MGM INSTITUTE OF HEALTH SCIENCES

(Deemed to be University u/s 3 of UGC Act, 1956)
Grade 'A++' Accredited by NAAC
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CHOICE BASED CREDIT SYSTEM (CBCS)

(with effect from 2025-2026 Batches)

Curriculum for

M.Sc. Health Informatics

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

Amended History

1. Amended as per AC-51/2025, [Resolution No.3.1(Annexure-3.14)], [Resolution No.3.5, (Annexure-7); Dated 29/04/2025.

Resolution No. 3.1 of Academic Council (AC-51/2025):

Resolved to approve the CBCS syllabus, including Program Outcomes (POs), Course Outcomes (COs), and PO-CO Mapping for 15 two-year postgraduate programs under MGMSBS for Semesters I and II. These include: M.Sc. Medical Biotechnology , M.Sc. Medical Genetics , M.Sc. Clinical Embryology , M.Sc. Clinical Nutrition , M.Sc. Medical Dialysis Technology , M.Sc. Molecular Biology , M.Sc. Medical Radiology & Imaging Technology , M.Sc. Cardiac Care Technology , M.Sc. Operation Theatre and Anaesthesia Technology , M.Sc. Emergency and Trauma Care , M. Optometry , Master in Hospital Administration , Master of Public Health , **M.Sc. Health Informatics** & M.Sc. Clinical Research to be effective from batch admitted in Academic Year 2025-26 onwards [ANNEXURE-3.1 to 3.30].

Annexure-3.14 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
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CHOICE BASED CREDIT SYSTEM (CBCS)

(Academic Year 2025 - 26)

Curriculum for

M.Sc. Allied Health Sciences

M.Sc. Health Informatics

Semester I & II

DIRECTOR'S MESSAGE

Welcome Message from the Director

Dear Postgraduate Students,

Welcome to **MGM School of Biomedical Sciences (MGMSBS), MGMIHS**, a premier institution dedicated to advancing allied and health sciences education. As you embark on this transformative academic journey, you are joining a community that fosters excellence in research, clinical expertise, and innovation**.**

MGMIHS, accredited with **NAAC 'A^{++}' Grade (CGPA 3.55, 2022)** and recognized as a **Category I Institution by UGC**, offers an ecosystem that nurtures both academic and professional growth. With **NIRF (151-200 rank band) recognition, NABH-accredited hospitals, NABL-accredited diagnostic labs, and JCI accreditation for MGM New Bombay Hospital**, we uphold global benchmarks in education and healthcare.

At MGMSBS, our **15 postgraduate programs** are meticulously designed to align with the National Commission for Allied and Healthcare Professionals **(NCAHP)** standards**,** National Education Policy **(NEP)** 2020**,** and the National Credit Framework **(NCrF).** We have implemented the **Choice-Based Credit System (CBCS)** to provide academic flexibility while ensuring rigorous training in clinical and technical skills**.** Our state-of-the-art research laboratories, digital classrooms, and the Central Research Laboratory (CRL) foster an environment that encourages innovation and evidence-based learning**.**

Postgraduate education at MGMSBS goes beyond theoretical learning—our curriculum integrates **hands-on clinical training, interdisciplinary collaboration, and exposure to real-world healthcare challenges**. We emphasize **research-driven education**, encouraging students to actively participate in **scientific discoveries, publications, and international collaborations**.

Beyond academics, we believe in **holistic development**, with initiatives such as the **AARAMBH Science and Wellness Club**, which promotes **mental well-being, leadership, and professional networking**.

As you step into this **next phase of academic and professional growth**, we encourage you to explore new ideas, engage in impactful research, and contribute meaningfully to the **healthcare ecosystem**. We are confident that your journey at MGMSBS will shape you into **skilled, compassionate, and visionary professionals**, ready to lead in the ever-evolving healthcare landscape.

We look forward to witnessing your achievements and contributions!

Dr. Mansee Thakur
Director, MGM School of Biomedical Sciences
MGM Institute of Health Sciences, Navi Mumbai

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 23 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 **800** 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 analyzing 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(s)
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, critical thinking and ethical reasoning to address societal challenges, uphold human rights, manage crises, and apply bioethical principles in healthcare and research.
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.

Semester I

MHIMT 101 T	Basics of Health Informatics & Health Information Management	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Develop a comprehensive understanding of healthcare systems and the role of health information in improving patient care.	**PO1, PO3**	Lecture, Demonstration, Group Discussion, Quiz, Assignment, Seminar	Internal Exam, University Exam (Theory Exam), Seminar, Assignment
CO2	Gain proficiency in managing health records, including the legal aspects, documentation, and quality control.	**PO1, PO3**	Lecture, Demonstration, Group Discussion, Quiz, Assignment, Seminar	Internal Exam, University Exam (Theory Exam), Seminar, Assignment
CO3	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.	**PO1, PO3**	Lecture, Demonstration, Group Discussion, Quiz, Assignment, Seminar	Internal Exam, University Exam (Theory Exam), Seminar, Assignment
CO4	Explore emerging trends in health informatics and their implications for future healthcare.	**PO1, PO3**	Lecture, Demonstration, Group Discussion, Quiz, Assignment, Seminar	Internal Exam, University Exam (Theory Exam), Seminar, Assignment
CO5	Apply theoretical knowledge to practical scenarios in health information management and informatics.	**PO1, PO3**	Lecture, Demonstration, Group Discussion, Quiz, Assignment, Seminar	Internal Exam, University Exam (Theory Exam), Seminar, Assignment
MHIMT 102 T	**Hospital Administration and Healthcare Financing**	**Mapped POs**	**Teaching-Learning Methodologies**	**Assessment Tools**
CO1	Understand and apply healthcare management principles and policies.	**PO3**	Lecture, Demonstration, Group Discussion, Quiz, Assignment, Seminar	Internal Exam, University Exam (Theory Exam), Seminar, Assignment
CO2	Analyze the financial management strategies and budgeting within healthcare organizations.	**PO6**	Lecture, Demonstration, Group Discussion, Quiz, Assignment, Seminar	Internal Exam, University Exam (Theory Exam), Seminar, Assignment
CO3	Implement quality improvement and patient safety protocols.	**PO3, PO5**	Lecture, Demonstration, Group Discussion, Quiz, Assignment, Seminar	Internal Exam, University Exam (Theory Exam), Seminar, Assignment
CO4	Navigate health economics, healthcare finance, and insurance systems.	**PO6**	Lecture, Demonstration, Group Discussion, Quiz, Assignment, Seminar	Internal Exam, University Exam (Theory Exam), Seminar, Assignment
CO5	Develop skills in resource tracking, management, and financial auditing in the healthcare sector.	**PO3, PO6**	Lecture, Demonstration, Group Discussion, Quiz, Assignment, Seminar	Internal Exam, University Exam (Theory Exam), Seminar, Assignment

