## BSc in Chemistry and Biological Chemistry with 2nd Major in Data Analytics (CHDA)

AY2022 - 2023 Intake onwards

FYP with Professional Attachment

|               |         | Number of Academic Units (AU) |                |                     |           |                |       |  |  |  |
|---------------|---------|-------------------------------|----------------|---------------------|-----------|----------------|-------|--|--|--|
| _             | Year of | Major Red                     | quirement      | Interdis            | ciplinary | Broadening and |       |  |  |  |
| Programme     | Study   | Core (C)                      | Major PE (MPE) | Common Core<br>(CC) |           |                | Total |  |  |  |
|               | 1       | 17                            |                | 9                   |           | 6              | 32    |  |  |  |
| Chemistry and | 2       | 21                            |                | 8                   | 3         | 6              | 38    |  |  |  |
| Biological    | 3       | 18                            |                |                     | 7         | 19             | 44    |  |  |  |
| Chemistry     | 4       |                               | 22             |                     |           | 6              | 28    |  |  |  |
|               | Total   | 56                            | 22             | 17                  | 10        | 37             | 142   |  |  |  |

| Category                          |                         |  | AU | Total AU |  |
|-----------------------------------|-------------------------|--|----|----------|--|
|                                   | Common (                | Core (University-level)                                |    |          |  |
|                                   | CC0001 In               | quiry and Communication in the Interdisciplinary World | 2  |          |  |
|                                   | CC0002 Na               | avigating the Digital World                            | 2  |          |  |
|                                   | CC0003 Et               | hics & Civics in a Multi-Cultural World                | 2  |          |  |
|                                   | CC0005 He               | ealthy Living & Wellbeing                              | 3  | 47       |  |
| Intordicainlines                  | CC0006 Su               | stainability: Society, Economy & Environment           | 3  | 17       |  |
| nterdisciplinary<br>Collaborative | CC0007 Sc               | ience & Technology for Humanity                        | 3  |          |  |
|                                   | ML0004 Ca               | areer and Entrepreneurial Development for the Future   |    |          |  |
| Core (ICC)                        | World                   |  | 2  |          |  |
|                                   | Foundatio               | nal Core (College-level)                               |    |          |  |
|                                   |                         | Communication Across the Sciences                      | 2  |          |  |
|                                   |                         | roduction to Data Science and Artificial Intelligence  | 3  | 10       |  |
| l                                 |                         | rofessional Attachment                                 | 5  |          |  |
|                                   | 10                      |  |    | l .      |  |
| <del>.</del>                      | CHEM Cor                | e  |    |          |  |
|                                   | CM1001                  | Foundations of Chemistry I                             | 4  |          |  |
|                                   | CM1002                  | Foundations of Chemistry II                            | 4  |          |  |
|                                   | MH1082                  | Calculus for the Sciences                              | 4  |          |  |
|                                   | MH1804^                 | Mathematics for Chemistry                              | 2  |          |  |
|                                   | PH1801                  | Foundations of Physics I                               | 3  |          |  |
|                                   | CM2011                  | Analytical and Bioanalytical Chemistry                 | 3  |          |  |
|                                   | CM2021                  | Inorganic and Bioinorganic Chemistry                   | 3  |          |  |
|                                   | CM2061                  | Chemistry & Biological Chemistry Laboratory 1          | 3  |          |  |
|                                   | CM2031                  | Organic and Bioorganic Chemistry                       | 3  | 56       |  |
| Major                             | CM2041                  | Physical and Biophysical Chemistry 1                   | 3  | 30       |  |
|                                   | CM2062                  | Chemistry & Biological Chemistry Laboratory 2          | 3  |          |  |
| Requirement                       | PS0001^                 | Introduction to Computational Thinking                 | 3  |          |  |
|                                   | CM3011 <sup>&amp;</sup> | Chemical Spectroscopy and Applications                 | 3  |          |  |
|                                   | CM3041 <sup>&amp;</sup> | Physical and Biophysical Chemistry 2                   | 3  |          |  |
|                                   | CM3062                  | Chemistry & Biological Chemistry Laboratory 4          | 3  |          |  |
|                                   | CM3031 <sup>&amp;</sup> | Organic Reaction Mechanisms and Synthesis              | 3  |          |  |
|                                   | CM3021 <sup>&amp;</sup> |  | 3  |          |  |
|                                   | CM3061                  | Chemistry & Biological Chemistry Laboratory 3          | 3  |          |  |
|                                   | CHEM Ma                 | or Prescribed Electives (MPE)                          | 1  | <u> </u> |  |
|                                   | CM4080                  | Honours Project 1                                      | 10 | 22       |  |
|                                   | 4 x MPEs                |  | 12 |          |  |

