

**Scheme of Studies BS Computer Science (Specialisation in Data Science)**

| First Year    |  |              |    |       |                 |                                    |              |    |       |
|---------------|--|--------------|----|-------|-----------------|------------------------------------|--------------|----|-------|
| Fall Semester |  |              |    |       | Spring Semester |                                    |              |    |       |
| Course Code   | Course Title                           | Credit Hours |    |       | Course Code     | Course Title                       | Credit Hours |    |       |
|               |  | Th           | Pr | Total |                 |                                    | Th           | Pr | Total |
| CT-175        | Programming Fundamentals               | 3            | 1  | 4     | CS-251          | Logic Design & Switching Theory.   | 3            | 1  | 4     |
| CT-174        | Fundamentals of Information Technology | 2            | 1  | 3     | CT-162          | Discrete Structures.               | 3            | 0  | 3     |
| EA-104        | Functional English                     | 3            | 0  | 3     | CT-260          | Object Oriented Programming.       | 3            | 1  | 4     |
| PH-122        | Applied Physics.                       | 3            | 1  | 4     | MT-171          | Differential & Integral Calculus   | 3            | 0  | 3     |
| ES-205        | Islamic Studies. OR                    | 2            | 0  | 2     | ES-105          | Pakistan Studies. OR               | 2            | 0  | 2     |
| ES-209        | Ethical Behaviour.                     |              |    |       | ES-127          | Pakistan Studies. (For Foreigners) |              |    |       |
| MT-001        | Mathematics-1 (Pre-Medical)            | -            | -  | NC    | MT-002          | Mathematics-2 (Pre-Medical)        | -            | -  | NC    |

| Second Year   |   |              |    |       |                 |                                       |              |    |       |
|---------------|---|--------------|----|-------|-----------------|---------------------------------------|--------------|----|-------|
| Fall Semester |   |              |    |       | Spring Semester |                                       |              |    |       |
| Course Code   | Course Title                              | Credit Hours |    |       | Course Code     | Course Title                          | Credit Hours |    |       |
|               |   | Th           | Pr | Total |                 |                                       | Th           | Pr | Total |
| CT-159        | Data Structure Algorithms & Applications. | 3            | 1  | 4     | CS-252          | Computer Architecture & Organization. | 3            | 1  | 4     |
| MT-227        | Differential Equations.                   | 3            | 0  | 3     | CT-261          | Database Management Systems.          | 3            | 1  | 4     |
| EA-115        | Academic Reading and Writing              | 3            | 0  | 3     | EA-218          | Business Communication                | 2            | 1  | 3     |
| EA-219        | Professional Ethics                       | 2            | 0  | 2     | MT-272          | Linear Algebra & Geometry.            | 3            | 0  | 3     |
| CT-xxx        | Data Science Elective - I                 | 2            | 1  | 3     | EC-209          | Financial & Cost Accounting.          | 3            | 0  | 3     |
|               |   |              |    |       | EA-200          | Community Service                     | -            | -  | NC    |

| Third Year    |   |              |    |       |                 |                                 |              |    |       |
|---------------|---|--------------|----|-------|-----------------|---------------------------------|--------------|----|-------|
| Fall Semester |   |              |    |       | Spring Semester |                                 |              |    |       |
| Course Code   | Course Title  | Credit Hours |    |       | Course Code     | Course Title                    | Credit Hours |    |       |
|               |   | Th           | Pr | Total |                 |                                 | Th           | Pr | Total |
| CT-265        | Introduction to Tools and Techniques for Data Science | 2            | 1  | 3     | CT-356          | Data Mining                     | 3            | 1  | 4     |
| MT-331        | Probability & Statistics                              | 3            | 0  | 3     | CT-xxx          | Data Science Elective - III     | 3            | 0  | 3     |
| CT-xxx        | Data Science Elective - II                            | 3            | 0  | 3     | CT-376          | Computer Communication Networks | 3            | 1  | 4     |
| CT-365        | Software Engineering                                  | 3            | 0  | 3     | CT-363          | Design & Analysis of Algorithms | 3            | 0  | 3     |
| CT-361        | Artificial Intelligence & Expert Systems              | 3            | 1  | 4     | CT-353          | Operating Systems               | 3            | 1  | 4     |
|               |   |              |    |       | EA/ES-xxx       | Foreign Language - I            | -            | -  | NC    |

| Final Year    |  |              |    |       |                 |                               |              |    |       |
|---------------|--|--------------|----|-------|-----------------|-------------------------------|--------------|----|-------|
| Fall Semester |  |              |    |       | Spring Semester |                               |              |    |       |
| Course Code   | Course Title                             | Credit Hours |    |       | Course Code     | Course Title                  | Credit Hours |    |       |
|               |  | Th           | Pr | Total |                 |                               | Th           | Pr | Total |
| CT-472        | Data Warehousing & Business Intelligence | 3            | 1  | 4     | CT-471          | Data Analysis & Visualization | 3            | 1  | 4     |
| MG-482        | Organisational Behaviour                 | 3            | 0  | 3     | MG-481          | Entrepreneurship.             | 3            | 0  | 3     |
| CT-xxx        | Data Science Elective - IV               | 3            | 0  | 3     | CT-355          | Information Security          | 3            | 0  | 3     |
| CT-499        | Computer Science Project.                | -            | 3  | 3     | CT-xxx          | Data Science Elective - V     | 3            | 0  | 3     |
| CS-428        | Parallel & Distributed Computing         | 3            | 1  | 4     | CT-499          | Computer Science Project.     | 0            | 3  | 3     |
| EA/ES-xxx     | Foreign Language - II                    | -            | -  | NC    |                 |                               |              |    |       |

| Elective- I Courses |   |
|---------------------|---|
| CT-263              | Object Oriented Analysis & Design       |
| CT-264              | Programming for Artificial Intelligence |
| CT-368              | Fundamentals of Data Science            |
| CT-266              | Fundamentals of Cybersecurity           |
| CT-267              | Fundamentals of Game Development        |

| Elective- V Courses |                 |
|---------------------|-----------------|
| CT-468              | Deep Learning   |
| CT-473              | Cloud Computing |
| CT-474              | Text Mining     |

| Elective- II Courses |  |
|----------------------|--|
| CT-369               | Business Process Analysis                |
| CT-370               | Platform & Architecture for Data Science |

| Foreign Language - I Courses |                      |
|------------------------------|----------------------|
| EA-220                       | Chinese Language - I |
| EA-231                       | Turkish Language - I |
| EA-224                       | German Language - I  |
| EA-226                       | French Language - I  |
| ES-221                       | Arabic Language - I  |

| Elective- III Courses |                   |
|-----------------------|-------------------|
| CT-378                | Machine Learning  |
| CT-357                | Speech Processing |

| Foreign Language - II Courses |                       |
|-------------------------------|-----------------------|
| EA-221                        | Chinese Language - II |
| EA-232                        | Turkish Language - II |
| EA-225                        | German Language - II  |
| EA-227                        | French Language - II  |
| ES-222                        | Arabic Language - II  |

| Elective- IV Courses |                            |
|----------------------|----------------------------|
| CT-466               | Artificial Neural Networks |
| CT-470               | Privacy Preservation       |