CC 001 T & CC 001 P	Research Methodology & Biostatistics (Core Course)	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Understand the basic concepts of biostatistics and their application in research	**PO2**	Lecture, Demonstration, Practical, Assignment, Seminar	Internal Exam, University Exam (Theory Exam, Practical Exam), Assignment
CO2	Describe the appropriate statistical methods required for a particular research design	**PO2**	Lecture, Demonstration, Practical, Assignment, Seminar	Internal Exam, University Exam(Theory Exam, Practical Exam), Assignment
CO3	Develop an appropriate framework for research studies and Data Analysis	**PO2**	Lecture, Demonstration, Practical, Assignment, Seminar	Internal Exam, University Exam (Theory Exam, Practical Exam), Assignment
MHIMT 103 E	**Fundamentals of Computer Application (Experiential)**	**Mapped POs**	**Teaching-Learning Methodologies**	**Assessment Tools**
CO1	Understand the basics of computer hardware and software, various windows accessories and the functioning of the control panel	**PO4**	Practical, Experiential, Assignment, Problem Based Learning, E-learning	University Exam (Experimental), Viva-Voice
CO2	Demonstrate Skill in essential Microsoft Office applications	**PO4**	Practical, Experiential, Assignment, Problem Based Learning, E-learning	University Exam (Experimental), Viva-Voice
CO3	Apply database management system concepts when designing the different database objects.	**PO4**	Practical, Experiential, Assignment, Problem Based Learning, E-learning	University Exam (Experimental), Viva-Voice
CO4	Demonstrate Skill in Using Computer Networks, network topologies and Devices.	**PO4**	Practical, Experiential, Assignment, Problem Based Learning, E-learning	University Exam (Experimental), Viva-Voice
CO5	Understanding about emerging computer technologies like Blockchain, Machine Learning.	**PO4**	Practical, Experiential, Assignment, Problem Based Learning, E-learning	University Exam (Experimental), Viva-Voice
MHIMT 104 P	**Python Basics**	**Mapped POs**	**Teaching-Learning Methodologies**	**Assessment Tools**
CO1	Develop a solid understanding of Python's syntax and semantics, including data types, variables, operators, and basic control structures.	**PO4**	Practical, Assignment, Problem Based Learning, E-learning	Internal Exam, University Exam, (Practical Exam), Viva-Voice
CO2	Demonstrate Competency in working with Python's core data structures, including lists, ranges, tuples, dictionaries, and sets.	**PO4**	Practical, Assignment, Problem Based Learning, E-learning	Internal Exam, University Exam, (Practical Exam), Viva-Voice
CO3	Handle input and output operations in Python, including reading from	**PO4**	Practical, Assignment, Problem Based Learning, E-learning	Internal Exam, University Exam,

	and writing to files, and interacting with user input in a robust manner.			(Practical Exam), Viva-Voice
CO4	Apply the principles of modular programming by defining and using functions, including the use of parameters, return values, and variable scope.	**PO4**	Practical, Assignment, Problem Based Learning, E-learning	Internal Exam, University Exam, (Practical Exam), Viva-Voice
CO5	Acquire the ability to implement object-oriented programming concepts in Python, such as classes, objects, inheritance, and polymorphism, to create reusable and maintainable code.	**PO4**	Practical, Assignment, Problem Based Learning, E-learning	Internal Exam, University Exam, (Practical Exam), Viva-Voice
CO6	Master the techniques for managing errors and exceptions in Python, ensuring that programs can handle unexpected situations gracefully and continue to operate correctly.	**PO4**	Practical, Assignment, Problem Based Learning, E-learning	Internal Exam, University Exam, (Practical Exam), Viva-Voice
CO7	Explore the use of regular expressions in Python for pattern matching and text processing, gaining the ability to handle complex string manipulation tasks.	**PO4**	Practical, Assignment, Problem Based Learning, E-learning	Internal Exam, University Exam, (Practical Exam), Viva-Voice

Semester II

MHIMT 105 T & MHIMT 109 E	Advanced Health Informatics & HI Practicum	Mapped POs	Teaching-Learning Methodologies	Assessment Tools
CO1	Understand the management of various advanced health informatics applications	**PO1, PO3, PO5**	Lecture, Demonstration, Experiential, Group Discussion, Assignment, Seminar, Problem Based Learning, E-learning, Case-Study	Internal Exam, University Exam (Theory Exam, Experimental), Logbook
CO2	Interpret the application of health informatics for managing patient data and supporting healthcare professionals in making a quality decision	**PO1, PO3, PO5**	Lecture, Demonstration, Experiential, Group Discussion, Assignment, Seminar, Problem Based Learning, E-learning, Case-Study	Internal Exam, University Exam (Theory Exam, Experimental), Logbook
CO3	Describe the content and features to be included in the informatics application to the application developer in making advance and expert informatics application	**PO1, PO3, PO5**	Lecture, Demonstration, Experiential, Group Discussion, Assignment, Seminar, Problem Based Learning, E-learning, Case-Study	Internal Exam, University Exam (Theory Exam, Experimental), Logbook
CO4	Identify the trends and emerging technology for informatics application in healthcare settings.	**PO1, PO3, PO5**	Lecture, Demonstration, Experiential, Group Discussion, Assignment, Seminar, Problem Based Learning, E-learning, Case-Study	Internal Exam, University Exam (Theory Exam, Experimental), Logbook
CO5	Recognize the future requirement using various approaches and prediction tools	**PO1, PO3, PO5**	Lecture, Demonstration, Experiential, Group Discussion, Assignment, Seminar, Problem Based Learning, E-learning, Case-Study	Internal Exam, University Exam (Theory Exam, Experimental), Logbook
CO6	Develop awareness, understanding and capacity in the specific roles and responsibilities of a health information management professional	**PO1, PO3, PO5**	Lecture, Demonstration, Experiential, Group Discussion, Assignment, Seminar, Problem Based Learning, E-learning, Case-Study	Internal Exam, University Exam (Theory Exam, Experimental), Logbook
CO7	Understand through an intensive experience the nature of hospitals and health care settings as workplaces and their associated values, routines and cultures	**PO1, PO3, PO5**	Lecture, Demonstration, Experiential, Group Discussion, Assignment, Seminar, Problem Based Learning, E-learning, Case-Study	Internal Exam, University Exam (Theory Exam, Experimental), Logbook
CO8	Develop skill and professional capacity for managing the health information system of a health care setting	**PO1, PO3, PO5**	Lecture, Demonstration, Experiential, Group Discussion, Assignment, Seminar, Problem Based Learning, E-learning, Case-Study	Internal Exam, University Exam (Theory Exam, Experimental), Logbook
CO9	Develop competency to plan, implement, and carry out a clinical	**PO1, PO3, PO5**	Lecture, Demonstration, Experiential, Group Discussion, Assignment,	Internal Exam, University Exam (Theory Exam,

