MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WB

Syllabus for 3 Years B. Sc. (Hons) in Telemedicine and Digital Health

(Effective for Students Admitted in Academic Session 2021-2022)

Aim:

To Create Manpower who will be instrumental in delivering Healthcare facility to remote patients through the Technology of Telemedicine and Digital Health overcoming the barrier of physical distance, cost of treatment and availability of Physicians

PROGRAM EDUCATIONAL OBJECTIVES:

PEO1: Acquire Hands-on Technical Training. Behavioral Training, Strategy and administration:

PEO2: Practice as Product Manager, Human Resources, Operations Manager, Data Analysts, Data Scientists in Government or Private Organizations or Successful Entrepreneurs

PEO3: Acquire excellent communication skills to deal with teammates, stakeholders, and patients in the online space and work both in team and independently

PEO4: Practice Lifelong Learning to overcome problems due to Technological and societal changes with leadership quality.

PROGRAM OUTCOMES

On Completion of the Program, students will be able to:

PO1: **Apply knowledge** of Mathematics, physics, chemistry, Biology, Computer Science and Information and Communication Technology (ICT) for providing medical service by Physician to Patients at a distant location.

PO2: **Analyze complex health and situational problem** of patients to provide appropriate Telehealth methodology suitable for both Physician and Patient.

PO3: **Design solutions** for extending Telemedicine facility to both Urban and Rural Patients

PO4: **Use Modern Telemedicine and Digital Health tools** for extending service of Physician to Patients.

PO5: **Investigate the problems** of Telemedicine and Digital Health to provide solutions.

PO6: **Assess societal, health, safety, legal and cultural issues** and the consequent responsibilities of Healthcare professionals.

PO7: **Demonstrate awareness** regarding societal and environmental impact of Telemedicine and Digital Healthcare for sustainable implementation.

PO8**: Apply ethical principles and commit to professional ethics** and responsibilities, and norms and regulations of Telemedicine and Digital Health

PO9: **Function effectively as an individual, and as a member or leader** in diverse teams, and in multidisciplinary settings.

PO10: **Communicate effectively** with Patients, Physicians, Patient parties and other Healthcare related personnel.

PO11: **Demonstrate knowledge of management principles and economics** as applicable to Telemedicine and Digital Healthcare

PO12: **Develop Life Long Learning Skills** in the broadest context of Technological and Societal Changes.

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Course Structure

FIRST SEMESTER

Subject Type		Course Code	Subject	Credit Distribution			Credit	Mode of Delivery	Proposed MOOCs
				L	T	P			
CC	CC1	DHT101	Introduction to Digital Health & Telemedicine	5	1		6	Offline/ Blended	As per MAKAUT Notification
	CC2	DHT102	Data capture, visualization and error analysis in healthcare	4			6	Offline/ Blended	
		DHT192	Data capture, visualization and error analysis in healthcare (P)			2			
GE	GE1		GE BASKET 1/2/3/4/5	4			4	Offline/ Online	
						2	2	Offline/ Online	
AECC	AECC1	DHT103	English Communication	2			2	Online	
Semester Total Credits							**20**		

DETAILED CONTENTS

FIRST SEMESTER

Core Courses

Introduction to Digital Health & Telemedicine

(DHT101)

Full marks: 100

Credit: 5+1=6

Lecture period: 60 hrs

Course Objectives: This course is designed to acquaint students with concept of Digital Health and Telemedicine

COURSE OUTCOMES:

On Completion of the Course, Students will be able to:

CO1: Explain the basics and components of Digital Healthcare and the opportunities and challenges for such services in India.

CO2: Describe the components of the existing healthcare delivery system in India

CO3: Identify the scope of digital healthcare.

CO4: Enumerate the different roles that the personnel will play for delivery of digital healthcare services.

CO5: Identify examples of existing digital healthcare and telemedicine technologies and services in India and the gaps which need to be mended.

Contents:

UNIT 1: Introduction to Telemedicine and Digital Health

A. Telemedicine: Definition, Need of telemedicine, Evolution of Telemedicine, factors contributing the development of Telemedicine, the technologies that have contributed to advances in Telemedicine, components of Telemedicine, the skillsets essential for Telemedicine.
B. Digital Health: Definition and components of Digital Health.

UNIT 2: Digitalization of Healthcare

Process mapping and the steps involved in Digital Health. The technologies available to facilitate Digital Health

UNIT 3: Application of Digital Health Interventions to improve health outcomes and removing inequities in healthcare delivery

Healthcare system in India. Models of healthcare delivery: Governmental, Not-for-Profit, Corporate

UNIT 4: Challenges and Opportunities for Digital Health in India

The way to empower people by enabling people-centric digital health systems so that people can make healthy and health-enabling choices, leading to better population health outcomes. The approaches to increase accessibility of health facilities and human resources for health for both client (patient)-to-provider (doctor) and provider-to-provider telemedicine.