|  | MH4702 Probabilistic Methods in OR (4AU)  Students are responsible to plan for their 2nd major courses   |        |         |
|--|--|--------|---------|
| 2nd Major in<br>Data Analytics<br>(BDEs) | BS3008 Computational Biology and Modeling (3AU) BS4017 High-Throughput Bioinformatics (3AU) CM4043* Molecular Modelling: Principles and Applications (3AU) CM4044* Artificial Intelligence in Chemistry (3AU) ES2001 Computational Earth Systems Science (4AU) MH3400 Algorithms for the Real World (4AU) MH3500 Statistics (4AU) MH3510 Regression Analysis (4AU) MH3511 Data Analysis with Computer (3AU) MH3701 Basic Optimization (4AU) MH4500 Time Series Analysis (4AU) MH4513 Survival Analysis (4AU) MH4513 Computational Economics (4AU) MH4320 Computational Economics (4AU) MH4511 Sampling and Survey (4AU) @ MH4512 Clinical Trials (4AU) | 9 - 12 | 9 - 12  |
|  | Data Analytics Electives (Read any 3) BC2407 Analytics II: Advanced Predictive Techniques (4AU)  |        |         |
|  | Predictive Techniques (4AU) / SC4024 Data Visualization (3AU)  | 3 - 4  |         |
|  | 6) Data Mining: EE4483 Artificial Intelligence & Data Mining 7) Data Visualisation/Management: BC2406 Analytics I: Visual and  | 3      |         |
| (BDEs)                                   | 5) Database: BC2402 Designing & Developing Databases (4AU) / EE4791 Database Systems (3AU) / SC2207 Introduction to Database (3AU)   | 3 - 4  | 20 20   |
| Data Analytics                           | 4) Algorithms: MH1403 Algorithms & Computing   | 3      | 16 - 18 |
| 2nd Major in                             | 3) Data Analysis/Computing: PS0001 Introduction to Computational Thinking  | NA     |         |
|  | Statistics 2) Linear Algebra: MH1804 Mathematics for Chemistry   | NA     |         |
|  | Data Analytics Compulsory Courses  1) Probability and Statistics: MH2500 Probability and Introduction to   | 4      |         |

<sup>^</sup>Counted towards 2nd major in Data Analytic Compulsory Course

&CM3011, CM3021. CM3031, CM3041 are offered in both semesters.

