Abbreviations | 3 |
| **13** | **The Nervous System**<br>• Neurological Disorders<br>• Pathologic conditions<br>• Hereditary Congenital and Developmental Disorders<br>• Circulatory Disturbances<br>• Other Organic Abnormalities<br>• Oncology<br>• Diagnostic Terms<br>• Surgical and other Procedures<br>• Laboratory Tests and Procedures | 3 |
| **14** | **Psychiatric Disorders**<br>Psychiatric Disorders<br>Other Descriptive and Diagnostic Terms, Various Tests | 3 |
| **15** | **The Sensory Organs**<br>Sense of Vision<br>• Pathologic conditions<br>• Hereditary, Congenital and Developmental Disorders<br>• Diagnostic Terms<br>• Operative terms<br>• Oncology<br>• Vision Tests and Procedures<br>Sense of Hearing<br>• Pathologic condition<br>• Hereditary, Congenital and Developmental Disorders<br>• Oncology | 3 |

| | | |
|---|---|---|
| | • Surgical Procedures<br>• Hearing Tests<br>Sense of Smell<br>• Pathologic and Other terms<br>• Laboratory Tests | |
| **16** | **Multi-System Diseases**<br>• Inflammations and Infections<br>• Symptomatic Terms<br>• Diagnostic Terms<br>• Laboratory Tests and Procedures | 3 |
| **17** | **Introduction to ICD**<br>International Classification of Diseases (ICD-10), Surgical Procedures and SNOMED-CT | 2 |
| **18** | **Nomenclatures and Classification Systems**<br>1. Standard Nomenclatures of diseases (SNDO)<br>2. Current Medical Information Terminology<br>3. Systematized Nomenclature of Pathology (SNOP)<br>4. Systematized Nomenclature of Medicine (SNOMED)<br>5. Common Procedures Coding System (HCPCS)<br>6. Current Procedural Terminology<br>7. International Classification of Functioning, Disability and Health (ICF)<br>8. Case-Mix Classifications<br>9. Diagnosis Related Groups(DRG)<br>10. ICD – 10 (CM)<br>11. ICD – 11<br>12. ICD – Oncology (ICD – O) | 27 |
| **19** | **Healthcare Common Procedure Coding System**<br>Coding of final diagnosis and secondary diagnosis.<br>Disease and operation nomenclatures, International Classification of Disease 10, International Classification of Disease – 9CM indexing of patient care data<br>Introduction and usage of International Classification of Disease in practical's<br>International Classification of Diseases<br>ICD-11, ICD-10 CM (Surgical Procedures)<br>CPT – Current Procedural Terminology (Introduction)<br>HCPCS – Healthcare Common Procedure Coding System (Introduction)<br>ICD-11 - Alpha-numeric coding<br>• Volume 1 – Tabular list<br>• Volume 2 – Instruction manual<br>• Volume 3 – Alphabetical Index<br>Classification of Diseases according to Clinical Pertinence<br>ICD-10 CM (Procedure) coding – International Classification of Diseases – Clinical modification<br>CPT – Introduction of CPT and HCPCS – 3 levels of codes SNOMED-CT | 30 |
| **Total** | | **105 hrs** |

**Main Reference:**


1. Medical Terminology; A system Approach- Barbara. A. Gylys, Mary Ellen Wedding
2. Language of Medicine: A Write-in text Explaining Medical Terms - Chabner Davi-Ellen
3. Pathologic basis of Disease – Robins
4. The language of Medicine - Saunders Pub
5. Essential of Human Diseases and Conditions - Margaret Schell Frazier
6. ICD-10-CM 2024
7. https://icd.who.int/browse/2024-01/mms/en#1435254666

| Name of the Programme | M.Sc. Health Informatics |
|---|---|
| Name of the Subject | Medical Transcribing & Editing (Theory + Practical) |
| Subject Code | MHIMT 108 L |

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|---|---|
| **Learning Outcomes** | • Understand the basics of Health Information Transcribing<br>• Understanding and apply the principles of Medical Transcribing<br>• Understanding and application of Medical editing and Proofreading<br>• Understanding the utilization of NLP and Transcription software<br>• Understanding the Medical Transcription outsourcing market in India, government policies and regulations<br>• Understand the Current/future trends and challenges in the Medical Transcription industry |
| **Course Outcome** | • Understand medical report formats, transcription principles, editing and proofreading rules specific to medical content.<br>• Develop skill and knowledge to accurately transcribe and edit health-related information<br>• Demonstrate Skill in using natural language processing and other transcription software and applications in Medical Transcribing. |

| Sr. No. | Topics | No. of Hrs. |
|---|---|---|
| **1** | **Health Information Transcribing**<br>• Overview of Health Information Transcribing, historical evolution, and significance in healthcare documentation<br>• Growth of Medical Transcription industry over the years<br>• Technological advancements that have influenced the growth of Medical Transcription | 5 |
| 2 | **Medical Transcription Principles**<br>• Listening skills and techniques for effective transcription<br>• Typing proficiency and speed building exercises<br>• Utilization of transcription equipment and software tools<br>• Transcription conventions, formatting guidelines, and practice sessions on transcribing different types of medical reports | 25 |
| **3** | **Medical Editing & Proofreading**<br>• Importance of editing and proofreading in Medical Transcription<br>• Common errors in Medical Transcription and strategies to avoid them<br>• Grammar and punctuation rules specific to medical content, practice sessions on editing and proofreading medical reports<br>• Edit and proofread a set of medical reports and provide feedback | 15 |
| **4** | **Utilizing Natural Language Processing & Transcription Software**<br>• Introduction to Natural Language Processing (NLP) and its applications in healthcare<br>• Overview of popular transcription software and applications, hands-on training on using transcription software for efficiency and accuracy<br>• Integration of NLP tools for automated transcription and editing, troubleshooting common issues with transcription software<br>• Practice transcribing and editing using transcription software | 30 |
| **5** | **Outsourcing and Government Policies** | 10 |

| | | |
|---|---|---|
| | • Outsourcing of MT work: Pros & cons<br>• Growth of Medical Transcription outsourcing industry globally<br>• Overview of the Medical Transcription outsourcing market in India, government policies and regulations<br>• Analyse a case study on compliance requirements and standards for Medical Transcription service providers | |
| **6** | **Industry Trends and Future Outlook**<br>• Current trends and challenges in the Medical Transcription industry<br>• Emerging technologies and their impact on Medical Transcription<br>• Career opportunities and pathways in Medical Transcription, future outlook and potential developments | 5 |
| **Total** | | **90 hrs** |

**Main Reference:**

1. Medical Transcription: Techniques, Technologies, and Editing Skills by Alice G. Ettinger and Blanche Ettinger
2. Medical Transcription: Techniques and Procedures by Marcy O. Diehl
3. The AAMT Book of Style for Medical Transcription" by American Association for Medical Transcription (AAMT)

**Additional References**

1. Online resources for medical terminology and anatomy
2. Transcription software manuals and tutorials
3. Journals and research articles on health information management and transcription

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|---|---|
| **Name of the Programme** | **M.Sc. Health Informatics** |
| **Name of the Subject** | **Web Development Basics (Practical)** |
| **Subject Code** | **MHIMT 109 P** |

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|---|---|
| **Learning Outcomes** | • Understand the web development basics<br>• Understanding and application of HTML and CSS<br>• Understanding the basic of JavaScript<br>• Understanding and application of advanced JavaScript<br>• Understanding and application of Version Control and Git<br>• Understanding and application of Back-End Development Basics<br>• Understanding and application of Full-Stack Development<br>• Apply the concept of web development for Planning and Designing a Web Project |
| **Course Outcome** | • Understand the fundamental concepts of web development.<br>• Demonstrate skill in front-end and back-end web development.<br>• Develop Skill to create responsive and dynamic websites. |

| Sr. No. | Topics | No. of Hrs. |
|---|---|---|
| **1** | **Introduction**<br>Overview of Web Development:<br>• Difference between front-end and back-end development<br>• Roles and responsibilities of a web developer<br>How the Web Works:<br>• Understanding clients, servers, and browsers<br>• HTTP/HTTPS protocols<br>• DNS and domain names<br>Web Development Tools and Environments:<br>• Text editors (VS Code, Sublime Text)<br>• Browsers and developer tools<br>• Version control systems (Git)<br>Setting Up a Development Environment:<br>• Installing necessary software (Node.js, Git)<br>• Basic command line usage | 4 |
| 2 | **HTML and CSS**<br>HTML Basics:<br>• Structure of an HTML document<br>• Common HTML elements (headings, paragraphs, links, images)<br>• Attributes and their usage<br>Advanced HTML:<br>• Forms and form elements<br>• Tables and their structure<br>• Embedding multimedia (audio, video)<br>CSS Basics:<br>• CSS syntax and selectors<br>• Styling text, colors, and backgrounds<br>• Box model and layout<br>Advanced CSS:<br>• Flexbox and Grid layout systems<br>• Responsive design principles<br>• CSS animations and transitions | 10 |

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|---|---|---|
| **3** | **JavaScript Fundamentals**<br>Introduction to JavaScript:<br>• JavaScript syntax and basic constructs<br>• Variables, data types, and operators<br>Control Structures:<br>• Conditional statements (if, else, switch)<br>• Looping constructs (for, while, do-while)<br>Functions and Scope:<br>• Defining and invoking functions<br>• Function scope and closures<br>DOM Manipulation:<br>• Selecting and modifying DOM elements<br>• Event handling and listeners | 10 |
| **4** | **Advanced JavaScript**<br>JavaScript Objects and Arrays:<br>• Creating and manipulating objects<br>• Array methods and iteration<br>Asynchronous JavaScript:<br>• Understanding callbacks<br>• Promises and async/await<br>JavaScript Frameworks:<br>• Introduction to React, Angular, or Vue.js<br>• Building components and managing state<br>Building Interactive Web Applications:<br>• Form validation<br>• Dynamic content updates | 10 |
| **5** | **Version Control and Git**<br>Introduction to Version Control Systems:<br>• Importance of version control<br>• Basic concepts (repository, commit, branch)<br>Basic Git Commands:<br>• Initializing a repository<br>• Cloning, committing, pushing, and pulling<br>Branching and Merging:<br>• Creating and managing branches<br>• Merging changes and resolving conflicts<br>Collaborating on Projects:<br>• Using GitHub for collaboration<br>• Pull requests and code reviews | 6 |
| **6** | **Back-End Development Basics**<br>Introduction to Server-Side Programming:<br>• Understanding server-side vs. client-side<br>• Introduction to Node.js<br>Setting Up a Server:<br>• Installing and configuring Node.js<br>• Creating a basic server<br>Working with Databases:<br>• Introduction to SQL and NoSQL databases<br>• CRUD operations (Create, Read, Update, Delete)<br>RESTful APIs:<br>• Designing and implementing RESTful APIs<br>• Handling requests and responses | 10 |
| **7** | **Full-Stack Development**<br>Integrating Front-End and Back-End:<br>• Connecting front-end with back-end services | 40 |

| | | |
|---|---|---|
| | • Fetching and displaying data<br>Building a Simple Full-Stack Web Application:<br>• Project setup and structure<br>• Implementing features and functionality<br>• Testing and debugging<br>Web Security:<br>• Basic security principles<br>• Authentication and authorization<br>Deployment:<br>• Hosting options (Heroku, Netlify)<br>• Deploying web applications<br>Presenting the Project:<br>• Preparing a project presentation<br>• Demonstrating features and functionality | |
| **Total** | | **90 hrs** |

