

**M Tech in Computational and Systems Biology**

**SCHEME OF STUDY (wef July 2021)**

**First Semester:**

| Course No.                           | Subject                                        | Scheme of Studies Periods<br>per week |   |   | Total<br>Credits |
|--------------------------------------|------------------------------------------------|---------------------------------------|---|---|------------------|
|                                      |                                                | L                                     | T | P |                  |
| <b>MTH 517</b>                       | Numerical Methods                              | 3                                     | - | - | 3                |
| <b>CSB 511</b>                       | Foundations of Computational & Systems Biology | 3                                     | - | - | 3                |
| <b>CSB 512</b>                       | Applied Bioinformatics                         | 3                                     | - | - | 3                |
| <b>CSB 513</b>                       | Mathematical & Computational Biology           | 3                                     | - | - | 3                |
| <b>HUM 511</b>                       | Communication Skills                           | 2                                     | - | - | 2                |
|                                      | Elective-1 (A)                                 | 3                                     | - | - | 3                |
|                                      | Elective-2 (B)                                 | 3                                     | - | - | 3                |
| <b>CSB 514</b>                       | Lab Practice-I                                 | -                                     | - | 2 | 1                |
| <b>CSB 515</b>                       | Seminar-I                                      | -                                     | - | 2 | 1                |
| Total Hours: 24<br>Total Credits: 22 |                                                | Total Semester Credits                |   |   | 22               |

**Second Semester:**

| Course No.                           | Subject                                                  | Scheme of Studies Periods<br>per week |   |   | Total<br>Credits |
|--------------------------------------|----------------------------------------------------------|---------------------------------------|---|---|------------------|
|                                      |                                                          | L                                     | T | P |                  |
| <b>CSB 521</b>                       | Mathematical Modeling & Simulation of Biological Systems | 3                                     | - | - | 3                |
| <b>CSB 522</b>                       | Optimization methods                                     | 3                                     | - | - | 3                |
| <b>CSB 523</b>                       | Data Mining, Data Analytics and Data Warehousing         | 3                                     | - | - | 3                |
|                                      | Elective-3 (A)                                           | 3                                     | - | - | 3                |
|                                      | Elective-4 (A)                                           | 3                                     | - | - | 3                |
|                                      | Elective-5 (C)                                           | 3                                     | - | - | 3                |
| <b>MTH 524</b>                       | Research Methodology                                     | 1                                     | 1 | - | 2                |
| <b>CSB 525</b>                       | Lab-II                                                   | -                                     | - | 2 | 1                |
| <b>CSB 526</b>                       | Seminar-II                                               | -                                     | - | 2 | 1                |
| Total Hours: 24<br>Total Credits: 44 |                                                          | Total Semester Credits                |   |   | 22               |

**M Tech in Computational and Systems Biology**

**Third Semester:**

| Course No.                          | Subject                | Scheme of Studies Periods<br>per week |   |    | Total<br>Credits |
|-------------------------------------|------------------------|---------------------------------------|---|----|------------------|
|                                     |                        | L                                     | T | P  |                  |
| <b>CSB 611</b>                      | Dissertation Phase - I | -                                     | - | 32 | 16               |
| Total Hours:32<br>Total Credits: 60 |                        | Total Semester Credits                |   |    | 16               |

**Fourth Semester:**

| Course No.                           | Subject                 | Scheme of Studies Periods<br>per week |   |    | Total<br>Credits |
|--------------------------------------|-------------------------|---------------------------------------|---|----|------------------|
|                                      |                         | L                                     | T | P  |                  |
| <b>CSB 621</b>                       | Dissertation Phase - II | -                                     | - | 40 | 20               |
| Total Hours: 40<br>Total Credits: 80 |                         | Total Semester Credits                |   |    | 20               |

**M Tech in Computational and Systems Biology**

| <b>List of Program Electives A</b>      |                                                                   | <b>List of Open Electives C</b> |                                                           |
|-----------------------------------------|-------------------------------------------------------------------|---------------------------------|-----------------------------------------------------------|
| CSB551                                  | Statistical Methods                                               | ARP - 581                       | Introduction to Urban Planning                            |
| CSB552                                  | Dynamic Systems with Application to Biology & Medicine            | BSE – 581                       | Bioprocess Engineering                                    |
| CSB553                                  | Omic Data & Quantitative Systems Biology                          | BSE – 582                       | Biophysics Tools and Techniques                           |
| CSB554                                  | Bio Python and Devops Tools                                       | CHE – 581                       | Analytical Techniques                                     |
| CSB555                                  | Biological Data Analytics and Data Science                        | CHE – 582                       | Green Technology & Processes                              |
| CSB556                                  | Computational Cell Biology                                        | CE – 581                        | Solid Waste Management                                    |
| CSB557                                  | Pattern Recognition & Machine Learning                            | CE – 582                        | Basic Concept of GIS                                      |
| CSB558                                  | Petri Net Models in Biology                                       | CE – 583                        | Road Safety                                               |
| CSB559                                  | Computational Models in Agriculture                               | CSE – 581                       | Machine Learning                                          |
| CSB560                                  | Computational Thermal Biology                                     | CSE – 582                       | Advanced Data Structures and Algorithms                   |
| CSB561                                  | Computational Epidemiology                                        | PHY – 581                       | Nanotechnology and Nanoscience                            |
| CSB562                                  | Computational Exposomics                                          | EE – 581                        | Electric Machines & Applications                          |
| CSB563                                  | Process Mining                                                    | EE – 582                        | Control and Instrumentation                               |
| CSB564                                  | Computational Ecology                                             | ECE – 581                       | Introduction to Fuzzy Logic                               |
| CSB565                                  | Cognitive Science                                                 | ECE – 582                       | Neural Networks and its Applications                      |
| CSB566                                  | Chemo Informatics & Drug Design                                   | EC - 581                        | Energy Resource Technologies                              |
| CSB567                                  | Machine Learning Techniques in Bioinformatics                     | HUM – 581                       | Intellectual Property Rights for Engineers                |
| CSB568                                  | Network Biology                                                   | HUM – 582                       | Applied Psychology: Human Centered Design and Engineering |
| CSB569                                  | Reactome & Interactome Informatics                                | ME – 581                        | Value Engineering                                         |
| CSB570                                  | Biological Data Science                                           | ME – 582                        | Design Thinking                                           |
| CSB571                                  | Computational Phylogenetics                                       | ME - 583                        | Mechatronics and NDT in Engineering                       |
| CSB572                                  | Bioimage Processing                                               | MME – 581                       | Advanced Instrumentation Methods for Material Analysis    |
| CSB573                                  | Data Security & Data Reliability                                  | MME – 582                       | Smart Materials and their Application                     |
|                                         |                                                                   | MBA-581                         | Engineering Startup Management                            |
| <b>List of Departmental Electives B</b> |                                                                   |                                 |                                                           |
| BI 566                                  | Computational Biology & Computational Biochemistry                |                                 |                                                           |
| BI 567                                  | Artificial Intelligence, Soft Computing & Neural Networks         |                                 |                                                           |
| BI 568                                  | Fuzzy sets and models in Biology                                  |                                 |                                                           |
| BI 569                                  | Computational Metagenomics                                        |                                 |                                                           |
| BI 570                                  | Computational Models for Biological Networks & Molecular Pathways |                                 |                                                           |