<sup>\*</sup>Can be counted towards CHEM MPE

|                         | ofessional Attachment  |      |    |                         |  |            |           |
|-------------------------|--|------|----|-------------------------|--|------------|-----------|
| Year 1 Sem              | ester 1  |      |    | Year 1 Sem              | nester 2   |            |           |
| Course                  |  | Туре | AU | Course                  |  | Туре       | AU        |
| CM1001                  | Foundations of Chemistry I   | С    | 4  | CM1002                  | Foundations of Chemistry II                              | С          | 4         |
| MH1802                  | Calculus for the Sciences  | С    | 4  | MH1804^                 | Mathematics for Chemistry                                | С          | 2         |
| CC0001                  | Inquiry and Communication in the<br>Interdisciplinary World  | CC   | 2  | PH1801                  | Foundations of Physics I                                 | С          | 3         |
| CC0002                  | Navigating the Digital World   | CC   | 2  | CC0003                  | Ethics & Civics in a Multi-Cultural World                | CC         | 2         |
| CC0005                  | Healthy Living & Well-being  | CC   | 3  |                         | BDE 1<br>BDE 2   | BDE<br>BDE | 3         |
| HW0001                  | Introduction to Academic Communicati   | ion* |    |                         |  |            |           |
| *for studen             | ts who have not cleared QET  |      | 15 |                         |  |            | 17        |
| Year 2 Sem              | ester 1  |      |    | Year 2 Sem              | nester 2   |            |           |
| Course                  |  | Туре | AU | Course                  |  | Туре       | ΑU        |
| CM2011                  | Analytical and Bioanalytical<br>Chemistry  | С    | 3  | CM2031                  | Organic and Bioorganic Chemistry                         | С          | 3         |
| CM2021                  | Inorganic and Bioinorganic Chemistry   | С    | 3  | CM2041                  | Physical and Biophysical Chemistry 1                     | С          | 3         |
| CM2061                  | Chemistry & Biological Chemistry<br>Laboratory 1   | С    | 3  | CM2062                  | Chemistry & Biological Chemistry<br>Laboratory 2         | С          | 3         |
| PS0001^                 | Introduction to Computational Thinking   | С    | 3  | PS0002                  | Introduction to Data Science and Artificial Intelligence | FC         | 3         |
| CC0006                  | Sustainability: Society, Economy &<br>Environment  | CC   | 3  | CC0007                  | Science & Technology for Humanity                        | СС         | 3         |
| ML0004                  | Career and Entrepreneurial  Development for the Future World   | CC   | 2  | MH1403                  | Algorithms & Computing                                   | BDE        | 3         |
|                         | BDE 3  | BDE  | 3  |                         |  |            |           |
|                         |  |      | 20 |                         |  |            | 18        |
| Year 3 Sem              | ester 1  |      |    | Year 3 Sem              | ester 2  |            |           |
| Course                  |  | Туре | AU | Course                  |  | Type       | AU        |
| CM3xxx <sup>&amp;</sup> | CHEM-Core  | С    | 3  | CM3xxx <sup>&amp;</sup> | CHEM-Core  | С          | 3         |
| CM3xxx <sup>&amp;</sup> | CHEM-Core  | С    | 3  | CM3xxx <sup>&amp;</sup> | CHEM-Core  | С          | 3         |
| CM3062                  | Chemistry & Biological Chemistry Laboratory 4  | С    | 3  | CM3061                  | Chemistry & Biological Chemistry<br>Laboratory 3         | С          | 3         |
| BC2402                  | Designing & Developing Databases (CHDA-Core)   | BDE  | 4  | HW0218                  | Communication Across the Sciences                        | FC         | 2         |
| BC2406                  | Analytics I: Visual and Predictive<br>Techniques (CHDA-Core)   | BDE  | 4  | MH3500                  | Statistics (CHDA-Elective 1)                             | BDE        | 4         |
| MH2500                  | Probability and Introduction to<br>Statistics (CHDA-Core)  | BDE  | 4  |                         | CHDA-Elective 2  | BDE        | 3         |
|                         |  |      |    | Year 3 Spe              |  |            | _         |
|                         |  |      | 24 | CM4082                  | Professional Attachment                                  | FC         | 5         |
|                         |  |      | 21 |                         |  |            | 23        |
| Year 4 Sem              | ester 1  |      | _  | Year 4 Sem              | ester 2  | _          |           |
| Course                  | A MENTAL AND A STATE OF THE STA | Туре | AU | Course                  | Harris Bud 15  | Туре       | AU        |
| CM4044 <sup>+</sup> ^   | Artificial Intelligence in Chemistry   | MPE  | 3  | CM4080                  | Honours Project 1  | MPE        | 10        |
|                         | CHEM MPE2  | MPE  | 3  |                         |  |            |           |
|                         | CHEM MPE3  | MPE  | 3  |                         |  |            |           |
|                         | CHEM MPE4  | MPE  | 3  |                         |  |            |           |
| EE4483                  | Artificial Intelligence & Data Mining (CHDA-Core)  | BDE  | 3  |                         |  |            |           |
|                         | BDE 4  | BDE  | 3  |                         |  |            | _         |
|                         |  |      |    |                         | ·  |            |           |
|                         |  |      | 18 |                         | Total (AU)   |            | 10<br>142 |

This study plan is meant as a guide.