**Bibliography:**


1. Duckett, J. (2011). HTML and CSS: Design and Build Websites. Wiley.
2. Duckett, J. (2014). JavaScript and JQuery: Interactive Front-End Web Development. Wiley.
3. Hartl, M. (2019). Ruby on Rails Tutorial: Learn Web Development with Rails. Addison-Wesley.
4. Version Control with Git, 3rd Edition by Prem Kumar Ponuthorai, Jon Loeliger
5. Node Cookbook: Discover solutions, techniques, and best practices for server-side web development with Node.js 14 by Bethany Griggs
6. The Road to React: The React.js with Hooks in JavaScript Book (2024 Edition) by Robin Wieruch (Author)
7. React Key Concepts: Consolidate your knowledge of React's core features 1st Edition, by Maximilian Schwarzmüller (Author)
8. https://github.com/tdonker/REST-API-books
9. Full Stack Web Development: The Comprehensive Guide (Grayscale Indian Edition) by Philip Ackermann (Author)
10. MASTERING HTML, CSS & Java Script Web Publishing by Laura Lemay , Rafe Colburn, Jennifer Kyrnin

| Name of the Programme | M.Sc. Health Informatics |
|---|---|
| Name of the Subject | Advanced Python (Practical) |
| Subject Code | MHIMT 110 P |

| | |
|---|---|
| **Learning Outcomes** | • Understand how to set up the python environment<br>• Understand the concept of multithreaded programming in Python<br>• Understand the database connectivity in Python<br>• Understanding about the various python packages required for Data analysis |
| **Course Outcome** | • Understanding the core principles and exploring advanced features and libraries of Python,<br>• Develop ability to implement multithreaded programs in Python, intricacies of concurrent execution and thread management to improve application performance.<br>• Demonstrate Skill in using Python for database interactions, including connecting to databases, executing queries, and managing data using libraries such as SQLite, MySQL, and Postgre SQL.<br>• Utilize Python for data analysis tasks, including data manipulation, statistical analysis, and visualization using libraries such as NumPy, pandas, and Matplotlib. |

| Sr. No. | Topics | No. of Hrs. |
|---|---|---|
| 1 | **Setting Python Environment**<br>• Install Python and Environment Setup<br>• Introduction to Integrated development (IDE) environment<br>• Jupyter Notebook | 10 |
| 2 | **Python Multithreaded Programming**<br>• What is multithreading?<br>• Starting a New Thread<br>• The Threading Module<br>• Synchronizing Threads<br>• Multithreaded Priority Queue<br>• Python Spreadsheet Interfaces<br>• Python XML interface<br>• Python JSON interface | 25 |
| 3 | **Using Databases in Python**<br>• Python MySQL Database Access<br>• Install the MySQLdb and other Packages<br>• Create Database Connection<br>• CREATE, INSERT, READ, UPDATE and DELETE Operation<br>• DML and DDL Operation with Databases<br>• Performing Transactions<br>• Handling Database Errors<br>• Web Scraping in Python | 30 |
| 4 | **Python for Data Analysis**<br>• Numpy:<br>  • Introduction to numpy | 40 |

| | | |
|---|---|---|
| | • Creating arrays<br>• Using arrays and Scalars<br>• Indexing Arrays<br>• Array Transposition<br>• Universal Array Function<br>• Array Processing<br>• Array Input and Output<br>• Pandas:<br>• What is pandas & where it is used?<br>• Series in pandas<br>• Index objects<br>• Reindex<br>• Drop Entry<br>• Selecting Entries<br>• Data Alignment<br>• Rank and Sort<br>• Summary Statics<br>• Missing Data<br>• Index Hierarchy<br>• Matplotlib:<br>• Introduction to Matplotlib<br>• Figures and subplots<br>• Colors, Markers & Line styles<br>• Ticks, Labels & Legends<br>• Saving plots to files<br>• Data Loading, Storage, and File Formats<br>• Reading and Writing Data in Text Format<br>• Binary Data Formats<br>• Interacting with Web APIs<br>• Data Cleaning and Preparation<br>• Handling missing data<br>• Data Transformation<br>• String manipulation<br>• Data Wrangling: Join, Combine & Reshape<br>• Exploratory Data Analysis (EDA) | |
| **Total** | | **90 hrs** |

**Bibliography:**

**Main Reference:**

1. Core Python Programming, 3ed: Covers fundamentals to advanced topics like OOPS, Exceptions, Data structures, Files, Threads, Net by R. Nageswara Rao
2. Python: The Complete Reference by Martin C. Brown
3. Django for Beginners by William S. Vincent
4. Two Scoops of Django 3.x by Daniel and Audrey
5. Django Design Patterns and Best Practices by Arun Ravindran

**Additional Reference:**

1. https://docs.djangoproject.com/en/4.0/intro/tutorial01/
2. https://tutorial.djangogirls.org/en/

## 1. Scheme of University Examination Theory for PG Program:

General structure / patterns for setting up question papers for Theory / Practical courses, their evaluation weightages for PG programs of MGMSBS are given in the following tables

### 1.1 Marks scheme for the University exam:

Final theory marks will be 100 marks (80 marks University Theory exam + 20 Marks Internal assessment).

| Question | | Marks distribution | Marks allotted per section | Marks |
|---|---|---|---|---|
| Sec: A | VSAQ | 5/6 x 2 M = 10 | 10 | 10 |
| Sec: B | SAQ | 3/4 x 5 M = 15 | 15 | 35 |
| Sec: B | LAQ | 2/3 x 10 M = 10 | 20 | |
| Sec: C | SAQ | 3/4 x 5 M = 15 | 15 | 35 |
| Sec: C | LAQ | 2/3 x 10 M = 10 | 20 | |
| **Total** | | | | **80 Marks** |

### 1.2 Practical exam pattern: Total 40 marks with following breakup

| Exercise | Description | Marks |
|---|---|---|
| Q No (1-4) | Code Implementation<br>(Code functionality structure and readability) | 4x5=20 M |
| Q No 5 | Conceptual Understanding<br>(Fundamental Principles and application knowledge) | 1x5=05 M |
| Q No 6 | Problem Solving Skills<br>(Logical thinking, debugging and troubleshooting) | 1x5=05 M |
| Q No 7 | Documentation and Presentation / VIVA<br>(Code documentation and explanation) | 10 M |
| **Total** | | **40 Marks** |

### 1.3 Practical to be conducted at respective departments and marks submitted jointly by the parent department to the university.

### 1.4 Breakup of theory IA calculation for 20 marks

| Description | Marks |
|---|---|
| Internal exam (at department) | 15 marks |
| Seminar | 5 marks |
| **Total** | **20 Marks** |

## 1.5 Breakup of practical IA calculation:

| **Description** | **Marks** |
|---|---|
| Internal exam (at department) | 10 marks |
| Viva | 5 marks |
| Journal | 5 marks |
| **Total** | **20 Marks** |

**Note** –20 marks to be converted to 10 marks weightage for submission to the university.

## 1.6: Checklist for Evaluation of Fundamentals of Computer Applications (MHIMT 103 E)

Name of the student: _____Date:_____
Program:_____
Semester: _____ Name of the Internal faculty/Observer:_____
Name of the External Faculty/Observer:_____

| **Core Competencies** | Marks allotted | Marks obtained |
|---|---|---|
| Students will gain a foundational understanding of computer hardware, software, and key Windows accessories, including the control panel. They will become proficient in Microsoft Office applications, such as document formatting in Word, worksheet management & data analysis in Excel, and creating multimedia-rich presentations in PowerPoint. Students will also learn the basics of database management systems and their application in designing database objects. Additionally, they will be introduced to computer networks, network topologies, and devices, while gaining insights into emerging technologies like Blockchain and Machine Learning. | | |
| **Section A: Fundamentals of Computer Applications** | | |
| Ability to recall definitions, concepts, and computer basics (VIVA) | 10 | |
| **Section B: MS Word** | | |
| Structure, alignment, and professional presentation (Document creation and layout) | 3 | |
| Application of font styles, paragraph alignment, and bulleting (Formatting (text, paragraphs, etc.) | 3 | |
| Accurate use of tables, charts, and other tools (Advanced features (tables/charts) | 4 | |
| **Section C: MS Excel** | | |
| Accuracy and clarity in organizing data and applying basic formatting ( Data entry and formatting) | 3 | |
| Correct implementation of formulas/functions (Formula usage) | 3 | |
| Accurate chart generation and meaningful visualization of data (Chart creation and interpretation) | 4 | |
| **Section D: MS PowerPoint** | | |
| Logical flow, organization of content, and relevance of information (Slide structure and content) | 3 | |
| Application of appropriate animations and transitions (Use of animations and transitions) | 3 | |
| Effective use of images, charts, and other multimedia elements (Multimedia integration) | 4 | |
| **Section E: DBMS (MS Access** | | |
| Proper structure, data types, and relationships between tables (Database design and table creation) | 3 | |
| Accuracy and efficiency of queries to retrieve relevant data (Query creation) | 3 | |
| Professional layout, clarity, and inclusion of relevant data in the report (Report generation) | 4 | |
| **Total** | **50 Marks** | |

Sign of Internal Examiner:_____
Sign of External Examiner:_____

## 1.7: Common Checklist for Evaluation of Experiential Learning Semester II-Onwards (M.Sc. Health Informatics)

Name of the student: _____Date:_____

Program:_____

Semester: _____ Name of the Internal faculty/Observer:_____

Name of the External Faculty/Observer:_____

| **Core Competencies** | Marks allotted | Marks obtained |
|---|---|---|
| Students will gain an understanding of the development and management of advanced health informatics applications. They will be able to interpret how health informatics supports patient data management and aids healthcare professionals in decision-making. Students will also identify emerging trends and technologies in healthcare informatics, describe essential features for developers, and recognize future needs using various prediction tools. They will be aware about the roles and responsibilities of health information management professionals and provide an in-depth understanding of the values, routines, and cultures of healthcare settings. | | |
| **Application of Knowledge** | | |
| **Assessment Method** -Case study analysis, System Evaluation, Project Proposal<br>**Description -** Assess problem-solving ability, application of theories in real-world scenarios, and innovative solutions. | 20 | |
| **Problem Solving skills** | | |
| **Assessment Method** -Case study analysis, System Evaluation, Project Proposal<br>**Description -** Test students' ability to perform tasks or implement concepts practically. | 15 | |
| **Reflection and critical thinking** | | |
| **Assessment Method** -Case study analysis, Project Proposal<br>**Description -** Evaluate reflective responses, insights from experiences, and evidence of self-awareness and growth. | 10 | |
| **Engagement and Participation** | | |
| **Assessment Method** - System Evaluation<br>**Description -** Measure participation, enthusiasm, and collaboration during experiential activities. | 05 | |
| **Total** | **50 Marks** | |

Sign of Internal Examiner:_____
Sign of External Examiner:_____

Resolution No. 3.2 of Academic Council (AC-51/2025):

Resolved to approve the CBCS syllabus for M.Sc. Health Informatics for Semesters III and IV, along with post facto approval of the syllabus for Semesters I and II, including Program Outcomes (POs) and Course Outcomes (COs), for the batch admitted in the Academic Year 2024- 25 [ANNEXURE-4A, 4B & 4C].

