

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
HDSC701	Data Science for Health and Social Care	04	--		04	--	--	04

Course Code	Course Name	Examination Scheme			
		ISA	MSE	ESE	Total
HDSC701	Data Science for Health and Social Care	20	30	50	100

Course Objectives:

Students will try:

1. To gain perspective of Data Science for Health and Social Care.
2. To understand different techniques of Biomedical Image Analysis.
3. To learn NLP techniques for processing Clinical text.
4. To understand the role of social media analytics for Healthcare data.
5. To learn advanced analytics techniques for Healthcare Data.
6. To investigate the current scope, potential, limitations, and implications of data science and its applications for healthcare.

Course Outcomes:

Student should be able to:

1. Identify sources and structure of healthcare data.
2. Apply structured lifecycle approach for handling Healthcare data science projects.
3. Analyze the data, create models, and identify insights from Healthcare data.
4. Apply various data analysis and visualization techniques for Healthcare and social media data.
5. Apply various algorithms and develop models for Healthcare data science projects.
6. To Provide data science solutions for solving problems of Health and Social Care.

Pre-requisite: Artificial Intelligence, Machine Learning

Detailed syllabus:

Sr. No.	Module	Detailed Content	Hours
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1	Data Science for Healthcare	Introduction, Healthcare Data Sources and Data Analytics for Healthcare, Applications and Practical Systems for Healthcare. Electronic Health Records(EHR), Components of EHR, Benefits of EHR, Barriers to Adopting EHR, Challenges of using EHR data, Phenotyping Algorithms	05
2	Biomedical Image Analysis	Biomedical Imaging Modalities, Object detection ,Image segmentation, Image Registration, Feature Extraction Mining of Sensor data in Healthcare, Challenges in Healthcare Data Analysis, Biomedical Signal Analysis, Genomic Data Analysis for Personalized Medicine.	06
3	Data Science and Natural Language Processing for Clinical Text	NLP, Mining information from Clinical Text, Information Extraction, Rule Based Approaches, Pattern based algorithms, Machine Learning Algorithms. Clinical Text Corpora and evaluation metrics, challenges in processing clinical reports, Clinical Applications.	06
4	Social Media Analytics for Healthcare	Social Media analysis for detection and tracking of Infectious Disease outbreaks. Outbreak detection, Social Media Analysis for Public Health Research, Analysis of Social Media Use in Healthcare.	06
5	Advanced Data Analytics for Healthcare	Review of Clinical Prediction Models, Temporal Data Mining for Healthcare Data Visual Analytics for Healthcare Data, Information Retrieval for Healthcare- Data Publishing Methods in Healthcare.	08
6	Data Science Practical Systems for Healthcare	Data Analytics for Pervasive Health, Fraud Detection in Healthcare Data Analytics for Pharmaceutical discoveries, Clinical Decision Support Systems, Computer-Assisted Medical Image Analysis Systems- Mobile Imaging and Analytics for Biomedical Data.	08

Textbooks:

1. Chandan K. Reddy and Charu C Aggarwal, "Healthcare data analytics", Taylor & Francis, 2015.
2. Hui Yang and Eva K. Lee, "Healthcare Analytics: From Data to Knowledge to Healthcare Improvement, Wiley,2016.

References:

1. Madsen, L. B. (2015). Data-driven healthcare: how analytics and BI are transforming the industry. Wiley India Private Limited
2. Strome, T. L., & Liefer, A. (2013). Healthcare analytics for quality and performance improvement. Hoboken,NJ, USA: Wiley
3. McNeill, D., & Davenport, T. H. (2013). Analytics in Healthcare and the Life Sciences: Strategies, Implementation Methods, and Best Practices. Pearson Education.
4. Rachel Schutt and Cathy O'Neil, "Doing Data Science", O'Reilly Media
5. Joel Grus, Data Science from Scratch: First Principles with Python, O'Reilly Media
6. EMC Education Services,"Data Science and Big Data Analytics",Wiley

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
HDSSBL701	Data Science for Health and Social Care: Lab	--	04	--	--	02	--	02

Course Code	Course Name	Examination Scheme			
		ISA	MSE	ESE	Total
HDSSBL701	Data Science for Health and Social Care: Lab	25	--	25	050

Course Outcomes:

Student should be able to:

- 1 Students will be able to, Identify sources of data, suggest methods for collecting, sharing and analyzing Healthcare data.
- 2 Students will be able to Clean, integrate and transform healthcare data.
- 3 Students will be able to apply various data analysis and visualization techniques on healthcare data.
- 4 Students will be able to apply various algorithms and develop models for healthcare data Analytics.
- 5 Students will be able to implement data science solutions for solving healthcare problems.

Pre-requisite: Python

Suggested Experiments:	
Sr. No.	Name of the Experiment
1	Clean, Integrate and Transform Electronic Healthcare Records.
2	Apply various data analysis and visualization techniques on EHR.
3	Bio Medical Image Preprocessing, Segmentation.
4	Bio Medical Image Analytics.
5	Text Analytics for Clinical Text Data.
6	Diagnose disease risk from Patient data.
7	Social Media Analytics for outbreak prediction/ Drug review analytics.
8	Visual Analytics for Healthcare Data.
9	Implement an innovative Data Science application based on Healthcare Data.
10	Documentation and Presentation of Mini Project.

Useful Links:

1. <http://openclassroom.stanford.edu/MainFolder/CoursePage.php?course=MachineLearning>
2. <http://www.cse.wustl.edu/~kilian/cse517a2010/>
3. <https://datarade.ai/data-categories/electronic-health-record-ehr-data>
4. <https://www.cms.gov/Medicare/E-Health/EHealthRecords>
5. https://onlinecourses.nptel.ac.in/noc20_ee40