	audit in the quality assurance cell		Seminar, Problem Based Learning, E-learning, Case-Study	Experimental), Logbook
CO10	Demonstrate competency to plan, implement, and carry out a claims processing in the health insurance department	**PO1, PO3, PO5, PO6**	Lecture, Demonstration, Experiential, Group Discussion, Assignment, Seminar, Problem Based Learning, E-learning, Case-Study	Internal Exam, University Exam (Theory Exam, Experimental), Logbook
MHIMT 106 T	**Clinical Workflow, Process Redesigning & Clinical Documentation Improvement (CDI)**	**Mapped POs**	**Teaching-Learning Methodologies**	**Assessment Tools**
CO1	Understand the concepts and importance of clinical workflow and process redesign, including the role of Clinical Documentation Improvement (CDI) programs and CDI specialists.	**PO1, PO3**	Lecture, Demonstration, Group Discussion, Quiz, Assignment, Seminar, Problem Based Learning, E-learning, Guest Lecture	Internal Exam, University Exam, (Theory Exam) Seminar, Assignment
CO2	Identify focus areas for medical documentation improvements and the benefits of CDI programs.	**PO1, PO3**	Lecture, Demonstration, Group Discussion, Quiz, Assignment, Seminar, Problem Based Learning, E-learning, Guest Lecture	Internal Exam, University Exam, (Theory Exam) Seminar, Assignment
CO3	Apply workflow analysis techniques to evaluate and document clinical processes, creating process maps to visualize workflows.	**PO1, PO3**	Lecture, Demonstration, Group Discussion, Quiz, Assignment, Seminar, Problem Based Learning, E-learning, Guest Lecture	Internal Exam, University Exam, (Theory Exam) Seminar, Assignment
CO4	Identify bottlenecks, inefficiencies, and areas for improvement in clinical processes, and apply knowledge of CDI metrics to measure improvement outcomes.	**PO1, PO3**	Lecture, Demonstration, Group Discussion, Quiz, Assignment, Seminar, Problem Based Learning, E-learning, Guest Lecture	Internal Exam, University Exam, (Theory Exam) Seminar, Assignment
CO5	Develop & Implement a plan for clinical process redesign, incorporating change management strategies to facilitate workflow optimization.	**PO1, PO3**	Lecture, Demonstration, Group Discussion, Quiz, Assignment, Seminar, Problem Based Learning, E-learning, Guest Lecture	Internal Exam, University Exam, Internal Exam, (Theory Exam) Seminar, Assignment
CO6	Apply various processes of a CDI program in both inpatient and outpatient settings, leveraging technology to enhance clinical workflow.	**PO1, PO3**	Lecture, Demonstration, Group Discussion, Quiz, Assignment, Seminar, Problem Based Learning, E-learning, Guest Lecture	Internal Exam, University Exam, (Theory Exam) Seminar, Assignment
CO7	Evaluate the role of technology in clinical workflow enhancement and apply CDI principles to improve documentation practices and quality metrics.	**PO1, PO3**	Lecture, Demonstration, Group Discussion, Quiz, Assignment, Seminar, Problem Based Learning, E-learning, Guest Lecture	Internal Exam, University Exam, (Theory Exam) Seminar, Assignment
MHIMT 107 T &	**Medical Language & International Classification of Disease Coding (Theory +**	**Mapped POs**	**Teaching-Learning Methodologies**	**Assessment Tools**

MHIMT 110 P	Practical)			
CO1	Describe medical terminologies and their components, including stem words/root, prefixes, and suffixes.	**PO1, PO3**	Lecture, Practical, Demonstration, Experiential, Group Discussion, Assignment, Seminar, Problem Based Learning, E-learning, Guest Lecture	Internal Exam, University Exam, (Theory Exam, Practical Exam), Viva-Voice
CO2	Explain the concepts of body systems and identify the terminologies related to body systems, diseases, diagnostic, therapeutic tests, and procedures.	**PO1, PO3**	Lecture, Practical, Demonstration, Experiential, Group Discussion, Assignment, Seminar, Problem Based Learning, E-learning, Guest Lecture	Internal Exam, University Exam, (Theory Exam, Practical Exam), Viva-Voice
CO3	Enumerate surgical procedures, diseases, disorders, and dysfunctions.	**PO1, PO3**	Lecture, Practical, Demonstration, Experiential, Group Discussion, Assignment, Seminar, Problem Based Learning, E-learning, Guest Lecture	Internal Exam, University Exam, (Theory Exam, Practical Exam), Viva-Voice
CO4	Develop an understanding of medical abbreviations, signs and symptoms and common medical terms.	**PO1, PO3**	Lecture, Practical, Demonstration, Experiential, Group Discussion, Assignment, Seminar, Problem Based Learning, E-learning, Guest Lecture	Internal Exam, University Exam, (Theory Exam, Practical Exam), Viva-Voice
CO5	Apply the principles of medical coding using various coding systems.	**PO1, PO3**	Lecture, Practical, Demonstration, Experiential, Group Discussion, Assignment, Seminar, Problem Based Learning, E-learning, Guest Lecture	Internal Exam, University Exam, (Theory Exam, Practical Exam), Viva-Voice
CO6	Explain how the disease classification system integrates with health information systems and supports healthcare data management.	**PO1, PO3**	Lecture, Practical, Demonstration, Experiential, Group Discussion, Assignment, Seminar, Problem Based Learning, E-learning, Guest Lecture	Internal Exam, University Exam, (Theory Exam, Practical Exam), Viva-Voice
MHIMT 108 T & MHIMT 111 P	**Medical Transcription & Editing (Theory + Practical)**	**Mapped POs**	**Teaching-Learning Methodologies**	**Assessment Tools**
CO1	Understand medical report formats, transcription principles, editing and proofreading rules specific to medical content.	**PO1, PO3**	Lecture, Practical, Demonstration, Experiential, Group Discussion, Assignment, Seminar, Problem Based Learning, E-learning, Case-Study, Guest Lecture	Internal Exam, University Exam, (Theory Exam, Practical Exam), Viva-Voice
CO2	Develop skill and knowledge to accurately transcribe and edit	**PO1, PO3**	Lecture, Practical, Demonstration, Experiential, Group	Internal Exam, University Exam, (Theory Exam,

	health-related information		Discussion, Assignment, Seminar, Problem Based Learning, E-learning, Case-Study, Guest Lecture	Practical Exam), Viva-Voice
CO3	Demonstrate Skill in using natural language processing and other transcription software and applications in Medical Transcribing.	**PO1, PO3**	Lecture, Practical, Demonstration, Experiential, Group Discussion, Assignment, Seminar, Problem Based Learning, E-learning, Case-Study, Guest Lecture	Internal Exam, University Exam, (Theory Exam, Practical Exam), Viva-Voice
DSE 001 P	**Web Development Basics (Practical)**	**Mapped POs**	**Teaching-Learning Methodologies**	**Assessment Tools**
CO1	Understand the fundamental concepts of web development.	**PO8**	Practical, Assignment, Problem Based Learning, E-learning, Guest Lecture	Internal Exam, University Exam (Practical Exam), Viva-Voice
CO2	Demonstrate skill in front-end and back-end web development.	**PO8**	Practical, Assignment, Problem Based Learning, E-learning, Guest Lecture	Internal Exam, University Exam (Practical Exam), Viva-Voice
CO3	Develop Skill to create responsive and dynamic websites.	**PO8**	Practical, Assignment, Problem Based Learning, E-learning, Guest Lecture	Internal Exam, University Exam (Practical Exam), Viva-Voice
DSE 002 P	**Advanced Python (Practical)**	**Mapped POs**	**Teaching-Learning Methodologies**	**Assessment Tools**
CO1	Understanding the core principles and exploring advanced features and libraries of Python	**PO7**	Practical, Assignment, Problem Based Learning, E-learning	Internal Exam, University Exam (Practical Exam), Viva-Voice
CO2	Develop ability to implement multithreaded programs in Python, intricacies of concurrent execution and thread management to improve application performance.	**PO7**	Practical, Assignment, Problem Based Learning, E-learning	Internal Exam, University Exam (Practical Exam), Viva-Voice
CO3	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.	**PO7**	Practical, Assignment, Problem Based Learning, E-learning	Internal Exam, University Exam (Practical Exam), Viva-Voice
CO4	Utilize Python for data analysis tasks, including data manipulation, statistical analysis, and visualization using libraries such as NumPy, pandas, and Matplotlib.	**PO7**	Practical, Assignment, Problem Based Learning, E-learning	Internal Exam, University Exam (Practical Exam), Viva-Voice