**Annexure-4B of AC-51/2025**

# MGM SCHOOL OF BIOMEDICAL SCIENCES

**(A constituent unit of MGM INSTITUTE OF HEALTH SCIENCES)**
(Deemed to be University u/s 3 of UGC Act 1956)
Grade "A$^{++}$" Accredited by NAAC
Sector 1, Kamothe, Navi Mumbai-410209, Tel. No.:022-2743763, 27437632, 27432890
Email. sbsnm@mgmuhs.com/Website: www.mgmsbsnm.edu.in

## CHOICE BASED CREDIT SYSTEM (CBCS)

## (Academic Year 2024 - 25)

## Curriculum for

## M.Sc. Allied Health Sciences

## M.Sc. Health Informatics

## Semester III & IV

## OUTLINE OF COURSE CURRICULUM

### M.Sc. Health Informatics

#### Semester III

| Code No. | Core Course | Credits/Week | | | | | Hrs/Semester | | | | | Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture (L) | Tutorial (T) | Practical (P) | Clinical Posing/ Rotation (CP)/ Experiential | Total Credits (C) | Lecture (L) | Tutorial (T) | Practical (P) | Clinical Posing/ Rotation (CP)/ Experiential | Total (hrs.) | Internal Assement (IA) | Semester End Exam (SEE) | Total |
| **Discipiline Specific Core Theory** | | | | | | | | | | | | | | |
| MHIMT 111 T | Entrepreneurship and Health IT Project Management | 4 | - | - | - | **4** | 60 | - | - | - | **60** | **20** | **80** | **100** |
| MHIMT 112 T | Managing Health Information Systems | 4 | - | - | - | **4** | 60 | - | - | - | **60** | **20** | **80** | **100** |
| MHIMT 113 | Disserration/ Project | - | - | 10 | - | **5** | - | - | 150 | - | **150** | **50** | - | **50** |
| **Discipiline Specific Core Practical** | | | | | | | | | | | | | | |
| MHIMT 114 P | Database Management System | - | - | 6 | - | **3** | - | - | 90 | - | **90** | **10** | **40** | **50** |
| MHIMT 115 P | Advanced Web Development | - | - | 8 | - | **4** | - | - | 120 | - | **120** | **10** | **40** | **50** |
| MHIMT 116 P | Mobile Application Development for Health Care | | | | | | | | | | | | | |
| MHIMT 117 P | Machine Learning in Health Care | - | - | 8 | - | **4** | - | - | 120 | - | **120** | **10** | **40** | **50** |
| MHIMT 118 P | Data Visualization and Reporting in Health Care | | | | | | | | | | | | | |
| **Total** | | **8** | **0** | **32** | **0** | **24** | **120** | **0** | **480** | **0** | **600** | **120** | **280** | **400** |

## OUTLINE OF COURSE CURRICULUM

### M.Sc. Health Informatics

#### Semester IV

| Code No. | Core Course | Credits/Week | | | | | Hrs/Semester | | | | | Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lecture (L) | Tutorial (T) | Practical (P) | Clinical Posing/ Rotation (CP)/ Experiential | Total Credits (C) | Lecture (L) | Tutorial (T) | Practical (P) | Clinical Posing/ Rotation (CP)/ Experiential | Total (hrs.) | Internal Assement (IA) | Semester End Exam (SEE) | Total |
| **General Elective (Any one)** | | | | | | | | | | | | | | |
| GE 001 T | Pursuit of Inner self Excellence (POISE) | 4 | - | - | - | **4** | 60 | - | - | - | **60** | **20** | **80** | **100** |
| GE 002 T | Bioethics, Biosafety, IPR and Technology Transfer | | | | | | | | | | | | | |
| GE 003 T | Disaster Management and Mitigation Resources | | | | | | | | | | | | | |
| GE 004 T | Human Rights | | | | | | | | | | | | | |
| **Discipiline Specific Core Practical** | | | | | | | | | | | | | | |
| MHIMT 119 | Disserration/ Project | - | - | 22 | - | **11** | - | - | 330 | - | **330** | - | **200** | **200** |
| **Internship** | | | | | | | | | | | | | | |
| MHIMT 120 | Internship | - | - | 14 | - | **7** | - | - | 210 | - | **210** | - | **50** | **50** |
| **Total** | | **4** | **0** | **36** | **0** | **22** | **60** | **0** | **540** | **0** | **600** | **20** | **330** | **350** |

# SECOND YEAR

## M.Sc. Health Informatics

### SEMESTER-III

| Code No. | Core Subjects |
|---|---|
| **Discipline Specific Core Theory** | |
| MHIMT 111 T | Entrepreneurship and Health IT Project Management |
| MHIMT 112 T | Managing Health Information Systems |
| MHIMT 113 | Dissertation / Project |
| **Discipline Specific Core Practical** | |
| MHIMT 114 P | Database Management System |
| MHIMT 115 P<br>MHIMT 116 P | Advanced Web Development **OR**<br>Mobile Application Development for Healthcare |
| MHIMT 117 P<br>MHIMT 118 P | Machine Learning in Healthcare **OR**<br>Data Visualization and Reporting in Healthcare |

| | |
|---|---|
| **Name of the Program** | **M.Sc. Health Informatics** |
| **Semester** | **Semester III** |
| **Name of the Subject** | **Entrepreneurship and Health IT Project management** |
| **Subject Code** | **MHIMT 111 T** |

| | |
|---|---|
| **Learning Outcomes** | • Understand the concept of Entrepreneurship<br>• Understand and analysis of Entrepreneurial thinking and idea generation<br>• Understand and analysis of new venture feasibility and business plans<br>• Understand the basic concepts of Health IT project management and its importance<br>• Understand and analyze the process of project initiation and planning<br>• Understand and analyze the agile project management process and various principles associated with it<br>• Understand and analyze various Health IT standards and regulations<br>• Understanding the effective ways of Health IT project management and execution<br>• Understand the process related to project closure and post-implementation |
| **Course Outcomes** | • Analyze the process of innovation and new idea generation and explain the business environment to identify business opportunities<br>• Evaluate and apply different entrepreneurial strategies and assess the new venture feasibility and risk evaluation<br>• Explain project management process, lifecycle and its organization.<br>• Explain the monitoring, evaluation and control process involve in the project management |

| Sr. No. | Topics | No. of Hrs. |
|---|---|---|
| 1 | **Introduction to Entrepreneurship**<br>• Introduction to entrepreneurship<br>• Importance of entrepreneurship in economic development | **5** |
| 2 | **Business idea and Entrepreneurial venture planning**<br>• Entrepreneurial thinking and idea generation<br>• Ideas from trend analysis, methods of generating ideas, creative problem solving, product planning, and development process<br>• Critical factors of new venture development, the challenges of new-venture start-ups, pitfalls in selecting new venture, opportunity evaluation process | **6** |
| 3 | **New venture feasibility and Business plans**<br>• Environmental assessment, Market research and feasibility study and Financial feasibility<br>• Different forms of ownership<br>• List the different legal formalities for a new venture<br>• Describe the cash management process | **6** |
| 4 | **Introduction to Health IT Project Management**<br>Overview of Project Management in Health IT:<br>• Introduction to project management principles | **7** |

| | | |
|---|---|---|
| | • Distinct characteristics and challenges of managing projects in the healthcare IT sector<br>Importance of Project Management in Healthcare:<br>• The impact of effective project management on healthcare outcomes<br>• Examples of successful healthcare projects and their contributions to improved patient care<br>Challenges and Opportunities in Health IT Projects:<br>• Common challenges such as interoperability, data security, and regulatory compliance<br>• Identifying opportunities for innovation and improvement through IT projects<br>Case Studies of Health IT Projects:<br>• In-depth analysis of successful health IT projects<br>• Lessons learned and best practices from real-world examples | |
| 5 | **Project Initiation and Planning**<br>Stakeholder Identification and Analysis:<br>• Techniques for identifying and analyzing stakeholders<br>• Strategies for effective stakeholder communication and engagement<br>Project Charter and Scope Definition:<br>• Developing a comprehensive project charter<br>• Defining project scope, objectives, and deliverables<br>Risk Management in Health IT Projects:<br>• Identifying and assessing risks specific to health IT projects<br>• Developing risk mitigation and contingency plans<br>Resource Planning and Allocation:<br>• Human resource management in health IT projects<br>• Budgeting and allocating resources efficiently | **8** |
| 6 | **Agile Project Management in Health IT**<br>Agile Methodologies in Healthcare:<br>• Introduction to Agile methodologies (Scrum, Kanban, etc.)<br>• Agile values and principles adapted for healthcare settings<br>Scrum, Kanban, and Lean Principles:<br>• Detailed exploration of Scrum, Kanban, and Lean methodologies<br>• Practical applications in health IT project environments<br>Agile Project Planning and Execution:<br>• Sprint planning and execution<br>• Daily stand-ups, retrospectives, and other Agile ceremonies<br>Adapting Agile to Health IT Projects:<br>• Challenges and solutions for applying Agile in health IT<br>• Hybrid approaches combining traditional and Agile methods | **8** |
| 7 | **Health IT Standards**<br>Overview of Health IT Standards:<br>• Introduction to standards like HL7, DICOM, and CDA<br>• The role of standards in achieving interoperability<br>Compliance with HIPAA and other Regulations:<br>• In-depth understanding of HIPAA requirements<br>• Navigating other relevant healthcare regulations<br>Interoperability and Data Exchange in Healthcare:<br>• Strategies for achieving interoperability in health IT<br>• Secure data exchange protocols and frameworks<br>Ethical Considerations in Health IT: | **7** |

| | | |
|---|---|---|
| | • Addressing ethical issues related to patient data, AI, and emerging technologies<br>• Ethical decision-making in health IT project management | |
| 8 | **Health IT Project Execution and Monitoring**<br>Team Management and Leadership:<br>• Effective leadership in health IT projects<br>• Building and managing high-performing project teams<br>Quality Assurance in Health IT Projects:<br>• Ensuring quality in health IT deliverables<br>• Implementing QA processes and methodologies<br>Monitoring and Controlling Health IT Projects:<br>• Monitoring project progress and performance metrics<br>• Implementing change control and issue resolution<br>Change Management in Healthcare Settings:<br>• Strategies for managing resistance to change<br>• Incorporating change management into project plans | **7** |
| 9 | **Project Closure and Evaluation**<br>Project Closure Processes:<br>• Closing out health IT projects effectively<br>• Transitioning deliverables to end-users or support teams<br>Post-Implementation Evaluation:<br>• Assessing project success against initial objectives<br>• Gathering feedback from stakeholders for continuous improvement<br>Project Documentation and Knowledge Transfer:<br>• The importance of comprehensive project documentation<br>• Strategies for knowledge transfer to support and operational teams | **6** |
| **Total** | | **60 hrs** |