Suggested Reading:

Textbooks :

1. Digital Health: Scaling Healthcare to the World Editors: Homero Rivas Katarzyna Wac.1st Edition. SpringerPaperback ISBN: 978-3-319-87081-6eBook ISBN: 978-3-319-61446-5. 2018. DOI: https://doi.org/10.1007/978-3-319-61446-5
2. Digital Health: Mobile and Wearable Devices for Participatory Health Applications Editors: Shabbir Syed-Abdul Xinxin Zhu Luis Fernandez-Luque 1st Edition. Elsevier Paperback ISBN: 9780128200773 eBook ISBN: 9780128200780. 2020

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References:

- World Health Organization, Classification of Digital Health Interventions v1.0, 2018, Available from: https://apps.who.int/iris/bitstream/handle/10665/260480/WHO-RHR-18.06-eng.pdf
- World Health Organization, WHO Guideline: Recommendations on Digital Health Interventions for Health System Strengthening, 2019, Available from: https://apps.who.int/iris/bitstream/handle/10665/311941/9789241550505-eng.pdf
- World Health Organization, Global Strategy on Digital Health 2020-2025, Available from: https://www.who.int/docs/default-source/documents/gs4dhdaa2a9f352b0445bafbc79ca799dce4d.pdf
- Gazette of India, Telemedicine Practice Guidelines, Available from: https://egazette.nic.in/WriteReadData/2020/219374.pdf
- **Sarbadhikari SN**, Digital Health in India – as envisaged by the National Health Policy (2017), Guest Editorial, *BLDE University Journal of Health Sciences*, 2019, **4**: 1-6. Available from: http://www.bldeujournalhs.in/article.asp?issn=2468-838X;year=2019;volume=4;issue=1;spage=1;epage=6;aulast=Sarbadhikari

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Data capture, visualization and error analysis in healthcare (DHT102)

Full marks: 100

Credit: 4

Lecture period: 60 hrs

Course Objectives: This course is designed to impart advance knowledge and skill on capturing data, visualization and error analysis in health care system.

COURSE OUTCOMES:

On Completion of the Course, Students will be able to:

CO1: List the different types of data and the methods by which the data can be analyzed to generate meaningful information.

CO2: Identify the different ways in which data is generated during the healthcare delivery during the processes of history-taking, examination, investigations and prescribing.

CO3: Explain the existing the technologies which are used to capture, transmit

CO4: Analyze the data in the digital healthcare domain.

CO5: Devise new ways of looking at the data to generate reports for improving the delivery of digital healthcare.

CO6: Explain the techniques of detecting errors creeping in during capture, transmission and analysis of data and the methodologies of eliminating bias.

CONTENTS:

UNIT 1: Data Collection

Types of data generated in healthcare systems, Volume of data, Data sharing amongst different domains.

UNIT 2: Data Analysis

A. Classification and Tabulation of data, Bar diagrams and Pie charts, Histogram, Frequency curve and frequency polygon, Ogives. Mean, median, mode, Standard deviation, Online Tools for data visualization, data mining and data cleansing.

B. Analysis of Variance (ANOVA): Basic Idea of ANOVA, Hypotheses of ANOVA, Assumptions of ANOVA, One-Way ANOVA, Two-Way ANOVA, Application of ANOVA in Digital Health.

C. Correlation and Regression analysis: Correlations and regressions-: Relation between two variables, scatter diagram, definition of correlations, curve fitting, principles of least squares, Two regression lines, Karl Pearson's coefficient of correlation, Rank correlation, Tied ranks.

D. Probability theory: Random experiments, sample space, probability theory, conditional probability. Baye's theorem.

E. Random variable,(.discrete and continuous), Probability density function(discrete and continuous), Distribution function for discrete random variable. Distribution function for continuous random variable, Joint probability distribution, Conditional and marginal distribution. Mathematical expectations: Introduction, The expected value of a random variable, moments, Moment generating functions, Product moments, Conditional expectations. Standard distributions -: Uniform distribution. (Discrete and continuous).Exponential distribution Gamma distribution, Beta distribution. Binomial distribution, Poisson distribution, Normal distributions. Standard normal distributions.

UNIT 3: Big Data and Data Analytics

Definition and introduction to Big Data, the Role of Data Analytics in Healthcare,Types of analytics: Descriptive analytics, Predictive analytics. Prescriptive analytics. Discovery analytics.