<sup>^</sup>Counted towards 2nd major in Data Analytic requirements

 $<sup>^{\&</sup>amp;}$  CM3xxx refers to CM3011, CM3021, CM3031, CM3041 - These courses are offered in both semesters

## BSc in Chemistry and Biological Chemistry with 2nd Major in Data Analytics (CHDA)

AY2022 - 2023 Intake onwards

with Professional Internship

|               |         | Number of Academic Units (AU) |                |   |           |                              |       |  |  |  |  |
|---------------|---------|-------------------------------|----------------|---|-----------|------------------------------|-------|--|--|--|--|
|               | Year of | Major Re                      | quirement      | Interdis                                | ciplinary | Broadening and               |       |  |  |  |  |
| Programme     | Study   | Core (C)                      | Major PE (MPE) | Common Core (CC) Foundational Core (FC) |           | Deepening<br>Electives (BDE) | Total |  |  |  |  |
|               | 1       | 17                            |                | 9                                       |           | 6                            | 32    |  |  |  |  |
| Chemistry and | 2       | 21                            |                | 8                                       | 3         | 9                            | 41    |  |  |  |  |
| Biological    | 3       | 18                            |                |   | 2         | 21                           | 41    |  |  |  |  |
| Chemistry     | 4       |                               | 12             |   | 10        | 6                            | 28    |  |  |  |  |
|               | Total   | 56                            | 12             | 17                                      | 15        | 42                           | 142   |  |  |  |  |

| Category          | -                       | ogical Chemistry with 2nd Major in Data Analytics (CH  | AU  | Total AU |  |  |
|-------------------|-------------------------|--|-----|----------|--|--|
| Category          | Common                  | Core (University-level)                                | AU  | TOTAL AU |  |  |
|                   |                         | quiry and Communication in the Interdisciplinary World | 2   |          |  |  |
|                   |                         |  | 2 2 |          |  |  |
|                   |                         | avigating the Digital World                            |     |          |  |  |
|                   |                         | hics & Civics in a Multi-Cultural World                | 2   |          |  |  |
|                   |                         | ealthy Living & Wellbeing                              | 3   |          |  |  |
| Interdisciplinary |                         | stainability: Society, Economy & Environment           | 3   | 17       |  |  |
| Collaborative     |                         | ience & Technology for Humanity                        | 3   |          |  |  |
| Core (ICC)        |                         | areer and Entrepreneurial Development for the Future   | 2   |          |  |  |
| 33.3 (.33)        | World                   |  |     |          |  |  |
|                   | Foundatio               | nal Core (College-level)                               |     |          |  |  |
|                   | HW0218 0                | Communication Across the Sciences                      | 2   | 15       |  |  |
|                   | PS0002 In               | troduction to Data Science and Artificial Intelligence | 3   | 15       |  |  |
|                   | CM4081 P                | rofessional Internship                                 | 10  |          |  |  |
|                   |                         |  | _   |          |  |  |
|                   | CHEM Cor                |  | _   |          |  |  |
|                   |                         | Foundations of Chemistry I                             | 4   |          |  |  |
|                   | CM1002                  | Foundations of Chemistry II                            | 4   |          |  |  |
|                   | MH1082                  | Calculus for the Sciences                              | 4   |          |  |  |
|                   |                         | Mathematics for Chemistry                              | 2   |          |  |  |
|                   | PH1801                  | Foundations of Physics I                               | 3   |          |  |  |
|                   | CM2011                  | Analytical and Bioanalytical Chemistry                 | 3   |          |  |  |
|                   | CM2021                  | Inorganic and Bioinorganic Chemistry                   | 3   |          |  |  |
|                   | CM2061                  | Chemistry & Biological Chemistry Laboratory 1          | 3   |          |  |  |
|                   | CM2031                  | Organic and Bioorganic Chemistry                       | 3   | 56       |  |  |
| Major             | CM2041                  | Physical and Biophysical Chemistry 1                   | 3   |          |  |  |
| Requirement       | CM2062                  | Chemistry & Biological Chemistry Laboratory 2          | 3   |          |  |  |
|                   | PS0001^                 | Introduction to Computational Thinking                 | 3   |          |  |  |
|                   | CM3011 <sup>&amp;</sup> | Chemical Spectroscopy and Applications                 | 3   |          |  |  |
|                   | CM3041 <sup>&amp;</sup> | Physical and Biophysical Chemistry 2                   | 3   |          |  |  |
|                   | CM3062                  | Chemistry & Biological Chemistry Laboratory 4          | 3   |          |  |  |
|                   | CM3031 <sup>&amp;</sup> | Organic Reaction Mechanisms and Synthesis              | 3   |          |  |  |
|                   | CM3021 <sup>&amp;</sup> | Organometallic Chemistry                               | 3   |          |  |  |
|                   | CM3061                  | Chemistry & Biological Chemistry Laboratory 3          | 3   |          |  |  |
|                   | CHEM MA                 | jor Prescribed Electives (MPE)                         |     |          |  |  |
|                   | 4 x MPEs                | joi i rescribed Liectives (ivir L)                     | 12  | 12       |  |  |
|                   |                         |  |     |          |  |  |