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1. Hisrich, R. D., Manimala, M. J., Peters, M. P & Shepherd. D.A. (2014). Entrepreneurship. (9th Ede) McGraw Hill Education: New Delhi.
2. "Project Management for Healthcare" by David Shirley
3. “Renovating healthcare IT: Building the foundation for digital transformation” by Susan Snedaker
4. "Health Informatics: Practical Guide Seventh Edition" by William R Hersh, Robert E Hoyt
5. “Agile Project Management For Dummies 3e (For Dummies (Computer/Tech))” by Mark C. Layton, Steven J. Ostermiller, Dean J. Kynaston
6. “Agile Project Management with Scrum (Developer Best Practices)” by Ken Schwaber


**Additional Reference:**


1. Kathy Schwalbe, Dan Furlong. Healthcare Project Management. Kathy Schwalbe LLC, 2013
2. David Sherly. Project Management for Healthcare. CRS Press. Taylor & Francis Group
3. Kuratko, D. F. (2016). Entrepreneurship: Theory, process, and practice. Cengage Learning.

| | |
|---|---|
| **Name of the Program** | **M.Sc. Health Informatics** |
| **Semester** | **Semester III** |
| **Name of the Subject** | **Managing Health Information Systems** |
| **Subject Code** | **MHIMT 112 T** |

| | |
|---|---|
| **Learning Outcomes** | • Understand the basics of HIS and importance<br>• Understand, analyze and apply the principles of HIS project planning<br>• Understand and analyze the process of organizing health information services in a hospital set up<br>• Understand how to do resource management while implementing a HIS project<br>• Understand and analyze the process of monitoring and controlling of HISs<br>• Understand the role of Leadership in strategic planning of HIS project<br>• Understand and analyze how the adoption of health information system affects the culture of a healthcare organization<br>• Understand and apply the knowledge management concepts in Healthcare<br>• Understand and analyze various QA approach in implementing and managing health information system in a hospital setup<br>• Understand and analyze the core concepts of IG in healthcare |
| **Course Outcomes** | • Plan, Monitor, organization and control the health Information system and its resources required for managing patient data<br>• Demonstrate the leadership role in healthcare IT projects and related activities<br>• Analyze the Benefits, Cultural Challenges, and issues in adopting health information system and application.<br>• Demonstrate the application of knowledge management system in healthcare organization<br>• Develop various QA approach in implementing and managing health information system<br>• Explain what is information governance, its need and the different IG models and their significance.<br>• Apply the concept of IG in managing healthcare and healthcare data management |

| Sr. No. | Topics | No. of Hrs. |
|---|---|---|
| 1 | **Health Information System – An Overview**<br>1. Component of health information system suggested by world health organization<br>2. Types of Health Information Systems<br>3. Functions of health information system in terms of customer perspective.<br>4. Reasons of implementing health information system in a hospital setup.<br>5. Support of health information system in clinical, enterprise and technical perspective. | **5** |
| 2 | **Planning of Health Information System**<br>1. List and explain the steps involve in the strategic planning of health information system | **5** |

| | | |
|---|---|---|
| | 2. Discussion about how a good project management supports the successful implementation of Health Information Technology.<br>3. Outline and explain the technology infrastructure required for the successful implementation and sustainability of health information system.<br>4. Importance of tactical planning in implementing strategic planning of health information system. | |
| 3 | **Organizing Information System Services**<br>1. Roles the IT staff performs during the delivery of HIS services<br>2. Process of Organizing Health Information services in a hospital set up<br>3. Understand the staffing pattern used in a hospital setup to organize health information service<br>4. Advantages & Disadvantages of Source oriented, Integrated and problem-oriented health records<br>5. Management Role's in major HIS projects<br>6. Various rules involved in designing forms | **5** |
| 4 | **Resource Management**<br>1. Resource management activities involves in implementing and managing health information system<br>2. Roles of the health informatics professionals in resource management<br>3. Human and technical resources required for the successful implementation and sustainability of health information system. | **5** |
| 5 | **Monitoring and Controlling of Health Information System**<br>1. Task involved in controlling and managing IT in healthcare.<br>2. 3LGM2 metamodel for modelling health information system.<br>3. Phases involve in good evaluation practice of health informatics application.<br>4. Processes to ensure the privacy and protection of health information.<br>5. Use of balanced score card monitoring the performance of Health Information System. | **5** |
| 6 | **Leadership in HIS Projects**<br>1. Leadership role of health informatics professionals in strategic planning of HIS project.<br>2. Principles of strategic leadership | **5** |
| 7 | **Adoption of Information Technology in Healthcare**<br>1. How the adoption of health information system affects the culture of a healthcare organization.<br>2. Issues associated with the adoption of information technology in healthcare.<br>3. Benefits of adopting health informatics application. | **5** |
| 8 | **Knowledge Management in IT**<br>1. Application of knowledge management system in healthcare organization using a case.<br>2. Reason for managing knowledge in healthcare.<br>3. Methods used in capturing and organizing knowledge in healthcare. | **5** |
| 9 | **Quality Assurance Approach in Managing HIS**<br>1. Primary elements of Total Quality Management<br>2. Approach of TQM in implementing and maintaining HIS.<br>3. Various QA approach in implementing and managing health information system in a hospital setup.<br>4. Importance of various CQI approach in implementing and maintaining HIS.<br>5. Role of health informatics professionals in implementing TQM and CQI approach. | **5** |
| 10 | **Core Concepts of Information Governance in Healthcare**<br>1. Introduction to Information Governance<br>• Definition and significance<br>• Needs and benefits<br>2. Information Governance Models | **7** |

| | | |
|---|---|---|
| | • IGRM, IGIM, IGMM<br>• Application of these models with case studies in healthcare settings<br>3. Healthcare Data Management Under Information Governance<br>• Healthcare data structure<br>• Management and governance of healthcare data<br>• Role of GDPR in healthcare data governance<br>4. Stakeholders in Information Governance<br>• Identification of key stakeholders<br>• Role and expectations of stakeholders in building Information Governance in Healthcare<br>• Best practices of Information Governance nationally and globally | |
| 11 | **Ethical and Technological Aspects of Information Governance**<br>1. Ethics in Information Governance<br>• Key ethical principles (Autonomy, Beneficence, Non-maleficence, Justice, Accountability, Transparency)<br>• Data privacy and confidentiality, including legal frameworks (HIPAA, GDPR)<br>• Ethical considerations in health information technologies (EHRs, patient consent, data sharing)<br>2. Information Technology in Support of Information Governance<br>• Role of IT in building Information Governance<br>• HIT standards and their relevance in interoperability and health information exchange<br>3. Data Security and Protection<br>• Ethical implications of data breaches<br>• Strategies for ensuring data security and balancing security with accessibility<br>4. Emerging Technologies and Ethical Challenges<br>• Ethical considerations in AI, ML, and big data analytics<br>• Bias, fairness, and impact on patient care<br>• Data ownership, control, and informed consent | **8** |
| **Total** | | **60 hrs** |

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**Main Reference:**


1. Today's Health Information Approach. Dana C Macway
2. Health Inforamtion System – Architecture and Strategies. Alfred Winter, R Haux, E Ammenwerth, B Brigl, N Hellrung, F, Jahn
3. Health Information System. Kevin Beaver
4. Leading Information Governance for Healthcare. American Health Information Management Association
5. Robert F Smallwood. Information Governance: Concept, Strategies and Best Practice. April 2014. Wiley Publication
6. Anthony David Giordano. Performing Information Governance. 2015 Edition. IBM Press


**Additional Reference:**


1. Health Information System – Concept, Methodologies, Tools and Applications. Joel Rodrigues
2. Healthcare Information Systems- A Practical Approach for Healthcare Management. Karen A Wager, F W Lee, J P Glaser
3. John Lannrelli, Micheal O"Shaughnessy. Information Governance and Security. 2015 Edition. Elsevier
4. Evelyn J S Hovenga, Heather Grain. Health Information Governance in Digital Environment. 2013 Edition. IOS Press

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|---|---|
| **Name of the Program** | **M. Sc. Health Informatics** |
| **Semester** | **Semester - III** |
| **Name of the Subject** | **Dissertation / Project*** |
| **Subject Code** | **MHIMT 113** |

***The Dissertation work will begin from 3rd Semester, and will continue through the 4th Semester.**

| | |
|---|---|
| **Name of the Program** | **M.Sc. Health Informatics** |
| **Semester** | **Semester III** |
| **Name of the Subject** | **Database Management System** |
| **Subject Code** | **MHIMT 114 P** |

| | |
|---|---|
| **Learning Outcomes** | • Explain the fundamental concepts of Relational Database Management Systems (RDBMS).<br>• Design and model databases using appropriate database design principles.<br>• Construct and execute SQL queries for data retrieval and manipulation.<br>• Utilize advanced MySQL features to optimize database performance.<br>• Implement database security measures, data integrity constraints, backup, and recovery techniques.<br>• Analyze future trends and emerging technologies in database management. |
| **Course Outcomes** | • Understand the core principles of database management systems, including data modeling, database architecture, and normalization techniques.<br>• Develop proficiency in using Structured Query Language (SQL) for data definition, manipulation, and querying within MySQL.<br>• Learn to design and implement databases that are efficient, scalable, and secure, applying best practices in data modeling and normalization.<br>• Apply theoretical knowledge through practical lab sessions and projects, developing real-world databases and solving complex data management problems. |

| Sr. No. | Topics | No. of Hrs. |
|---|---|---|
| 1 | **Introduction to Database Management Systems**<br>Overview of Database Systems<br>• Definition and Purpose of a Database Management System (DBMS)<br>• Components of a DBMS<br>• Types of DBMS (Hierarchical, Network, Relational, and Object-Oriented)<br>Introduction to MySQL<br>• Overview of MySQL as a Relational Database Management System (RDBMS)<br>• Installation and Setup of MySQL<br>• Basic MySQL Commands and Interface<br>Database Models<br>• Conceptual, Logical, and Physical Models<br>• Entity-Relationship (ER) Model<br>• Introduction to Relational Model and Tables | **15** |
| 2 | **Database Design and Data Modeling**<br>Data Modeling Concepts<br>• Entity-Relationship Diagrams (ERDs)<br>• Entities, Attributes, and Relationships<br>• Cardinality and Participation Constraints<br>Normalization | **15** |

