GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Engineering

Level: PG

Branch: Biomedical Engineering

Subject Code : ME02031051

Subject Name : Medical Informatics

w. e. f. Academic Year:	2024-25
Semester:	2
Category of the Course:	Professional Elective Course

Prerequisite:	Basic knowledge of Human Anatomy and Physiology, Biomechanics
Rationale:	The student understands the various aspects of informatics applied in health industry so that quality of health care is improved.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Students will be able to explain the characteristics, architecture, and functionalities of online and offline modules of HIS..	R,U,A,A
02	Students Will be able to Comprehend the structure, components, and significance of Electronic Patient Records (EPR) in clinical workflows..	R,U,A,A
03	Students Will be able to Analyze the applications of fuzzy logic in modeling, decision-making, and diagnosis within the medical field.	U,A,A,E
04	Students Will be able to Design and implement user-friendly front-end interfaces for HIS using Java and related technologies.	A,A,E,C
05	Students Will be able to, Implement JavaScript to enhance the functionality and user experience of web-based healthcare solutions.	A,A,E,C

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	2	4	70`	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	MEDICAL INFORMATICS : Historical highlights and Evolution, Hospital Information System – its characteristics and functional online and offline modules, Health Informatics, Medical Informatics and its six levels of interfaces - Hardware and software requirements, Virtual Hospital, e – health services - Body Area Networks - Health Grid	8	18
2.	MEDICAL DATA AND STANDARDS: Electronic Patient Record (EPR) - Integrated clinical data – Bio signal and Medical image formats - Medical data storage and retrieval techniques – Steganography, - Medical Standards – HL7 – DICOM - IEEE 1073 - IRMA - LOINC - ICD10 - Medical standard organizations	10	22
3.	SOFT COMPUTING Fuzzy logic – its applications in Medicine, Physiological System Modelling and Simulation, Virtual Reality and Multimedia Applications in Medicine, Biometrics - Biometric Devices - Physiological Characteristic Devices - Behavioural Characteristic Devices - Feature extraction and Decision making - Social issues	9	20
4.	JAVA PROGRAMMING: Design and Development of Hospital Information Systems – Developing front-end, back-end and Client – Server interface programs in Java Environment – SQL	10	20
5.	INTERNET AND WEB: Medical Networks - Java script programming - Web Design and programming - Design of Web	8	20
	Total	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
10	**10**	**25**	**25**	**15**	**15**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Ramachandra Lele, Computers in Medicine Progress in Medical Informatics, Tata McGraw Hill Publishing Company, New Delhi, 2005
2. Herbert Schildt, The Complete Reference – JAVA, Tata McGraw Hill Publishing Company, New Delhi, 2005
3. Mohan Bansal M S, Medical Informatics, Tata McGraw Hill Publishing Company, New Delhi, 2005
4. H M Dietel, Internet and World Wide Web, AB Goldberg publishers, New Delhi, 2007
5. Ranjan Parekh, Principles of Multimedia, Tata McGraw Hill Publishing Company, New Delhi, 2006
6. Tay Vaughan, Multimedia – Making it Work, Tata McGraw Hill Publishing Company, New Delhi, 2006
7. Raif Steinmetz, Multimedia – Computing, Communications and Applications, Pearson Education, New Delhi, 2007
8. Deitel, "Java How to Program", Pearson Education / PHI, 2006.
9. A S Godbole A Kahate, "Web Technologies, TCP/IP to Internet Application Architectures", TMH 2007

(b) Open source software and website:

1. OpenMRS, OSCAR EMR, iHRIS (Human Resources Information System), Nightscout

Suggested Course Practical List:

1. To study structure of EHRs and compliance with HIPAA and GDPR.
2. To study EHR software for recording, updating, and retrieving patient data.
3. Create and manage databases for storing healthcare data.
4. Writing SQL queries to extract and analyze patient records.
5. To Design modules for patient registration, billing, and lab management.
6. Explore various software that aids in diagnosis and treatment planning.
7. To Train and test machine learning models for predicting diseases.
8. Study real-world ethical dilemmas involving medical informatics.

List of Laboratory/Learning Resources Required: Computer System, Raspberry Pi/Arduino Kits, Medical Sensor Modules

Suggested Activities for Students:

Students can Visit Hospital and Learn to add modules for patient registration, medical history, and appointment scheduling**.** Create a simple application to simulate data exchange between two healthcare systems using HL7 standards.

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