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 T	Basics of Health Informatics & Health Information Management	3	-	-	-	3	45	-	-	-	45	20	80	100
MHIMT 102 T	Hospital Administration and Healthcare Financing	4	-	-	-	4	60	-	-	-	60	20	80	100
CC 001 T	Research Methodology & Biostatistics (Core Course)	3	-	-	-	3	45	-	-	-	45	-	50	50
Discipiline Specific Core Practical / Experiential														
MHIMT 103 E	Fundamentals of Computer Application	-	-	-	12	4	-	-	-	180	180	-	50	50
MHIMT 104 P	Python Basics	-	-	8	-	4	-	-	120	-	120	10	40	50
CC 001 P	Research Methodology & Biostatistics (Core Course)	-	-	4	-	2	-	-	60	-	60	-	50	50
Total		10	0	12	12	20	150	0	180	180	510	50	350	400

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 T	Advanced Health Informatics & HI Practicum	3	-	-	-	3	45	-	-	-	45	20	80	100
MHIMT 106 T	Clinical Workflow, Process Redesigning & Clinical Documentation Improvement (CDI)	3	-	-	-	3	45	-	-	-	45	20	80	100
MHIMT 107 T	Medical Lanaguage & International Classification of Disease Coding	3	-	-	-	3	45	-	-	-	45	20	80	100
MHIMT 108 T	Medical Transcription & Editing	2	-	-	-	2	30	-	-	-	30	20	80	100
Discipiline Specific Core Practical / Experiential														
MHIMT 109 E	Advanced Health Informatics & HI Practicum	-	-	-	9	3	-	-	-	135	135	-	50	50
MHIMT 110 P	Medical Lanaguage & International Classification of Disease Coding	-	-	4	-	2	-	-	60	-	60	10	40	50
MHIMT 111 P	Medical Transcription & Editing	-	-	4	-	2	-	-	60	-	60	10	40	50
Discipline Specific Elective														
DSE 001 P	Web Development Basics (Optional 1)	-	-	6	-	3	-	-	90	-	90	10	40	50
DSE 002 P	Advanced Python (Optional 2)													
Total		11	0	14	9	21	165	0	210	135	510	110	490	600

T- Theory, P- Practical, E- Experiential

FIRST YEAR

M.Sc. Health Informatics

SEMESTER-I

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

Name of the Program	**M. Sc. Health Informatics**
Semester	**Semester I**
Name of the Subject	**Basics of Health Informatics & Health Information Management**
Subject Code	**MHIMT 101 T**

Learning Outcomes	• Understanding about healthcare delivery system and digital initiatives in India. • Understanding about Health Information management in various settings, Good medical records and recent advances in HIM • Understanding about Medical record management principles and techniques and applying them. • Analyzing various organizational aspect of HIM Services • Understanding and analyzing management of health data and Quality control • Understanding and applying statistical techniques to process health data • Understanding and analysis the need of computerized systems • Understanding and applying of various record keeping techniques • Understanding about Health Informatics and its impact on healthcare delivery • Understanding and analysis of various Health Information Systems, interoperability among various HISs and regulatory issues • Understanding and evaluating the emerging trends and future health informatics technologies • 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. • Gain proficiency in managing health records, including the legal aspects, documentation, and quality control. • 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. • Explore emerging trends in health informatics and their implications for future healthcare. • Apply theoretical knowledge to practical scenarios in health information management and informatics.

Sr. No.	Topics	No. of Hrs.
1	**Healthcare delivery system – An Overview** • Description of the organization and structure of healthcare in India • Funding mechanisms in India (out of pocket, private insurance, public insurance) • Digital health initiatives in India	2
2	**Introduction to Health Information Management** • Definition, Goals & Objective, Characteristics, Purpose, Values of Health	3

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

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

	• Ethical, legal, and social implications of adopting new technologies in healthcare	
11	**Future Directions and Challenges in Health Informatics** **Trends Shaping the Future of Health Informatics** • Predictions for the future of health IT and informatics • Emerging trends in research and development within the field • Potential challenges and opportunities for health informatics professionals **Case Studies and Practical Applications** • Analysis of real-world case studies highlighting successful health IT implementations • Practical applications of health informatics concepts in healthcare settings • Group projects or presentations on innovative uses of health IT solutions **Ethical and Social Considerations** • Ethical dilemmas in health informatics practice (e.g., privacy, data security) • Social implications of health IT adoption and usage • Strategies for addressing ethical challenges in health informatics	**5**
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 Program	**M.Sc. Health Informatics**
Semester	**Semester I**
Name of the Subject	**Hospital Administration and Healthcare Financing**
Subject Code	**MHIMT 102 T**

Learning Outcomes	• Understanding the basics of Healthcare management and Economics • To know the principles of organizational management in various healthcare settings • Understanding and evaluating healthcare finance and budgeting • To know the HR functions in a healthcare setting • To know how the administrators manages clinical and no clinical services • Understanding the various health insurance schemes and mechanism of financial protection • Understanding the Quality Assurance (QA) and how to improve it • Analyze the healthcare policies, regulations and ethical issues • Understanding about the planning and maintenance of hospital infrastructure and managing support services • Understanding hospital accounting
Course Outcomes	• Understand and apply healthcare management principles and policies. • Analyze the financial management strategies and budgeting within healthcare organizations. • Implement quality improvement and patient safety protocols. • Navigate health economics, healthcare finance, and insurance systems. • 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** • Definition and importance of management in healthcare • Key concepts in health economics: demand, supply, production, & market models • Principle of Management • Roles and functions of healthcare managers • Managerial skills and decision-making in healthcare • Basic requirement of IT infrastructure in Hospital • Health Information Management Systems (HIMS) requirements for hospitals and its components	**6**
2	**Organizational Management and Hospital Structures** • Principles of organizational management in healthcare • Organizational culture, values, and mission • Hospital organizational structures: Government, private, and not-for-profit • Management theories and their application in hospital settings • Indicators in Hospital	**6**
3	**Healthcare Finance and Budgeting** • Health financing functions and sources of revenue	**6**