| DE             | Any 6 BDE  | 17     | 17      |
|----------------|--|--------|---------|
|                | Students are responsible to plan for their 2nd major courses                     | 1      |         |
|                | MH4702 Probabilistic Methods in OR (4AU)   |        |         |
|                | MH4512 Clinical Trials (4AU)   |        |         |
|                | MH4511 Sampling and Survey (4AU) @   |        |         |
|                | MH4320 Computational Economics (4AU)   |        |         |
|                | MH4302 Theory of Computing (4AU)   |        |         |
|                | MH4513 Survival Analysis (4AU)   |        |         |
|                | MH4500 Time Series Analysis (4AU)  |        |         |
| (DDL3)         | MH3701 Basic Optimization (4AU)  |        |         |
| (BDEs)         | MH3511 Data Analysis with Computer (3AU)   | 9 - 12 | 9 - 12  |
| Data Analytics | MH3510 Regression Analysis (4AU)   |        |         |
| 2nd Major in   | MH3400 Algorithms for the Real World (4AU) MH3500 Statistics (4AU)               |        |         |
|                | ES2001 Computational Earth Systems Science (4AU)                                 |        |         |
|                | CM4044* Artificial Intelligence in Chemistry (3AU)                               |        |         |
|                | CM4043* Molecular Modelling: Principles and Applications (3AU)                   |        |         |
|                | BS4017 High-Throughput Bioinformatics (3AU)                                      |        |         |
|                | BS3008 Computational Biology and Modeling (3AU)                                  |        |         |
|                | BC2407 Analytics II: Advanced Predictive Techniques (4AU)                        |        |         |
|                | Data Analytics Electives (Read any 3)  | I      | 1       |
|                |  |        |         |
|                | Predictive Techniques (4AU)/ SC4024 Data Visualization (3AU)                     | 3 - 4  |         |
|                | 7) Data Visualisation/Management: BC2406 Analytics I: Visual and                 | 2.4    |         |
|                | 6) Data Mining: EE4483 Artificial Intelligence & Data Mining                     | 3      |         |
|                | Database(3AU)  |        |         |
|                | EE4791 Database Systems (3AU)/SC2207 Introduction to                             | 3 - 4  |         |
| (BDEs)         | 5) Database: BC2402 Designing & Developing Databases (4AU) /                     |        | 16 - 18 |
| Data Analytics | 4) Algorithms: MH1403 Algorithms & Computing                                     | 3      | 16 10   |
| 2nd Major in   | Thinking   | NA     |         |
|                | 3) Data Analysis/Computing: PS0001 Introduction to Computational                 | INA    |         |
|                | 2) Linear Algebra: MH1804 Mathematics for Chemistry                              | NA     |         |
|                | 1) Probability and Statistics: MH2500 Probability and Introduction to Statistics | 4      |         |
|                | Data Analytics Compulsory Courses  | 1      |         |

<sup>^</sup>Counted towards 2nd major in Data Analytic Compulsory Course

&CM3011, CM3021. CM3031, CM3041 are offered in both semesters.