| | | |
|---|---|---|
| | • Purpose of Normalization<br>• First, Second, and Third Normal Forms (1NF, 2NF, 3NF)<br>• Denormalization and its Applications<br>Designing a Database Schema<br>• Converting ER Diagrams to Relational Schema<br>• Defining Tables, Primary Keys, and Foreign Keys<br>• Relationships and Referential Integrity | |
| **3** | **SQL and MySQL Fundamentals Database Schema**<br>SQL Basics<br>• Introduction to Structured Query Language (SQL)<br>• Data Definition Language (DDL): CREATE, ALTER, DROP<br>• Data Manipulation Language (DML): SELECT, INSERT, UPDATE, DELETE<br>Querying and Filtering Data<br>• Basic SELECT Queries<br>• Filtering Data with WHERE Clauses<br>• Sorting and Ordering Results<br>• Using Aggregate Functions (SUM, AVG, COUNT, etc.)<br>Joins and Subqueries<br>• Types of Joins: INNER JOIN, LEFT JOIN, RIGHT JOIN, FULL JOIN<br>• Using Subqueries and Nested Queries<br>• Combining Results with UNION and INTERSECT | **18** |
| **4** | **Advanced MySQL Features**<br>Indexing and Performance Optimization<br>• Purpose and Types of Indexes<br>• Creating and Managing Indexes<br>• Query Optimization Techniques<br>Transactions and Concurrency Control<br>• Concepts of Transactions and ACID Properties (Atomicity, Consistency, Isolation, Durability)<br>• Implementing Transactions in MySQL<br>• Concurrency Control and Locking Mechanisms<br>Stored Procedures and Triggers<br>• Creating and Using Stored Procedures<br>• Writing and Managing Triggers<br>• Using Views to Simplify Complex Queries | **17** |
| **5** | **Database Security and Integrity**<br>Security Measures<br>• User Authentication and Authorization<br>• Granting and Revoking Privileges<br>• Securing Data with Encryption<br>Data Integrity and Constraints<br>• Defining Constraints: UNIQUE, NOT NULL, CHECK<br>• Implementing Referential Integrity<br>• Handling Errors and Data Validation<br>Backup and Recovery<br>• Backup Strategies: Full, Incremental, and Differential Backups<br>• Restoring Data from Backups<br>• Using MySQL Backup Tools | **15** |

| | | |
|---|---|---|
| **6** | **Future Trends in Database Technology**<br>Emerging Database Technologies<br>• Introduction to NoSQL Databases (e.g., MongoDB, Cassandra)<br>• Cloud-Based Databases and Database-as-a-Service (DBaaS)<br>• Big Data Technologies and Integration with SQL | **10** |
| **Total** | | **90 hrs** |

**Bibliography:**

1. Database system Concepts, Third Edition, Abraham Silberschatz (Bell Laboratories), Henry F, Korth (Bell Laboratories) and S. Sudarshan (Indian Institute of Technology, Bombay) McGraw-Hill Companies, Inc.
2. Fundamentals of Database systems, Third Edition. Author: Elmasri and Navathe
3. Efficient MySQL Performance: Best Practices and Techniques By Daniel Nichter
4. MySQL Crash Course By Rick Silva

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|---|---|
| **Name of the Program** | **M.Sc. Health Informatics** |
| **Semester** | **Semester III** |
| **Name of the Subject** | **Advanced Web Development** |
| **Subject Code** | **MHIMT 115 P** |

| | |
|---|---|
| **Learning Outcomes** | • Understanding the concepts of advanced HTML and CSS<br>• Understanding and applying the Advanced JavaScript functionalities and ES6+<br>• Understanding and applying the concepts of Server-Side Development with Node.js<br>• Understanding and applying the concepts of PHP web development<br>• Understanding and applying the concepts of Advanced Front-End Development<br>• Understanding and applying the concepts of DevOps and Deployment<br>• Understanding and applying the concepts of Web Security |
| **Course Outcomes** | • Understanding of advanced web development concepts.<br>• Gain expertise in modern web technologies and frameworks.<br>• Develop the ability to build complex, scalable, and secure web applications. |

| Sr. No. | Topics | No. of Hrs. |
|---|---|---|
| **1** | **Advanced HTML and CSS**<br>HTML5 Advanced Features:<br>• Semantic elements<br>• Web forms 2.0<br>• Multimedia elements (audio, video)<br>• Canvas and SVG graphics<br>CSS3 Advanced Techniques:<br>• CSS preprocessors (Sass, LESS)<br>• Advanced layout techniques (CSS Grid, Flexbox)<br>• CSS animations and transitions<br>• Responsive design and media queries | **17** |
| 2 | **Advanced JavaScript and ES6+**<br>Modern JavaScript Syntax:<br>• ES6+ features (let, const, arrow functions, template literals)<br>• Modules and classes<br>Advanced JavaScript Concepts:<br>• Closures, hoisting, and scope<br>• Asynchronous programming (promises, async/await)<br>• Event loop and concurrency.<br>JavaScript Frameworks and Libraries:<br>• Deep dive into React, Angular, or Vue.js<br>• State management (Redux, Vuex)<br>• Component lifecycle and hooks | **17** |
| **3** | **Server-Side Development with Node.js**<br>Node.js and Express.js: | **17** |

| | | |
|---|---|---|
| | • Setting up a Node.js server<br>• Building RESTful APIs with Express.js<br>• Middleware and routing<br>Database Integration:<br>• SQL databases (PostgreSQL, MySQL)<br>• NoSQL databases (MongoDB, Firebase)<br>• ORM/ODM (Sequelize, Mongoose)<br>Authentication and Authorization:<br>• JWT and OAuth<br>• Role-based access control<br>• Secure password storage and hashing | |
| **4** | **PHP Web Development**<br>Introduction to PHP:<br>• PHP syntax and basic constructs<br>• Variables, data types, and operators<br>Advanced PHP Concepts:<br>• Functions, arrays, and superglobals<br>• Object-oriented PHP<br>• Error handling and debugging.<br>PHP and MySQL Integration:<br>• Connecting to a MySQL database<br>• Performing CRUD operations<br>• Using PDO for database interactions<br>Building Web Applications with PHP:<br>• Session management<br>• Form handling and validation<br>• Security best practices | **18** |
| **5** | **Advanced Front-End Development**<br>Single Page Applications (SPAs):<br>• Architecture and design patterns<br>• Client-side routing<br>• State management in SPAs<br>Progressive Web Apps (PWAs):<br>• Service workers and caching<br>• Offline capabilities<br>• Web app manifest<br>Web Performance Optimization:<br>• Lazy loading and code splitting<br>• Performance monitoring tools<br>• Best practices for optimizing web performance | **17** |
| **6** | **DevOps and Deployment**<br>Version Control and CI/CD:<br>• Advanced Git techniques (rebasing, cherry-picking)<br>• Continuous Integration/Continuous Deployment (CI/CD) pipelines<br>• Automated testing and deployment<br>Containerization and Orchestration:<br>• Docker basics and containerization<br>• Kubernetes for container orchestration<br>• Deploying applications with Docker and Kubernetes<br>Cloud Services and Hosting:<br>• Cloud platforms (AWS, Azure, Google Cloud) | **17** |

| | | |
|---|---|---|
| | • Serverless architecture<br>• Scaling and load balancing | |
| **7** | **Web Security**<br>Security Best Practices:<br>• Secure coding practices<br>• Common vulnerabilities (XSS, CSRF, SQL Injection)<br>• OWASP Top Ten<br>Implementing Security Measures:<br>• HTTPS and SSL/TLS<br>• Content Security Policy (CSP)<br>• Security headers<br>Monitoring and Incident Response:<br>• Logging and monitoring<br>• Incident response planning<br>• Tools for security monitoring | **17** |
| **Total** | | **120 hrs** |

**Bibliography:**


1. Flanagan, D. (2020). JavaScript: The Definitive Guide. O'Reilly Media.
2. Hartl, M. (2019). Ruby on Rails Tutorial: Learn Web Development with Rails. Addison-Wesley.
3. Duckett, J. (2014). JavaScript and J Query: Interactive Front-End Web Development. Wiley.
4. Marks, K. E. (Year). PHP Web Development with MySQL. PHP [architect].
5. Grinberg, M. (2018). Flask Web Development: Developing Web Applications with Python. O'Reilly Media.
6. Vincent, W. S. (2020). Django for Beginners: Build Websites with Python and Django. Welcome To Code.

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|---|---|
| **Name of the Program** | **M.Sc. Health Informatics** |
| **Semester** | **Semester III** |
| **Name of the Subject** | **Mobile Application Development for Healthcare** |
| **Subject Code** | **MHIMT 116 P** |

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| **Learning Outcomes** | • Understand the basics of mHealth applications<br>• Understand, apply and analyze User-Centered mHealth Design Principles<br>• Understand and apply the concepts of mobile application development to mHealth applications<br>• Understand and an apply various techniques to test and deploy the mHealth application also analyze the security measures<br>• Understand and analyze the emerging trends and future direction of mHealth applications |
| **Course Outcomes** | • Understand the fundamentals of mobile application development in the healthcare context<br>• Gain proficiency in modern mobile development technologies and frameworks.<br>• Develop the ability to design, implement, test, and deploy secure and effective mHealth applications. |

| Sr. No. | Topics | No. of Hrs. |
|---|---|---|
| **1** | **Introduction to Mobile Health (mHealth) Applications**<br>Overview of mHealth<br>• Definition and scope<br>• Benefits and challenges<br>• Historical evolution and current trends<br>Mobile Platforms and Technologies<br>• Overview of mobile operating systems (iOS, Android)<br>• Development environments and tools<br>• Key technologies: Bluetooth, NFC, sensors<br>mHealth Ecosystem<br>• Stakeholders in mHealth (patients, providers, payers)<br>• Integration with existing healthcare systems (EHR, telemedicine)<br>• Case studies of successful mHealth applications | **24** |
| 2 | **Mobile Application Design for Healthcare**<br>User-Centered Design Principles<br>• Understanding user needs<br>• Design thinking process<br>• Creating personas and user journeys<br>UI/UX Design for mHealth Applications<br>• Principles of effective UI/UX design<br>• Accessibility and usability considerations<br>• Tools for prototyping and design<br>Regulatory and Compliance Requirements<br>• HIPAA, GDPR, and other regulations<br>• Ensuring privacy and security in design<br>• Ethical considerations in mHealth applications | **24** |

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| **3** | **Mobile Application Development**<br>Introduction to Mobile Programming<br>• Programming languages (Swift, Kotlin, Java)<br>• Development frameworks (React Native, Flutter)<br>Setting up development environments<br>• Backend Development and Integration<br>• Overview of backend technologies<br>• RESTful APIs and integration with cloud services<br>• Data storage and management<br>Developing mHealth Features<br>• Implementing health-related features (monitoring, alerts, reminders)<br>• Utilizing mobile sensors and wearables<br>• Integration with third-party health services | **24** |
| **4** | **Testing and Deployment of mHealth Applications**<br>Testing Mobile Applications<br>• Types of testing (unit, integration, user acceptance)<br>• Automated testing tools and frameworks<br>• Ensuring app performance and reliability<br>Deployment and Distribution<br>• App store guidelines (Apple App Store, Google Play)<br>• Continuous integration and deployment (CI/CD) practices<br>• Post-deployment monitoring and updates<br>Security and Maintenance<br>• Ensuring data security and user privacy<br>• Handling updates and maintenance<br>• Responding to security incidents | **24** |
| **5** | **Emerging Trends and Future Directions in mHealth**<br>Artificial Intelligence and Machine Learning<br>• AI applications in mHealth<br>• Machine learning models for health data<br>• Ethical considerations of AI in healthcare<br>Telemedicine and Remote Monitoring<br>• Technologies enabling telemedicine<br>• Design approach for remote patient monitoring<br>• Case studies and future outlook<br>Wearable's and IoT in Healthcare<br>• Overview of healthcare wearable's<br>• Integration with IoT devices<br>• Future trends in wearable technology | **24** |
| **Total** | | **120 hrs** |