	• Revenue collection and government financing of health services • Financial management and budgeting within healthcare organizations • Risk pooling, financial protection, and equality in health financing	
4	**Human Resource Management in Healthcare** • Overview of HR functions in healthcare settings • Recruitment, training, & development of healthcare staff • Leadership and team management in hospitals • Legal issues and performance appraisal in healthcare HR	**6**
5	**Clinical and Non-Clinical Services Management** • Overview of clinical departments: OPD, in-patients, ICU, surgical, and emergency services • Management of nursing services, pharmacy, diagnostics, and patient services • The role of hospital administrators in managing clinical and non-clinical services	**6**
6	**Health Insurance and Financial Protection** • Concept and types of health insurance • Government-funded health insurance schemes (e.g., PMJAY, Ayushman Bharat) • Financial protection mechanisms through insurance • The role of insurance in healthcare financing and accessibility	**6**
7	**Quality Assurance and Improvement in Healthcare** • Concepts and standards of quality care • Quality improvement tools and methodologies • Quality assessment: Utilization management, peer review, and risk management • Compliance with international standards like ISO and NABH • Use of AI in Hospital Administration and in Quality Management of Healthcare	**6**
8	**Healthcare Policies, Law, and Ethics** • Health law, regulations, and accreditation standards • Role of IT infrastructure in Govt. policy making and healthcare data integration • Ethical issues in healthcare, including patient autonomy, informed consent, and end-of-life care • Medico-legal aspects in healthcare practice • Compliance and auditing methods in healthcare	**6**
9	**Hospital Infrastructure and Support Services** • Planning and maintaining hospital infrastructure • Managing support services: Laundry, catering, cleaning, CSSD, transport, & security • Biomedical engineering and equipment maintenance in hospitals • Corporate governance and relationships with external institutions	**6**
10	**Accounting, Audit, and Healthcare Statistics** • Accounting systems and audit procedures in healthcare • Legal requirements for hospital financial reporting • Hospital statistics: Analysis and reporting of hospital services and discharges • Vital statistics: Collection, processing, & interpretation	**6**
Total		**60 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.

Name of the Program	M.Sc. Health Informatics
Semester	Semester I
Name of the Subject	Research Methodology & Biostatistics (Core Course)
Subject Code	CC 001 T

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, analyse 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.
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.	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), Systematic sampling, Stratified sampling, Cluster sampling, Multi-stage sampling, Sampling with probability proportional to size, Sequential sampling.	5
4	**Measurement in research**: Measurement Scales, Sources of Error in Measurement,	3
5	**Methods of Data Collection**: Types of data, Collection of Primary Data, Observation Method, Interview Method	4
6	Research Ethics 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, 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, power of test, Normal distribution, Parametric Tests including Z-test, t-test, and ANOVA	4
10	**Chi-square Test**: Chi-square as a Non-parametric Test, Applications.	

		2
11	**Measures of Relationship**: Correlation and Simple Regression Analysis	3
12	**Non-parametric test**: Sign test, Wilcoxon signed-Rank Test, Wilcoxon Rank Sum Test: Mann-Whitney U test, Kruskal Walli's test, Friedman's test, and Spearman Rank correlation test.	3
13	**Vital Health Statistics**: rate, crude rate, age specific rate, Measurement of fertility, Rate, Measures of mortality.	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 parametricor Distribution-free Tests	8
9	Computer Application Using Statistical Software including SPSS	6
Total		**60 hrs**

Reference Books:

1. Daniel WW. Biostatistics: A foundation for analysis in the health sciences. 10th ed. Wiley; 2013.
2. Gupta SC, Kapoor VK. Fundamentals of mathematical statistics. Sultan Chand & Sons; 2020 Sep.
3. Kothari CR, Garg G. Research methodology: Methods and techniques.2019.
4. Mahajan BK. Methods in biostatistics for medical students and research workers. 7th ed. Jaypee Brothers Medical Publishers; 2010.
5. Murthy MN. Sampling theory and methods. Statistical Publishing Society; 1967.
6. Singh YK. Fundamental of research methodology and statistics. New Age International; 2006.

Resolution No. 3.5 of Academic Council (AC-51/2025):

Resolved to approve the submitted list of recommended books for M.Sc. Clinical Nutrition and the course on **Biostatistics and Research Methodology** [ANNEXURE-7].

Annexure-7 of AC-51/2025

Biostatistics & Research Methodology Books List

Subject	Book Name	Author
Biostatistics & Research Methodology	Biostatistics: A Foundation for Analysis in the Health Sciences (10th ed.)	Daniel WW.
	Biostatistical Analysis (5th ed.)	Zar JH.
	Research Methodology: Methods and Techniques	Kothari CR, Garg G.
	Methods in Biostatistics for Medical Students and Research Workers (7th ed.)	Mahajan BK.
	Sampling Theory and Methods	Murthy MN.
	Fundamentals of Research Methodology and Statistics	Singh YK.
	Fundamentals of Biostatistics (8th ed.)	Rosner B.
	An Introduction to Medical Statistics (4th ed.)	Bland M.

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

Learning Outcomes	• Understanding the fundamentals of computers • To the know word processing using MS Word • Understanding various functionalities of Excel • To know how to make presentation using MS PowerPoint • Understand the basics of DBMS • To know the various functionalities of Microsoft Access database • Understand the basics of computer network • 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 • Demonstrate Skill in essential Microsoft Office applications • Apply database management system concepts when designing the different database objects. • Demonstrate Skill in Using Computer Networks, network topologies and Devices. • Understanding about emerging computer technologies like Blockchain, Machine Learning.

Sr. No.	Topics	No of Hrs.
1	**Fundamentals of Computer** • What is a Computer? • Components of Computer System • Types of Computers • Generations of Computers • Basic Operations • Concept of Hardware and Software • Basics of Operating System • File and Directory Management • Concepts of Programming Languages • Introduction to Algorithms and Flowcharts	**25**
2	**Understanding Word Processing (MS Word)** • Word Processing Basics • Text Creation and manipulation • Formatting the Text • Table Manipulation • Track and Accept/Reject Changes to a Document	**20**
3	**Using Spread Sheet (MS Excel)** • Elements of Electronic Spread Sheet • Manipulation of Cells	**25**

	• Insert data • Formulas and Function • Analysis of Data • Data Visualization	
4	**Making Presentation (MS PowerPoint)** • Basics • Creation of Presentation • Preparation of Slides • Presentation of Slides • Slide Show	**25**
5	**Introduction to Database Management System** • Introduction to databases (Definition, Importance, Applications) • Types of Databases • DBMS components • Data Models • SQL Basics • Compare the flat file with the relational database management system	**20**
6	**Microsoft Access** • Introduction to MS Access • Filters, Forms, and Reports • Writing and modifying queries • Charts and Import Data • Introduction to SQL	**20**
7	**Network Infrastructure** • Introduction to Networking • Types of Network • Network Topologies • Networking Devices • Internet Basics	**20**
8	**Emerging Technologies** • Cloud Computing concepts and models • Internet of Things (IoT) • Blockchain Technology basics • Introduction to Artificial Intelligence and Machine Learning	**25**
Total		**180 hrs**

Bibliography:

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

Name of the Program	**M.Sc. Health Informatics**
Semester	**Semester I**
Name of the Subject	**Python Basics**
Subject Code	**MHIMT 104 P**

Learning Outcomes	• Understanding the basics of python programming. • Understanding and using the list, ranges and tuples • Understanding and using the python dictionaries and sets • Understanding and using the input/ output functionalities of python • Understanding and using python functions • Understanding and using the concepts of Object-oriented programming • Understanding and using the python exception handling functionalities • 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. • Demonstrate Competency in working with Python's core data structures, including lists, ranges, tuples, dictionaries, and sets. • Know how to handle input and output operations in Python, including reading from and writing to files, and interacting with user input in a robust manner. • Apply the principles of modular programming by defining and using functions, including the use of parameters, return values, and variable scope. • Acquire the ability to implement object-oriented programming concepts in Python, such as classes, objects, inheritance, and polymorphism, to create reusable and maintainable code. • Master the techniques for managing errors and exceptions in Python, ensuring that programs can handle unexpected situations gracefully and continue to operate correctly. • 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** • What is Python & the history of Python? • Unique features of Python • Install Python and Environment Setup • First Python Program • Python Identifiers, Keywords & Indentation • Comments and document interlude in Python • Command line arguments • Getting User Input • Python Data Types • Python variables • Python Core objects and Functions	**15**
2	**List, Ranges & Tuples in Python**	**15**

	• Introduction • Lists in Python • Understanding Iterators • Generators, Comprehensions & Lambda Expressions • Understanding and using Ranges • Ordered Sets with tuples	
3	**Python Dictionaries and Sets** • Python Dictionaries • Sets & Python Sets Examples	**10**
4	**Input and Output in Python** • Reading and writing text files • Writing Binary Files Manually • Using Pickle to Write Binary Files	**10**
5	**Python functions** • Python user-defined functions • Python packages functions • Defining and calling Function • The anonymous Functions • Loops & statements in Python • Python Modules & Packages	**15**
6	**Python Object Oriented** • Overview of OOP • Creating Classes and Objects • Accessing attributes • Built-In Class Attributes • Destroying Objects	**15**
7	**Python Exceptions Handling** • What is an Exception? • Handling an exception • try….except…else • try-finally clause • Argument of an Exception • Python Standard Exceptions • Raising an exception • User-Defined Exceptions	**15**
8	**Python Regular Expressions** • What are regular expressions? • The match Function • The search Function • Matching vs. searching • Search and Replace • Extended Regular Expressions • Wildcard	**15**
Total		**120 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

FIRST YEAR

M.Sc. Health Informatics

SEMESTER- II

Code No.	Core Subjects
Discipline Specific Core Theory	
MHIMT 105 T	Advanced Health Informatics & HI Practicum
MHIMT 106 T	Clinical Workflow, Process Redesigning & Clinical Documentation Improvement (CDI)
MHIMT 107 T	Medical Language & International Classification of Disease Coding
MHIMT 108 T	Medical Transcription & Editing
Discipline Specific Core Practical / Experiential	
MHIMT 109 E	Advanced Health Informatics & HI Practicum
MHIMT 110 P	Medical Language & International Classification of Disease Coding
MHIMT 111 P	Medical Transcription & Editing
Discipline Specific Elective	
DSE 001 P	Web Development Basics (Optional 1)
DSE 002 P	Advanced Python (Optional 2)

Name of the Program	**M.Sc. Health Informatics**
Semester	**Semester II**
Name of the Subject	**Advanced Health Informatics & HI Practicum (Theory + Experiential)**
Subject Code	**MHIMT 105 T & MHIMT 109 E**

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

	• Develop competency to plan, implement, and carry out a clinical audit in the quality assurance cell • 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** • Features and functionality of the administrative, clinical, and nursing modules of the hospital information system • EHR adoption model • Strategies for implementing various electronic health records for the management of patient clinical data • Analyze the global scenario of telemedicine in providing healthcare to the outreach community • Barriers in implementing telemedicine in Indian Scenario • Understanding eHealth market segments using examples and case studies • Benefits and current trends of eHealth Applications • Role of health informatics professionals in implementing eHealth applications and Telemedicine	5
2	**Consumer Health Informatics** • Role of informatics application in the empowerment of healthcare consumers • Methodology used for the assessment of validity and reliability of online health information • Role of health informatics professionals in protecting the privacy and confidentiality of consumer health information	5
3	**Knowledge Base and Expert System** • Classification and comparison of the various Knowledge-Based Expert Systems, highlighting the features and functionality • Rationale for a knowledge-based expert system in healthcare • Functions of a clinical decision support system • Advantages and disadvantages of clinical decision support system • Role of Artificial Intelligence (AI) in managing patient data	5
4	**Protection of Healthcare Information** • Legal implication in implementing informatics application in healthcare • Various methodologies for legally protecting the health information maintained in an automated system • Ways in which information is getting released from a hospital to various stakeholders • Role of HIPPA in releasing and protecting patient data • Analysis of various reengineering processes a hospital should comply with in protecting the patient data • Role of a Health Information Management Professional in protecting patient data	5

5	**mHealth Applications in Healthcare**
	• Introduction to mHealth
	  • Definition and scope of mHealth
	  • Historical evolution of mHealth
	  • Benefits and challenges of mHealth applications
	• mHealth Technologies and Platforms
	  • Overview of mobile devices and platforms
		5

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

	• Informatics solutions for improving communication and coordination during emergencies • Use of social media and digital platforms in emergency response	
9	**Future Direction of Healthcare Informatics** • Trends used in predicting the development of healthcare informatics • Reasons and types of future study for predicting the growth and impact of health informatics application	5
	HI Practicum	
10	**Medical Records Department** • To carry out diagnostic coding of the files in the department • Evaluate the accuracy of diagnostic and procedural coding • Analysis of statistical data for decision making as per the requirement. • Implement provider querying techniques to resolve coding discrepancies • Verify, analyze and validate the accuracy and completeness of health records data. • To know the process of transition from paper to electronic health records	**135**
11	**Quality Management Department** • Use quality management tools to analyze data. • Conduct quality assessments, including data and process quality. • Understand coding audits. • Understand how to ensure data quality meets organizational standards. • Understand internal and external data quality guidelines. • Understand how to monitor and detect fraud or misuse of data.	
12	**Insurance and Claims Processing** Integrated PMJAY & MJPJAY: • Learning of log-in in the portal • Pre authorization module: Method of raising the pre-authorization along with ICD 11 and International Classification of Health Interventions (ICHI) codes, Clinical Protocols module. • Claim module: Learning the process of claims uploading and appeals. • Access of Grievance module. • Access of Health camps modules Mediclaim: • Manage the use of clinical data required by various payment and reimbursement systems • Take part in selection and processes for insurance claims management • Apply information operability and information exchange with other sections of the enterprise	
13	**Registration and Billing** • Communicate with patients about details on patient-centered health information • Assist in the processes for revenue cycle management and reporting	
14	**Information Technology (IT) / Hospital Information System (HIS) Department** • Understand the need for Health IT in healthcare settings. • Assess end users' information needs. • Identify the required software and IT solutions. • Ensure IT solutions meet technical standards. • Conduct training for end users on IT systems. • Assist in IT system implementation. • Develop tools to assess user satisfaction. • Establish a system for regular audits and user feedback.	
15	**OPD, Emergency room, Radiology Dept., Labs, In-patient wards, Pharmacy, Operation Theatre, Intensive Care Unit, Clinical nutrition**	