<sup>\*</sup>Can be counted towards CHEM MPE

| B.Sci. (Che             | mistry and Biological Chemistry) with 2:                     | nd maior | in Data Ana | lvtics (CHDA)           |   |                   |        |
|-------------------------|--|----------|-------------|-------------------------|---|-------------------|--------|
| -                       | Study Plan for AY2022-2023 intake                            |          |             | , (2.1.2.1.)            |   |                   |        |
|                         | ssional Internship   |          |             |                         |   |                   |        |
| Year 1 Sem              | nester 1   |          |             | Year 1 Sem              | ester 2   |                   |        |
| Course                  |  | Type     | AU          | Course                  |   | Type              | AU     |
| CM1001                  | Foundations of Chemistry I                                   | C        | 4           | CM1002                  | Foundations of Chemistry II                                 | C                 | 4      |
| MH1802                  | Calculus for the Sciences                                    | С        | 4           | MH1804^                 | Mathematics for Chemistry                                   | С                 | 2      |
| CC0001                  | Inquiry and Communication in the<br>Interdisciplinary World  | CC       | 2           | PH1801                  | Foundations of Physics I                                    | С                 | 3      |
| CC0002                  | Navigating the Digital World                                 | CC       | 2           | CC0003                  | Ethics & Civics in a Multi-Cultural World                   | CC                | 2      |
| CC0005                  | Healthy Living & Well-being                                  | CC       | 3           |                         | BDE 1<br>BDE 2  | BDE<br>BDE        | 3<br>3 |
| HW0001                  | Introduction to Academic Communicat                          | ion*     |             |                         | BDL 2   | BDL               | 3      |
|                         |  |          | 15          |                         |   |                   | 17     |
| *for studer             | nts who have not cleared QET                                 |          | 13          |                         |   |                   | 1,     |
| Year 2 Sem              | nester 1   |          |             | Year 2 Sem              | ester 2   |                   |        |
| Course                  | 105101 1   | Туре     | AU          | Course                  |   | Туре              | AU     |
|                         | Analytical and Bioanalytical                                 |          |             |                         |   |                   |        |
| CM2011                  | Chemistry  | С        | 3           | CM2031                  | Organic and Bioorganic Chemistry                            | С                 | 3      |
| CM2021                  | Inorganic and Bioinorganic Chemistry                         | С        | 3           | CM2041                  | Physical and Biophysical Chemistry 1                        | С                 | 3      |
| CM2061                  | Chemistry & Biological Chemistry<br>Laboratory 1             | С        | 3           | CM2062                  | Chemistry & Biological Chemistry Laboratory 2               | С                 | 3      |
| PS0001^                 | Introduction to Computational<br>Thinking                    | С        | 3           | PS0002                  | Introduction to Data Science and<br>Artificial Intelligence | FC                | 3      |
| CC0006                  | Sustainability: Society, Economy & Environment               | СС       | 3           | CC0007                  | Science & Technology for Humanity                           | CC                | 3      |
| ML0004                  | Career and Entrepreneurial  Development for the Future World | CC       | 2           | MH1403                  | Algorithms & Computing                                      | BDE               | 3      |
|                         | BDE 3  | BDE      | 3           |                         | BDE 4   | BDE               | 3      |
|                         |  |          | 20          |                         |   |                   | 21     |
|                         |  |          |             | V2.6                    |   |                   |        |
| Year 3 Sem<br>Course    | iester 1   | Туре     | AU          | Year 3 Sem<br>Course    | ester 2   | Туре              | AU     |
| CM3xxx <sup>&amp;</sup> | CHEM-Core  | С        | 3           | CM3xxx <sup>&amp;</sup> | CHEM-Core   | С                 | 3      |
|                         |  | С        | 3           |                         |   | С                 |        |
| CM3xxx <sup>&amp;</sup> | CHEM-Core  | C        | 3           | CM3xxx <sup>&amp;</sup> | CHEM-Core   | C                 | 3      |
| CM3062                  | Chemistry & Biological Chemistry<br>Laboratory 4             | С        | 3           | CM3061                  | Chemistry & Biological Chemistry<br>Laboratory 3            | С                 | 3      |
| BC2402                  | Designing & Developing Databases (CHDA-Core)                 | BDE      | 4           | HW0218                  | Communication Across the Sciences                           | FC                | 2      |
| BC2406                  | Analytics I: Visual and Predictive Techniques (CHDA-Core)    | BDE      | 4           | MH3500                  | Statistics (CHDA-Elective 1)                                | BDE               | 4      |
| MH2500                  | Probability and Introduction to Statistics (CHDA-Core)       | BDE      | 4           |                         | CHDA-Elective 2   | BDE               | 3      |
|                         |  |          |             |                         | BDE 5   | BDE               | 2      |
|                         |  |          | 21          |                         |   |                   | 20     |
| Year 4 Sem              | nester 1   |          |             | Year 4 Sem              | ester 2   |                   |        |
|                         |  | Туре     | AU          | Course                  |   | Туре              | AU     |
| Course                  | 5 6 1 11 1 11  | FC       | 10          | CM4043+^                | Molecular Modelling: Principles and                         | MPE               | 3      |
| CM4081                  | Professional Internship                                      |          |             |                         | Applications  |                   |        |
|                         | Professional Internship                                      |          |             |                         |   |                   | 3      |
|                         | Professional Internship                                      |          |             |                         | CHEM MPE2   | BDE               | 2      |
|                         | Professional Internship                                      |          |             |                         | CHEM MPE 3  | MPE               | 3      |
|                         | Professional Internship                                      |          |             |                         | CHEM MPE 3<br>CHEM MPE 4                                    | MPE<br>MPE        | 3      |
|                         | Professional Internship                                      |          |             |                         | CHEM MPE 3<br>CHEM MPE 4<br>CHDA-Core                       | MPE<br>MPE<br>BDE | 3      |
|                         | Professional Internship                                      |          |             |                         | CHEM MPE 3<br>CHEM MPE 4                                    | MPE<br>MPE        | 3      |
|                         | Professional Internship                                      |          | 10          |                         | CHEM MPE 3<br>CHEM MPE 4<br>CHDA-Core                       | MPE<br>MPE<br>BDE | 3      |

