

# DSC6018: HEALTH DATA ANALYTICS

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## Effective Term

Semester A 2026/27

## Part I Course Overview

### Course Title

Health Data Analytics

### Subject Code

DSC - Data Science

### Course Number

6018

### Academic Unit

Data Science (DS)

### College/School

College of Computing (CC)

### Course Duration

One Semester

### Credit Units

3

### Level

P5, P6 - Postgraduate Degree

### Medium of Instruction

English

### Medium of Assessment

English

### Prerequisites

Nil

### Precursors

Nil

### Equivalent Courses

SDSC6018 Health Data Analytics

### Exclusive Courses

Nil

## Part II Course Details

### Abstract

In this course, students will analyze various types of medical and healthcare data using advanced analytical techniques. Key topics include healthcare data structures, medical image analysis, text analysis of clinical documents, trial data analysis, claims data, electronic health record (EHR) analysis, wearable device data processing, and health economics.

Students will explore a range of statistical and computational methods, including machine learning, natural language processing, and predictive modeling, to extract meaningful insights from complex datasets. Real-world case studies will be utilized to demonstrate the practical applications of these methods in medicine and public health.

By the end of the course, students will have developed the skills necessary to effectively analyze medical data, interpret results, and apply methodologies across various healthcare domains, enabling them to address pressing challenges in the field.

### Course Intended Learning Outcomes (CILOs)

| CILOs |                                                                                                                                                            | Weighting (if app.) | DEC-A1 | DEC-A2 | DEC-A3 |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------|--------|--------|
| 1     | Explain healthcare data structures, including medical images, text, trial data, claims/EHR data, and wearable device data.                                 | 15                  | x      |        |        |
| 2     | Describe key analytical techniques, such as statistical models, machine learning methods, and predictive modeling, used for analyzing healthcare datasets. | 20                  | x      | x      |        |
| 3     | Apply software tools and programming languages (e.g., Python, R) to preprocess, analyze, and visualize healthcare data.                                    | 30                  | x      | x      |        |
| 4     | Interpret analytical results and draw conclusions accurately from real-world healthcare case studies.                                                      | 20                  |        | x      | x      |
| 5     | Develop the ability to analyze diverse, real-world medical and healthcare datasets by implementing appropriate methods and techniques.                     | 15                  |        | x      | x      |

#### A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

#### A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

#### A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

### Learning and Teaching Activities (LTAs)

| LTAs |                   | Brief Description                                                                                                                                                                                                                                                                                                                                                         | CILO No.      | Hours/week (if applicable) |
|------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------------------|
| 1    | Lectures          | Learning through teaching is primarily conducted via lectures. Lectures are designed to introduce key concepts, theories, and methodologies related to medical data analysis. In-lecture exercises and case studies will be incorporated to facilitate understanding and demonstrate real-world applications.                                                             | 1, 2, 3, 4    | 30 hours/sem               |
| 2    | Tutorial Sessions | Tutorial sessions provide students with additional exercises and hands-on practice to reinforce their learning. These sessions focus on applying data analysis techniques and using relevant software tools, giving students the opportunity to deepen their understanding of the concepts introduced in lectures and to gain practical experience with medical datasets. | 1, 2, 3, 4, 5 | 9 hours/sem                |

**Assessment Tasks / Activities (ATs)**

| ATs |                                                                                                                                                                                                                                                                                                                      | CILO No.      | Weighting (%) | Remarks ("- for nil entry) | Allow Use of GenAI? |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------|----------------------------|---------------------|
| 1   | Assignments<br>Questions are designed to evaluate how well students can apply the analytical methods and computational tools learned in class to analyze medical datasets and solve problems. These assignments will help students build practical skills in processing and interpreting health and healthcare data. | 1, 2, 3, 4, 5 | 20            | -                          | Yes                 |

|   |                                                                                                                                                                                                                                                                                                                                                                                                                         |               |    |   |     |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----|---|-----|
| 2 | Midterm Exam<br>The examination will assess students' understanding of analytical methods, tools, and their applications in solving various medical and healthcare data problems. Emphasis will be placed on conceptual clarity and the ability to interpret results.                                                                                                                                                   | 1, 2, 3, 4, 5 | 20 | - | No  |
| 3 | Project<br>A final group project using real-world health/ healthcare data will evaluate students' ability to collaborate and apply appropriate analytical techniques to solve complex, real-world problems. Students will demonstrate their skills in selecting suitable methods, interpreting results accurately, drawing meaningful conclusions, and summarizing findings in a written report and group presentation. | 1, 2, 3, 4, 5 | 30 | - | Yes |

**Continuous Assessment (%)**

70

**Examination (%)**

30

**Examination Duration (Hours)**

2

**Minimum Examination Passing Requirement (%)**

30

### **Assessment Rubrics (AR)**

#### **Assessment Task**

Assignments (Applicable to students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

#### **Criterion**

20%

#### **Excellent**

(A+, A, A-) High

#### **Good**

(B+, B, B-) Significant

#### **Fair**

(C+, C, C-) Moderate

#### **Marginal**

(D) Basic

#### **Failure**

(F) Not even reaching marginal levels

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**Assessment Task**

Assignments (for students admitted from Semester A 2022/23 to Summer Term 2024)

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## Part III Other Information

### Keyword Syllabus

- Healthcare data structures
- Medical image analysis
- Medical text analysis
- Trial data analysis
- Claims/Electronic Health Record (EHR)
- Wearable device
- Health Economics

### Reading List

#### Compulsory Readings

| Title |     |
|-------|-----|
| 1     | Nil |

#### Additional Readings

| Title |                                                                                                                                                                                         |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | AI-First Healthcare: AI Applications in the Business and Clinical Management of Health, Kerrie L. Holley, Siupo Becker, © 2021, O'Reilly Media.                                         |
| 2     | Explainable AI in Healthcare and Medicine: Building a Culture of Transparency and Accountability, Arash Shaban-Nejad, Martin Michalowski, David L. Buckeridge (Eds.), © 2021, Springer. |
| 3     | Healthcare and Artificial Intelligence, Bernard Nordlinger, Cédric Villani, Daniela Rus, © 2020, Springer.                                                                              |