	Understanding Clinical Workflow, Inventory Management, and Medical Records: 1. Learn how different hospital departments (OPD, Emergency, Radiology, Labs, Wards, Pharmacy, OT, ICU, and Clinical Nutrition) function. 2. Understand how inventory (medicines, equipment, and supplies) is managed in each unit. 3. Learn how patient records are documented and maintained in each department. **Understanding Health IT Systems (EMR, PACS, LIS, RIS, etc.):** 1. Learn how Electronic Medical Records (EMR) improve patient data management. 2. Understand how PACS helps store and share radiology images. 3. Explore how LIS and RIS support lab and radiology services. 4. Get familiar with other health IT tools used to improve patient care and hospital operations.	
Total		**180 hrs**

Bibliography:

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. "Cyber security in Healthcare: A Comprehensive Review of Threats and Solutions" - Health Services Management Research
12. "Understanding the Cyber security Threat Landscape in Healthcare" - Healthcare Informatics Research
13. "Risk Management in Healthcare Cyber security: A Guide for Healthcare Organizations" - Journal of Healthcare Risk Management
14. "Mitigating Cyber security Risks in Healthcare: Strategies and Solutions" - Journal of Cyber security
15. "The Role of Artificial Intelligence in Healthcare Cyber security" - Journal of Artificial Intelligence Research
16. "Blockchain for Health Data and Its Potential Use in Health IT and Health Care Related Research" - ONC Report

Name of the Program	**M.Sc. Health Informatics**
Semester	**Semester II**
Name of the Subject	**Clinical Workflow, Process Redesigning & Clinical Documentation Improvement (CDI)**
Subject Code	**MHIMT 106 T**

Learning Outcomes	• Understand the basics of clinical workflow and process redesign and its impact on healthcare delivery • Understand the workflow analysis methods and tools • Analyze the root causes of clinical workflow problems • Understand the impact of change within a healthcare organization • Understand the role of technology in clinical workflow optimization • Design an action plan for clinical process redesign • Understand the Lean and Six Sigma tools for process improvement • Understand the CDI program • Understand the main focus areas of CDI specialist and required competencies • Understand the general process of CDI • Understand the implication of CDI in an inpatient setting • Understand the association between CDI an PSI • Understand the implication of CDI in an outpatient setting • Understand the different types of CDI metrics
Course Outcomes	• Understand the concepts and importance of clinical workflow and process redesign, including the role of Clinical Documentation Improvement (CDI) programs and CDI specialists. • Identify focus areas for medical documentation improvements and the benefits of CDI programs. • Apply workflow analysis techniques to evaluate and document clinical processes, creating process maps to visualize workflows. • Identify bottlenecks, inefficiencies, and areas for improvement in clinical processes, and apply knowledge of CDI metrics to measure improvement outcomes. • Develop & Implement a plan for clinical process redesign, incorporating change management strategies to facilitate workflow optimization. • Apply various processes of a CDI program in both inpatient and outpatient settings, leveraging technology to enhance clinical workflow. • 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** • Overview of clinical workflow and its impact on healthcare delivery • Principles of process improvement and redesign	3

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

	• Demonstrate the applications of patient safety and adverse event composite • Association of CDI and PSI	
13	**CDI in an outpatient (OP) setting** • Overview of outpatient CDI • Relevance and benefits of OP CDI • Different aspects of HCC coding and risk adjustment factor • CDI for an emergency department	3
14	**CDI Metrics** • Introduction on CDI metrics • Different types of CDI metrics • CDI Metrics for success • Common key performance of CDI metrics	3
Total		**45 hrs**

Bibliography:

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 Program	**M.Sc. Health Informatics**
Semester	**Semester II**
Name of the Subject	**Medical Language & International Classification of Disease Coding (Theory + Practical)**
Subject Code	**MHIMT 107 T & MHIMT 110 P**

Learning Outcomes	• To understand the origin and use of medical language • To understand the anatomy of a medical term • To understand the meanings of stem words from various body systems • To understand the meanings of prefixes from various body systems • To understand the meanings of suffixes from various body systems • To understand the meanings of various surgical terminologies • To understand the various medical abbreviations in use • To understand the common signs symptoms and common medical terms in use • To understand various disease conditions body system-wise • To understand syndromes, STDs, Neoplasms • To understand the concept of medical coding • To understand the concept and code using disease coding manuals • To understand the concept and code using procedure coding manuals
Course Outcomes	• Describe medical terminologies and their components, including stem words/root, prefixes, and suffixes. • Explain the concepts of body systems and identify the terminologies related to body systems, diseases, diagnostic, therapeutic tests, and procedures. • Enumerate surgical procedures, diseases, disorders, and dysfunctions. • Develop an understanding of medical abbreviations, signs and symptoms and common medical terms. • Apply the principles of medical coding using various coding systems. • Explain how the disease classification system integrates with health information systems and supports healthcare data management.

Sr. No.	Topics	No. of Hrs.
1	**Introduction** • Origin of medical terms historical perspective • Various uses and applications of medical terms • Purpose of learning medical terminology • Components of Medical Terms Stem words, Prefixes, Suffixes & combining vowels	**2**
2	**Stem Words/Root** • Musculo-skeletal system • Respiratory system • Cardiovascular system • Digestive system	**5**

	• Endocrine system • CNS system • Urinary system • Reproductive system • Organs of special sense • Integumentary system	
3	**Prefix, Suffix** ***Prefixes*** • Definition, Various Prefixes, meanings and example terms • Pseudo Prefixes – meaning & Example terms ***Suffixes*** • Definition & Types of suffixes • Various Suffixes, meaning, and example terms	**8**
4	**Surgical Terminologies** • Various surgical terminologies- system-wise ▪ Musculoskeletal system ▪ Respiratory system ▪ Cardiovascular system ▪ Digestive system ▪ Endocrine system ▪ CNS ▪ Urinary System ▪ Reproductive System ▪ Special Senses • Surgical positions & sutures	**4**
5	**Medical Abbreviations** • Common Medical abbreviations used in medical practice	**2**
6	**Common Signs, Symptoms & Medical Terms** • The common signs and symptoms associated with various diseases • The common medical terms used to furnish additional information in healthcare	**4**
7	**Disease Conditions – System-wise (**explain the common diseases affecting the various body systems, along with their definitions, causes, signs and symptoms, mode of transmission, diagnosis, treatment/ management/ prevention) • Musculoskeletal system diseases • Respiratory system diseases • Cardiovascular system diseases • Digestive system diseases • Endocrine system diseases • CNS diseases • Urinary System diseases • Reproductive System diseases • Organs of Special Senses diseases	**18**
8	**Syndromes, STDs & Neoplasms** • Common Syndromes • Common sexually transmitted Diseases • Neoplasms	**10**
9	**Introduction to Medical coding and Nomenclature systems** 1. Understanding Medical coding and its applications. 2. Various Medical Nomenclature Systems i. SNDO ii. CMIT iii. SNOP	**2**

	iv. SNOMED -CT v. CPT • Introduction to Disease and Surgical coding systems	
10	**Disease Coding Systems** 1. ICD 10 2. ICD 10-CM 3. ICD-11 4. ICD -O 5. ICF	**25**
11	**Procedure Coding Systems** 1. Current Procedural Terminology (CPT) 2. ICD-10 PCS 3. Healthcare Common Procedure Coding System (HCPCS)	**25**
Total		**105 hrs**