**Bibliography:**


1. "mHealth: Transforming Healthcare" by Robert S. H. Istepanian, Bryan Woodward
2. "Healthcare Information Technology Exam Guide for CHTS and CAHIMS Certifications" by Kathleen A. McCormick, Brian Gugerty
3. "Designing for Emerging Technologies: UX for Genomics, Robotics, and the Internet of Things" by Jonathan Follett
4. "Health Informatics: Practical Guide" by William R. Hersh
5. "Mobile Health: Sensors, Analytic Methods, and Applications" by James M. Rehg, Susan Murphy, Santosh Kumar

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|---|---|
| **Name of the Program** | **M.Sc. Health Informatics** |
| **Semester** | **Semester III** |
| **Name of the Subject** | **Machine Learning in Healthcare** |
| **Subject Code** | **MHIMT 117 P** |

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| **Learning Outcomes** | • Understand the basics of Machine Learning<br>• Understanding and application of the ANNs<br>• Understand and analyze the main challenges of ML models<br>• Understanding and applications of various Classification Algorithms<br>• Understanding and applications of various Regression Algorithms<br>• Understand and analyze various ML model evaluation matrices |
| **Course Outcomes** | • Understand the fundamental concepts and techniques of machine learning.<br>• Gain proficiency in implementing machine learning algorithms using modern tools and frameworks.<br>• Learn to train, evaluate and improve machine learning models. |

| Sr. No. | Topics | No. of Hrs. |
|---|---|---|
| 1 | **Fundamentals of Machine Learning**<br>**Introduction:**<br>• What is AI?<br>• Examples of AI<br>• What is Machine Learning?<br>• Examples of Machine Learning<br>• What is Deep Learning?<br>• Example of Deep Learning<br>• AI vs Machine Learning vs Deep Learning<br>• How does Machine Learning work?<br>**Types of Machine Learning with examples:**<br>• Supervised Learning<br>• Unsupervised Learning<br>• Reinforcement Learning<br>• Instance-Based Learning Vs. Model-Based Learning<br>**Training, validation, and test sets**<br>**Jupyter Notebook Tutorial**<br>**The universal workflow of machine learning:**<br>• Defining the problem and assembling a dataset<br>• Choosing a measure of success<br>• Deciding on an evaluation protocol<br>• Preparing data<br>• Developing a model that does better than a baseline<br>• Scaling up: developing a model that overfits<br>• Regularizing the model and tuning the hyperparameters<br>**Dimensionality Reduction:**<br>• Feature Engineering<br>• Principal Component Analysis (PCA)<br>• Partial Least Squares | **20** |

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|---|---|---|
| 2 | **Introduction to Artificial Neural Networks**<br>Biological Neurons<br>Neural Networks<br>Artificial Neural Networks<br>Activation Functions<br>Feed Forward Neural Networks: The Perceptron<br>Multilayer Feed Forward Neural Networks | **20** |
| **3** | **Main Challenges of Machine Learning**<br>**Data pre-processing and feature learning:**<br>• Data Cleaning<br>• Handling Text and Categorical Attributes<br>• Custom transformers<br>• Feature Scaling<br>Classification vs. Regression<br>Insufficient Quantity of training data<br>Non-representative Training data<br>Poor-Quality Data<br>Irrelevant Features<br>Over fitting the training data<br>Under fitting the training data<br>Testing and Validating<br>Hyper parameter Tuning and Model Selection<br>Data Mismatch | **20** |
| **4** | **Classification Algorithms**<br>Decision Tree Classification<br>K-Nearest Neighbors (KNN)<br>Logistic Regression<br>Naïve Bayes<br>Random Forest Classification<br>Support Vector Machines (SVM) | **20** |
| **5** | **Regression Algorithms**<br>Linear / Ridge / Lasso Regression<br>Decision Tree Regression<br>Principal Components Regression<br>Polynomial Regression<br>Random Forest Regression<br>Support Vector Regression | **20** |
| **6** | **Select and Train a Model**<br>**Model Evaluation Metrics:**<br>• Confusion Matrix<br>• Jaccard Index<br>• Kolomogorov Smirnov chart<br>• Gini Coefficient etc.<br>Training & Evaluating on the Training set<br>Better Evaluation using Cross-validation<br>Fine Tuning the model<br>Ensemble Methods<br>Analyze the Best Models and Their Errors<br>Evaluate the developed model on the Test Set | **20** |
| **Total** | | **120 hrs** |

**Bibliography:**

1. Python Machine Learning by Sebastian Raschka and Vahid Mirjalili
2. Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow by Aurélien Géron
3. Introduction to Machine Learning with Python: A Guide for Data Scientists" by Andreas C. Müller and Sarah Guido

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|---|---|
| **Name of the Program** | **M.Sc. Health Informatics** |
| **Semester** | **Semester III** |
| **Name of the Subject** | **Data Visualization and Reporting in Healthcare** |
| **Subject Code** | **MHIMT 118 P** |

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| **Learning Outcomes** | • Understanding the basic concepts of Data Visualization<br>• Understanding and application of various visualization effect<br>• Understanding and application of Advanced Data Visualization Techniques<br>• Understanding about the various reporting techniques in Healthcare<br>• Understanding the recent data visualization and reporting technologies and future trends |
| **Course Outcomes** | • Understand the fundamentals of data visualization and reporting in the healthcare context.<br>• Gain proficiency in using modern data visualization tools and technologies and to learn best practices for data reporting and presentation<br>• Develop the ability to create clear and effective visualizations that communicate complex healthcare data. |

| Sr. No. | Topics | No. of Hrs. |
|---|---|---|
| 1 | **Introduction to Data Visualization**<br>Fundamentals of Data Visualization<br>• Definition and importance of data visualization<br>• Historical evolution and key milestones<br>• Principles of effective data visualization<br>Types of Data Visualization<br>• Common types of charts and graphs (bar, line, pie, scatter)<br>• Specialized healthcare visualizations (heat maps, time series, dashboards)<br>• Choosing the right visualization for the data<br>Tools and Software for Data Visualization<br>• Introduction to visualization tools (Tableau, Power BI, Qlik)<br>• Overview of programming languages (Python, R) and libraries (Matplotlib, Seaborn, ggplot2)<br>• Setting up visualization environments | **24** |
| 2 | **Designing Effective Visualizations**<br>Data Preparation and Cleaning<br>• Data sources and collection methods<br>• Data preprocessing techniques<br>• Handling missing and inconsistent data<br>Visual Design Principles<br>• Color theory and usage in visualizations<br>• Typography and layout considerations<br>• Accessibility and inclusivity in design<br>Storytelling with Data<br>• Crafting a narrative with data<br>• Techniques for highlighting key insights<br>• Case studies of effective data storytelling in healthcare | **24** |
| 3 | **Advanced Data Visualization Techniques** | **24** |

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|---|---|---|
| | Interactive Visualizations<br>• Creating interactive charts and dashboards<br>• Using tools like Tableau and Power BI for interactivity<br>• Implementing interactivity with D3.js<br>Geospatial Visualizations<br>• Introduction to geographic information systems (GIS)<br>• Visualizing healthcare data on maps<br>• Tools and libraries for geospatial visualization (Leaflet, GeoPandas)<br>Big Data Visualization<br>• Challenges of visualizing large datasets<br>• Techniques for handling and visualizing big data<br>• Using cloud-based tools for big data visualization (Google Data Studio, AWS Quick Sight) | |
| 4 | **Reporting in Healthcare**<br>Principles of Effective Reporting<br>• Components of a good report<br>• Structuring reports for different audiences<br>• Best practices for clear and concise reporting<br>Tools for Creating Reports<br>• Overview of reporting tools (Microsoft Excel, Power BI, Tableau)<br>• Integrating visualizations into reports<br>• Automation of report generation<br>Regulatory and Compliance Considerations<br>• Understanding healthcare regulations (HIPAA, GDPR)<br>• Ensuring data privacy and security in reports<br>• Ethical considerations in healthcare reporting | **24** |
| 5 | **Recent Technologies and Future Trends**<br>Machine Learning and AI in Data Visualization<br>• Leveraging machine learning for advanced visualizations<br>• AI-driven insights and automated analysis<br>• Tools and frameworks for integrating AI (Tensor Flow, Py Torch)<br>Real-Time Data Visualization<br>• Techniques for real-time data streaming and visualization<br>• Applications in healthcare monitoring and diagnostics<br>• Tools for real-time visualization (Grafana, Kibana)<br>Future Directions in Data Visualization<br>• Emerging technologies and trends<br>• The impact of virtual reality (VR) and augmented reality (AR) on data visualization<br>• The future of data visualization in healthcare | **24** |
| **Total** | | **120 hrs** |

**Bibliography:**

1. "Storytelling with Data: A Data Visualization Guide for Business Professionals" by Cole Nussbaumer Knaflic
2. "The Visual Display of Quantitative Information" by Edward R. Tufte
3. "Data Visualization: A Practical Introduction" by Kieran Healy
4. "Interactive Data Visualization for the Web" by Scott Murray
5. "Practical Tableau: 100 Tips, Tutorials, and Strategies from a Tableau Zen Master" by Ryan Sleeper

# SECOND YEAR

## M.Sc. HEALTH INFORMATICS

## SEMESTER- IV

| Code No. | Core Subject |
|---|---|
| **General Elective (Any one)** | |
| GE 001 T | Pursuit of Inner Self Excellence (POISE) |
| GE 002 T | Bioethics, Biosafety, IPR, and Technology Transfer |
| GE 003 T | Disaster Management and Mitigation Resources |
| GE 004 T | Human Rights |
| **Discipline Specific Core Practical** | |
| MHIMT 119 | Dissertation / Project* |
| **Internship** | |
| MHIMT 120 | Internship |

*(a) **Dissertation / Project Course** commences in III Semester

**(Elective): Any one subject is to be chosen from the following** (Subjects offered may change from time to time depending on the availability of expertise)

**Elective courses may or may not have practical and/or field work.

▲Multidisciplinary/ Interdisciplinary

# General Elective

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|---|---|
| **Name of the Program** | **M. Sc. Health Informatics** |
| **Semester** | **Semester - IV** |
| **Name of the Subject** | **Pursuit of Inner Self Excellence (POISE)** |
| **Subject Code** | **GE 001 T** |