Suggested Reading:

Textbooks :

1. Introduction to Bio-Statistics: A Textbook of BiometryAuthor: Pranab Kumar Banerjee3rd Edition. S. Chandand Company Paperback ISBN: 978-8121923293.2007
2. Fundamentals of Biostatistics. Authors: K. Janardhan P. HanmanthRao1st Edition.Dreamtech PressPaperback ISBN: 978-9389447538.2019

References :

- Biostatistics: Basic Concepts and Methodology for the Health Sciences Authors: Wayne W. Daniel, Chad L. Cross 10th Edition. International Student Version. Wiley Paperback ISBN: 9788126551897.2014
- Mahajan's Methods In Biostatistics For Medical Students And Research Workers. Editor : Bratati Banerjee9th Edition. Jaypee Brothers Medical Publishers ISBN:978-9352703104.2019

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Data capture, visualization and error analysis in healthcare Practical-I (DHT192)

Full marks: 100

Credit: 2

Laboratory period: 40 hrs

Course Objectives: Students will be able to do hands-on experiments on Data capture, visualization and statistical analysis

COURSE OUTCOMES:

On Completion of the Course, Students will be able to:

CO1: Classify the data and identify the distribution of data

CO2: Interpret data can be generated in Telemedicine and Digital Healthcare

CO3: Identify relation between different sets of data and their significance

CO4: Analyze the data provided to them for presentation of their analyses with suggestions

CO5: Use tools available for summarization and analysis of healthcare data

List of Experiments:

The data may be taken from Health or Health related activities as far as possible.

1. To solve problems related to Descriptive Statistics using any computer software or programming language.

2. To find out correlation between two or more variables using any computer software or programming language.

3. To perform analysis of variance (ANOVA) (one-way) using any computer software or programming language.

4. To perform analysis of variance (ANOVA) (two-way) using any computer software or programming language.

5. To perform regression analysis using any computer software or programming language.

6. To determine the probability of an event using any computer software or programming language.

7. To fit a probability distribution to sample data using computer software or programming Language.

8. To generate Discrete Probability Distributions from Uniform Distribution using computer software or programming language

9. To compute the probability of each element occurring in a column of a m x n matrix using Computer software or programming language.

10. To create and organize Missing Data using computer software or programming language.

11. To clean messy data and locate extrema using computer software or programming language

12. To identify and remove inconsistent data and describe the effect using computer software and programming language.

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ABILITY ENHANCEMENT COURSE

English Communication

(DHT103)

Total Marks-100

Credit: 2

Lecture Hour- 20 hrs

Course Objective: The course is designed to develop the student's communicative competence in English by giving adequate exposure in the four communication skills - LSRW - listening, speaking, reading and writing and the related sub- skills, thereby, enabling the student to apply the acquired communicative proficiency in social and professional contexts.

COURSE OUTCOMES:

On Completion of the Course, Students will be able to:

CO1: Explain the basic terms used by the patients in conveying their problems

CO2: Generate a summary of the patient's problems for onward transmission to the doctor

CO3: Interpret the advice of the doctor which is generated in the form of a prescription

CO4: Explain the prescription to the patient

CO5: Apply techniques of communication by minimal physical input in repetitive scenarios

CONTENTS:

UNIT 1: FUNCTIONAL GRAMMAR & VOCABULARY (2 hrs)

Tense: Formation and application; Affirmative / Negative / Interrogative formation; Modals and their usage; Conditional sentences; Direct and indirect speech; Active and passive voice; usage of common phrasal verbs, synonyms & antonyms.

UNIT 2: READING SKILLS (2 hrs)

Comprehension passages: reading and understanding articles from technical writing. Interpreting texts: analytic texts, descriptive texts, discursive texts; SQ3R reading strategy.

UNIT 3: WRITING SKILLS (8 hrs)

Writing business letters - enquiries, complaints, sales, adjustment, collection letters, replies to complaint & enquiry letters; Job applications, Résumé, Memo, Notice, Agenda, Reports – types & format, E-mail etiquette, advertisements.

UNIT 4: LISTENING & SPEAKING LISTENING (8 hrs)

Listening process, Types of listening; Barriers in effective listening, strategies of effective listening Speaking: Presentations, Extempore, Role-plays, GD, Interview.

SUGGESTED READINGS:

1. Bhatnagar, M & Bhatnagar, N (2010) Communicative English for Engineers and Professionals. New Delhi: Pearson Education.

2. Raman, M & Sharma, S (2017) Technical Communication. New Delhi: OUP.

3. Kaul, Asha (2005) The Effective Presentation: Talk your way to success. New Delhi: SAGE Publication.

4. Sethi, J & Dhamija, P.V. (2001), A Course in Phonetics and Spoken English. New Delhi: PHI.

5. Murphy, Raymond (2015), English Grammar in Use. Cambridge: Cambridge University Press