Bibliography:

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 Program	**M.Sc. Health Informatics**
Semester	**Semester II**
Name of the Subject	**Medical Transcribing & Editing (Theory + Practical)**
Subject Code	**MHIMT 108 T & MHIMT 111 P**

Learning Outcomes	• Understand the basics of Health Information Transcribing • Understanding and apply the principles of Medical Transcribing • Understanding and application of Medical editing and Proofreading • Understanding the utilization of NLP and Transcription software • Understanding the Medical Transcription outsourcing market in India, government policies and regulations • Understand the Current/future trends and challenges in the Medical Transcription industry
Course Outcomes	• Understand medical report formats, transcription principles, editing and proofreading rules specific to medical content. • Develop skill and knowledge to accurately transcribe and edit health-related information • 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** • Overview of Health Information Transcribing, historical evolution, and significance in healthcare documentation • Growth of Medical Transcription industry over the years • Technological advancements that have influenced the growth of Medical Transcription	5
2	**Medical Transcription Principles** • Listening skills and techniques for effective transcription • Typing proficiency and speed building exercises • Utilization of transcription equipment and software tools • Transcription conventions, formatting guidelines, and practice sessions on transcribing different types of medical reports	25
3	**Medical Editing & Proofreading** • Importance of editing and proofreading in Medical Transcription • Common errors in Medical Transcription and strategies to avoid them • Grammar and punctuation rules specific to medical content, practice sessions on editing and proofreading medical reports • Edit and proofread a set of medical reports and provide feedback	15
4	**Utilizing Natural Language Processing & Transcription Software** • Introduction to Natural Language Processing (NLP) and its applications in healthcare • Overview of popular transcription software and applications, hands-on training on using transcription software for efficiency and accuracy • Integration of NLP tools for automated transcription and editing, troubleshooting common issues with transcription software • Practice transcribing and editing using transcription software	30
5	**Outsourcing and Government Policies**	10

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

Bibliography:

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

Discipline Specific Elective

Name of the Program	**M.Sc. Health Informatics**
Semester	**Semester II**
Name of the Subject	**Web Development Basics (Practical)**
Subject Code	**DSE 001 P**

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

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

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

	• Designing and implementing RESTful APIs • Handling requests and responses	
7	**Full-Stack Development** Integrating Front-End and Back-End: • Connecting front-end with back-end services • Fetching and displaying data Building a Simple Full-Stack Web Application: • Project setup and structure • Implementing features and functionality • Testing and debugging Web Security: • Basic security principles • Authentication and authorization Deployment: • Hosting options (Heroku, Netlify) • Deploying web applications Presenting the Project: • Preparing a project presentation • Demonstrating features and functionality	40
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 Program	**M.Sc. Health Informatics**
Semester	**Semester II**
Name of the Subject	**Advanced Python (Practical)**
Subject Code	**DSE 002 P**

Learning Outcomes	• Understand how to set up the python environment • Understand the concept of multithreaded programming in Python • Understand the database connectivity in Python • Understanding about the various python packages required for Data analysis
Course Outcomes	• Understanding the core principles and exploring advanced features and libraries of Python. • Develop ability to implement multithreaded programs in Python, intricacies of concurrent execution and thread management to improve application performance. • 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. • 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** • Install Python and Environment Setup • Introduction to Integrated development (IDE) environment • Jupyter Notebook	**10**
2	**Python Multithreaded Programming** • What is multithreading? • Starting a New Thread • The Threading Module • Synchronizing Threads • Multithreaded Priority Queue • Python Spreadsheet Interfaces • Python XML interface • Python JSON interface	**25**
3	**Using Databases in Python** • Python MySQL Database Access • Install the MySQLdb and other Packages • Create Database Connection • CREATE, INSERT, READ, UPDATE and DELETE Operation • DML and DDL Operation with Databases • Performing Transactions • Handling Database Errors • Web Scraping in Python	**30**

4	**Python for Data Analysis**
	• Numpy:
	  • Introduction to numpy
	  • Creating arrays
		40

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

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**

Marks Scheme for the University Examination (50 Marks)

Final theory marks will be 50 marks University Theory exam.

Question	Question No.	Question Type	Marks Distribution	Marks
Sec: A	1.	LAQ (2 out of 3)	2 X 10 Marks = 20	20
Sec: B	2.	SAQ (6 out of 8)	6 X 05 Marks = 30	30
Total				**50 Marks**

Practical exam pattern: Total 40 marks with following breakup

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

Practical exam pattern Research Methodology & Biostatistics (Core course)

Total 50-mark distribution:

Exercise	Description	Marks
Q No 1	**Practical/Problem-Solving:** These questions can assess statistical analysis, research design, hypothesis testing, or interpretation of data etc	2 × 10 marks each) = **20 marks**
Q No 2	Identification of study designs, Critical appraisal of research papers, Application of biostatistical tools, Sampling techniques etc	(4 × 5 marks each) = **20 marks**
Q No 3	**Viva Voce (Oral Examination)** Assessing conceptual clarity, application of research methodology, and statistical reasoning.	**10 marks**
Total		**50 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.

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:_____

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 **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 **Description -** Test students' ability to perform tasks or implement concepts practically.	15	
Reflection and critical thinking		
Assessment Method -Case study analysis, Project Proposal **Description -** Evaluate reflective responses, insights from experiences, and evidence of self-awareness and growth.	10	
Engagement and Participation		
Assessment Method - System Evaluation **Description -** Measure participation, enthusiasm, and collaboration during experiential activities.	05	
Total	**50 Marks**	

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)
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

Department of Health Informatics

Logbook for Semester II

MASTER
IN
HEALTH INFORMATICS

STUDENT NAME: _____

PRN NUMBER: _____

BATCH: _____

SEMESTER:_____

PERIOD FROM:_____**TO**_____

COORDINATOR **HOD** **DIRECTOR**

Note:

1. A total of 225 hrs. posting to the various departments of the hospital must be completed within 15 weeks (during the semester)
2. Activities carried out by the student during the posting along with the day, date and Dept. Name must be clearly mentioned.
3. Signature of the Dept. In Charge must be collected on a weekly basis.
4. Before final submission the logbook must be duly signed by the Coordinator, HoD and Director SBSMGM.

STUDENT'S DAILY LOG

Day/Date/Time **(Clearly Mention the above)**	**Activity carried out**		**Department In-charge Signature**
	Activity details	**Department Name**	

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E-mail- registrar@mgmuhs.com
Website: www.mgmuhs.com