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|---|---|
| **Learning Outcomes** | • Demonstrate self-awareness, decision-making, and problem-solving abilities for personal and professional growth.<br>• Develop resilience and stress management strategies to enhance mental well-being.<br>• Explore and utilize intrinsic motivation and emotional intelligence for career success.<br>• Practice empathy, compassion, and teamwork for collaborative engagement in society and industry. |

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| **Course outcomes** | • Develop self-reliance, decisiveness, and intuitive abilities to make informed academic and career choices.<br>• Enhance critical thinking and presentation skills for effective idea articulation.<br>• Explore and harness inner potential to enhance focus and success in research and technical fields.<br>• Apply stress management techniques for improved well-being and productivity.<br>• Foster empathy, compassion, teamwork, and ethical responsibility for professional and societal growth. |

| Sr. No. | Topics | No. of hrs. |
|---|---|---|
| 1 | **Spiritual Values for human excellence :**The value of human integration; Compassion, universal love and brotherhood (Universal Prayer) ;Heart based living ; Silence and its values, Peace and non-violence in thought, word and deed ; Ancient treasure of values - Shatsampatti, Patanjali's Ashtanga Yoga, Vedic education-The role of the Acharya, values drawn from various cultures and religious practices- Ubuntu, Buddhism, etc.: Why spirituality? Concept–significance: Thought culture | **15** |
| 2 | **Ways and Means :**Correlation between the values and the subjects ;Different teaching techniques to impart value education; Introduction to Brighter Minds initiative; Principles of Communication; Inspiration from the lives of Masters for spiritual values- Role of the living Master | **15** |
| 3 | **Integrating spiritual values and life:** Relevance of VBSE (Value Based Spiritual Education) in contemporary life; Significant spiritual values; Spiritual destiny; Principles of Self-management; Designing destiny | **15** |
| 4 | **Experiencing through the heart for self-transformation (Heartfulness Meditation):** Who am I?; Introduction to Relaxation; Why, what and how HFN Meditation?; Journal writing for Self-Observation; Why, what and how HFN Rejuvenation(Cleaning)?; Why, what and how HFN connect to Self (Prayer)?; Pursuit of inner self excellence; Collective Consciousness – concept of *egregore effect;* | **15** |
| **Total** | | **60 hrs.** |

**Bibliography:**

1. www.pdfdrive.net
2. www.khanacademy.org
3. www.acadeicearths.org
4. www.edx.org
5. www.open2study.com
6. www.academicjournals.org

| Name of the Program | M. Sc. Health Informatics |
|---|---|
| Semester | Semester - IV |
| Name of the Subject | Bioethics, Biosafety, IPR, and Technology Transfer |
| Subject Code | GE 002 T |

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| **Learning Outcomes** | • Apply biosafety measures and laboratory safety protocols to ensure a secure research environment.<br>• Assess ethical concerns in biotechnology, healthcare, and biomedical research.<br>• Interpret and implement policies on intellectual property rights (IPR) and technology transfer.<br>• Evaluate legal and regulatory compliance in laboratory and institutional settings.<br>• Communicate bioethical principles effectively to diverse stakeholders.<br>• Mediate ethical conflicts in research and industry through critical reasoning and negotiation. |
| **Course Outcomes** | • Implement biosafety and risk management protocols to ensure health and safety in biological laboratories.<br>• Provide informed and professional guidance on bioethics, safety regulations, and intellectual property rights.<br>• Ensure institutional compliance with legal frameworks and effectively coordinate with regulatory authorities.<br>• Develop effective communication strategies to foster ethical decision-making and knowledge dissemination.<br>• Mediate and manage ethical conflicts in research, biotechnology, and healthcare settings.<br>• Demonstrate professional integrity and respect for diverse opinions in ethical and legal discussions. |

| Sr. No. | Topics | No. of hrs. |
|---|---|---|
| 1 | **Ethics**: Benefits of Allied Health Sciences, ELSI of Bioscience, recombinant the therapeutic products for human healthcare, genetic modifications and food consumption, release of genetically engineered organisms, applications of human genetic r DNA research, human embryonic stem cell research. | **15** |
| 2 | **Patenting:** Patent and Trademark, Bio science products and processes, Intellectual property rights, Plant breeders rights, trade marks, industrial designs, copyright biotechnology in developing countries. Biosafety and its implementation, Quality control in Biotechnology. | **15** |
| 3 | **Introduction to quality assurance, accreditation & SOP writing: Concept** of ISO standards and certification, National regulatory body for accreditation, Quality parameters, GMP & GLP, Standard operating procedures, Application of QA in field of genetics, Data management of clinical and testing laboratory. | **15** |
| 4 | **Funding Agencies** (Financing alternatives, VC funding, funding for Bioscience in India, Exit strategy, licensing strategies, valuation), support mechanisms for entrepreneurship (Bio-entrepreneurship efforts in India, difficulties in India experienced, organizations supporting group with, areas of scope, funding agencies in India, policy initiatives), Role of knowledge centers and R&D (knowledge centers like universities and research institutions, role of technology and up gradation) | **15** |
| **Total** | | **60 hrs** |

**Bibliography:**

1. www.pdfdrive.net
2. www.khanacademy.org
3. www.acadeicearths.org
4. www.edx.org
5. www.open2study.com
6. www.academicjournals.org

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|---|---|
| **Name of the Program** | **M. Sc. Health Informatics** |
| **Semester** | **Semester - IV** |
| **Name of the Subject** | **Disaster management and mitigation resources** |
| **Subject Code** | **GE 003 T** |

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| **Learning Outcomes** | • Explain disaster types, their impact, and public health consequences.<br>• Assess risk factors and apply disaster preparedness and mitigation strategies.<br>• Evaluate international disaster risk reduction frameworks (UNISDR, DRR) and their effectiveness.<br>• Formulate public health response plans to minimize disaster impact. |
| **Course Outcomes** | • Explain the fundamentals of disaster phenomena, their contextual aspects, and public health consequences.<br>• Analyze international disaster risk reduction (DRR) frameworks and their implementation strategies.<br>• Evaluate disaster impact assessments and design effective public health response strategies. |

| Sr. No. | Topics | No. of hrs. |
|---|---|---|
| 1 | **Introduction:** Definition of Disaster, hazard, global and Indian scenario, general perspective, importance of study in human life, Direct and indirect effects of disasters, long term effects of disasters. Introduction to global warming and climate change. | **8** |
| 2 | **Natural Disaster and Manmade disasters:** Natural Disaster: Meaning and nature of natural disaster, Flood, Flash flood, drought, cloud burst, Earthquake, Landslides, Avalanches, Volcanic eruptions, Mudflow, Cyclone, Storm, Storm Surge, climate change, global warming, sea level rise, ozone depletion Manmade Disasters: Chemical, Industrial, Nuclear and Fire Hazards. Role of growing population and subsequent industrialization, urbanization and changing life style of human beings in frequent occurrences of manmade disasters. | **15** |
| 3 | **Disaster Management, Policy and Administration:** Disaster management: meaning, concept, importance, objective of disaster management policy, disaster risks in India, Paradigm shift in disaster management. Policy and administration: Importance and principles of disaster management policies, command and co-ordination of in disaster management, rescue operations-how to start with and how to proceed in due course of time, study of flow charts showing the entire process. | **12** |
| 4 | **Financing Relief Measures:** Ways to raise finance for relief expenditure, role of government agencies and NGO's in this process, Legal aspects related to finance raising as well as overall management of disasters. Various NGO's and the works they have carried out in the past on the occurrence of various disasters, Ways to approach these teams. International relief aid agencies and their role in extreme events. | **13** |
| 5 | **Preventive and Mitigation Measures:** Pre-disaster, during disaster and post disaster measures in some events in general structural mapping: Risk mapping, assessment and analysis, sea walls and embankments, Bio shield, shelters, early warning and communication Non Structural Mitigation: Community based disaster preparedness, risk transfer and risk financing, capacity development and training, awareness and education, contingency plans. Do's and don'ts in case of disasters and effective implementation of relief aids. | **12** |
| **Total** | | **60 hrs.** |

**Bibliography:**

1. Shailendra K. Singh: Safety & Risk Management, Mittal Publishers
2. J. H. Diwan: Safety, Security & Risk Management, APH
3. Stephen Ayers & Garmvik: Textbook of Critical Care, Holbook and Shoemaker
4. www.pdfdrive.net
5. www.khanacademy.org
6. www.acadeicearths.org
7. www.edx.org
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| **Name of the Program** | **M. Sc. Health Informatics** |
| **Semester** | **Semester - IV** |
| **Name of the Subject** | **Human Rights** |
| **Subject Code** | **GE 004 T** |

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|---|---|
| **Learning Outcomes** | • Analyze human rights frameworks at national and international levels.<br>• Interpret case laws, tribunal decisions, and human rights treaties.<br>• Design policies and advocacy strategies for human rights protection.<br>• Demonstrate legal and non-legal approaches to human rights promotion. Engage in informed discussions and constructive debates on human rights issues. |
| **Course Outcomes** | • Identify and contextualize human rights issues within national and international frameworks.<br>• Critically evaluate human rights cases, tribunal decisions, and treaty reports.<br>• Formulate human rights-based policies and interventions for legal and social advocacy.<br>• Advocate for human rights through legal and non-legal mechanisms.<br>• Engage in informed discussions and debates on human rights with constructive reasoning. |

| Sr. No. | Topics | No. of hrs. |
|---|---|---|
| 1 | **Background:** Introduction, Meaning, Nature and Scope, Development of Human Rights, Theories of Rights, Types of Rights | **8** |
| 2 | **Human rights at various level:** Human Rights at Global Level UNO, Human Rights – UDHR 1948– UN Conventions on Human Rights: International Covenant on civil and Political Rights 1966, International Convent on Economic, Social and Cultural Right, Racial Discrimination -1966 International, Instruments: U.N. Commission for Human Rights, European Convention on Human Rights. | **15** |
| 3 | **Human rights in India**: Development of Human Rights in India, Human Rights and the Constitution of India, Protection of Human Rights Act 1993- National Human Rights Commission, State Human Rights Commission, Composition Powers and Functions, National Commission for Minorities, SC/ST and Woman | **12** |
| 4 | **Human Rights Violations:** Human Rights Violations against Women, Human Rights Violations against Children, 35 Human Rights Violations against Minorities SC/ST and Trans-genders, Preventive Measures | **13** |
| 5 | **Political issues**: Political Economic and Health Issues, Poverty, Unemployment, Corruption and Human Rights, Terrorism and Human Rights, Environment and Human Rights, Health and Human Rights | **12** |
| **Total** | | **60 hrs.** |

**Bibliography:**

1. Jagannath Mohanty Teaching of Humans Rights New Trends and Innovations Deep & Deep Publications Pvt. Ltd. New Delhi 2009
2. Ram Ahuja: Violence Against Women Rawat Publications Jewahar Nager Jaipur. 1998.
3. Sivagami Parmasivam Human Rights Salem 2008
4. Hingorani R. C.: Human Rights in India: Oxford and IBA New Delhi.

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|---|---|
| **Name of the Program** | **M. Sc. Health Informatics** |
| **Semester** | **Semester IV** |
| **Name of the Subject** | **Dissertation / Project Work** |
| **Subject Code** | **MHIMT 119** |

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| **Learning Outcomes** | • Apply informatics principles to design and develop healthcare solutions.<br>• Ensure compliance with industry standards such as HL7, FHIR, and HIPAA.<br>• Analyze healthcare challenges and propose effective IT solutions.<br>• Manage healthcare IT projects, ensuring secure, interoperable, and data-driven system implementation.<br>• Demonstrate critical thinking and problem-solving skills for Health IT innovation.<br>• Communicate effectively with healthcare professionals and IT teams to facilitate collaboration.<br>• Test, evaluate, and optimize healthcare systems to enhance usability, cybersecurity, and efficiency.<br>• Prepare for real-world Health IT innovation and implementation through hands-on experience. |
| **Course Outcomes** | • Develop healthcare informatics solutions that align with industry standards and regulatory requirements.<br>• Evaluate healthcare challenges and design innovative IT-based interventions.<br>• Implement secure and interoperable health information systems using industry frameworks.<br>• Demonstrate project management skills to plan, execute, and optimize healthcare IT projects.<br>• Collaborate effectively with multidisciplinary teams to integrate healthcare and IT expertise.<br>• Assess system performance through testing and optimization to improve cybersecurity and efficiency. |

**The Dissertation work will begin from 3rdSemester and will continue through the 4thSemester. (330 hrs.)**

1. Dissertation/Project work should be carried out as an individual Dissertation.
2. The students will carry independent project work under the supervision of the staff of Department on the topic assigned to him/her. In house projects are encouraged. Students may be allowed to carry out the project work in other Departmental laboratories/ Research institutes / Industries as per the availability of Infrastructure.
3. Co-guides from the other institutions may be allowed.
4. The Dissertation/ Project work will begin from 3rd Semester, and will continue through the 4th Semester.
5. The Dissertation/ Project report (also developed application shall be presented at the time of presentation and viva voce) will be submitted at the end of the 4th Semester and evaluated.
6. Five copies of the project report shall be submitted to the Director, SBS.
7. To conduct of the End Semester Examination and evaluation of Dissertation/ Project work the University will appoint External Examiners.
8. Since the dissertation is by research, Dissertation/ Project work carries a total of 250 marks and evaluation will be carried out by both internal and external evaluators.
9. The student has to defend his/her Dissertation/Project Work in a seminar which will be evaluated by an internal and external experts appointed by the University.
10. The assignment of marks for Project/ Dissertation is as follows:

    Part I -

    Topic Selection, Review of Literature, Novelty of works-50 marks

    Part II

    a. Continuous Internal Assessment, Novelty, Overall Work Culture- 100Marks
    b. Dissertation/ Project work book: 50 Marks
    c. Viva- Voce: 50 Marks
    d. However, a student in 4th semester will have to opt for general elective course from other related disciplines in addition to his Dissertation/ Project work in the parent department.

# Course Code MHIMT 120: Internship

To provide a structured learning experience that enhances students' technical, analytical, and professional skills while addressing the evolving needs of healthcare organizations. By integrating academic knowledge with hands-on practice, these internships prepare Health Informatics students to become competent professionals capable of driving digital transformation in healthcare. **(Total- 210 hrs.)**

## Scheme of University Examination Theory for PG Program:

General structure / patterns for setting up question papers for Theory / Practical courses, their evaluation weightages for PG programs of MGMSBS are given in the following tables

### Marks scheme for the University exam:

Final theory marks will be 100 marks (80 marks University Theory exam + 20 Marks Internal assessment).

| Question | | Marks distribution | Marks allotted per section | Marks |
|---|---|---|---|---|
| Sec: A | VSAQ | 5/6 x 2 M = 10 | 10 | 10 |
| Sec: B | SAQ | 3/4 x 5 M = 15 | 15 | 35 |
| Sec: B | LAQ | 2/3 x 10 M = 10 | 20 | |
| Sec: C | SAQ | 3/4 x 5 M = 15 | 15 | 35 |
| Sec: C | LAQ | 2/3 x 10 M = 10 | 20 | |
| **Total** | | | | **80 Marks** |

### Practical exam pattern: Total 40 marks with following breakup

| Exercise | Description | Marks |
|---|---|---|
| Q No (1-4) | Implementation<br>(Code functionality structure and readability etc.) | 4x5=20 M |
| Q No 5 | Conceptual Understanding<br>(Fundamental Principles and application knowledge etc.) | 1x5=05 M |
| Q No 6 | Problem Solving Skills<br>(Logical thinking, debugging and troubleshooting etc.) | 1x5=05 M |
| Q No 7 | Documentation and Presentation / VIVA<br>(Code documentation and explanation) | 10 M |
| **Total** | | **40 Marks** |

**Practical to be conducted at respective departments and marks submitted jointly by the parent department to the university.**

### Breakup of theory IA calculation for 20 marks

| Description | Marks |
|---|---|
| Internal exam (at department) | 15 marks |
| Seminar | 5 marks |
| **Total** | **20 Marks** |

**Breakup of practical IA calculation:**

| **Description** | **Marks** |
|---|---|
| Internal exam (at department) | 10 marks |
| Viva | 5 marks |
| Journal | 5 marks |
| **Total** | **20 Marks** |

**Note** –20 marks to be converted to 10 marks weightage for submission to the university.

**Semester III – Dissertation (PG) (Internal Assessment)**

| **Dissertation/Project Proposal : overall performance of the student** | **Marks allotted** | **Marks Obtained** |
|---|---|---|
| Open mindedness/ Receptivity to feedback Integrates feedback | 5 Marks | |
| Meets deadlines / Regularity in meeting / Consistency in communication | 10 Marks | |
| **Continuous Internal evaluation (CIE)** | | |
| Interest shown in selecting topic | 5 marks | |
| Appropriate review | 10 marks | |
| Discussion with guide and other faculty | 10 marks | |
| Quality of protocol | 5marks | |
| Preparation of proforma / log book / daily reports | 5marks | |
| **TOTAL** | **Out of 50** | |

**Semester IV - Evaluation parameter (Dissertation / Project)**

| Evaluation parameter (Semester IV) | Continuous Internal Evaluation (CIE) | Semester End Evaluation (SEE) | |
|---|---|---|---|
| | Guide | Internal examiner | External examiner |
| Thesis preparation, Novelty, Overall Lab Work Culture | 25 | - | - |
| Dissertation/Project work book | 25 | 25 | 25 |
| Evaluation of thesis including Viva Voce | - | 50 | 50 |
| Total | 50 | 75 | 75 |
| **Overall Total = 200** | | | |

## Semester IV - Evaluation of the MHIMT 120: Internship

Name of the student: _____Date:_____

Program: _____

Semester: _____ Name of the internal faculty/Observer: _____

Name of the External Faculty/Observer:_____

# Final Evaluation (50 Marks)

1. Technical Knowledge & Application (10 marks): _____
2. Problem-Solving & Critical Thinking (5 marks): _____
3. Communication & Teamwork (5 marks): _____
4. Professionalism & Punctuality (5 marks): _____
5. Quality of Log Book Maintenance (5 marks): _____
6. Learning Outcome & Skill Development (5 marks): _____
7. Final Internship Report Quality (5 marks): _____
8. Student's Initiative & Engagement (5 marks): _____
9. Overall Performance (5 marks): _____
10. Total: _____
11. **Final Remark:**

    _____

    _____

Sign of Internal Examiner: _____

Sign of External Examiner: _____

# MGM SCHOOL OF BIOMEDICAL SCIENCES

**(A constituent unit of MGM INSTITUTE OF HEALTH SCIENCES)**
(Deemed to be University u/s 3 of UGC Act 1956)
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Sector 1, Kamothe, Navi Mumbai-410209, Tel.No.: 022-2743763, 27437632, 27432890
Email. sbsnm@mgmuhs.com/ Website: www.mgmsbsnm.edu.in

## Department of Health Informatics

# Internship Logbook

## *MASTER IN HEALTH INFORMATICS*

**STUDENT NAME:** _____

**PRN NUMBER:** _____

**BATCH:** _____

**SEMESTER:**_____

**PERIOD FROM:**_____**TO**_____

**COORDINATOR** **HOD** **DIRECTOR**

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**AIM:**

To provide a structured learning experience that enhances students' technical, analytical, and professional skills while addressing the evolving needs of healthcare organizations. By integrating academic knowledge with hands-on practice, these internships prepare Health Informatics students to become competent professionals capable of driving digital transformation in healthcare.

Guidelines:

1. The internship shall commence after the student has completed and passed all subjects up to Semester III
2. The internship is compulsory
3. The duration of the internship shall be 210 Hours.
4. Activities carried out by the student during the internship must be clearly mentioned.

**Evaluation of Internees:**

**Formative Evaluation:** The continuous assessment of interns during their internship should be conducted by the Head of the Department, assigned faculty, or a designated individual from the organization (in the case of industry-based internships). The primary objective of this evaluation is to ensure that interns develop the necessary competencies to function effectively in real-world scenarios. This can be facilitated through the maintenance of records or a logbook by all interns. Such documentation serves as tangible evidence of the training process and, more importantly, reflects the intern's progression in acquiring the required competencies for professional performance.

**Summative Evaluation:** It will be based on the observations of the assigned person from the Department/Organization and record/logbook maintained by the intern.

Based on this two evaluations, the Head of the Department shall issue certificate of satisfactory completion of the training.

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## DEPARTMENT OF HEALTH INFORMATICS

## Internship Completion Certificate

**Class:** _____ **Year:** _____

This is to certify that_____, bearing PRN_____,

has successfully completed the internship at _____ from _____to_____. During this period, the student has completed a total of **210 hours** of internship, as per the university guidelines.

The student demonstrated a high level of professionalism, technical competence, and problem-solving skills.

We wish him/her success in his/her future endeavours.

| | |
|---|---|
| Head of the Department<br>Dept. of Health Informatics<br>MGMSBS, MGMIHS | Director<br>MGMSBS<br>Kamothe, Navi Mumbai |

# Weekly Summary Report

**Week**: _____

**Total Hours Completed This Week**: _____

**Key Activities Performed**:

---

**Challenges Faced & How They Were Addressed**:

---

**New Skills Acquired**:

---

**Comments by Internship Supervisor**:

---

## STUDENT'S DAILY LOG

| Date/Da | Task & Activities | Skill gained | Hours Completed | Supervisor Signature |
|---|---|---|---|---|
| | | | | |

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## Final Evaluation

1. Technical Knowledge & Application (1-10): _____
2. Problem-Solving & Critical Thinking (1-5): _____
3. Communication & Teamwork (1-5): _____
4. Professionalism & Punctuality (1-5): _____
5. Quality of Log Book Maintenance (1-5): _____
6. Learning Outcome & Skill Development (1-5): _____
7. Final Internship Report Quality (1-5): _____
8. Student's Initiative & Engagement (1-5): _____
9. Overall Performance (1-5): _____
10. Total: _____
11. **Final Comments**:

**Evaluator Signature & Date**: _____

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