This study plan is meant as a guide.
^Counted towards 2nd major in Data Analytic requirements

<sup>&</sup>amp; CM3xxx refers to CM3011, CM3021, CM3031, CM3041 - These courses are offered in both semesters

## BSc in Chemistry and Biological Chemistry with 2nd Major in Data Analytics (CHDA)

AY2022 - 2023 Intake onwards

with Professional Internship and FYP

|               |         |                   | Number of Academic Units (AU) |                     |                           |                |       |  |  |  |  |
|---------------|---------|-------------------|-------------------------------|---------------------|---------------------------|----------------|-------|--|--|--|--|
| _             | Year of | Major Requirement |                               | Interdis            | ciplinary                 | Broadening and |       |  |  |  |  |
| Programme     | Study   | Core (C)          | Major PE (MPE)                | Common Core<br>(CC) | Foundational Core<br>(FC) |                | Total |  |  |  |  |
|               | 1       | 17                |                               | 9                   |                           | 7              | 33    |  |  |  |  |
| Chemistry and | 2       | 21                |                               | 8                   | 3                         | 3              | 35    |  |  |  |  |
| Biological    | 3       | 18                | 3                             |                     | 2                         | 19             | 42    |  |  |  |  |
| Chemistry     | 4       |                   | 19                            |                     | 10                        | 3              | 32    |  |  |  |  |
|               | Total   | 56                | 22                            | 17                  | 15                        | 32             | 142   |  |  |  |  |

| Category                          | -                       | ogical Chemistry with 2nd Major in Data Analytics (Ch  | AU | Total AU |  |  |  |
|-----------------------------------|-------------------------|--|----|----------|--|--|--|
| 7                                 | Common                  | Core (University-level)                                |    |          |  |  |  |
|                                   |                         | quiry and Communication in the Interdisciplinary World | 2  |          |  |  |  |
|                                   |                         | avigating the Digital World                            | 2  |          |  |  |  |
|                                   |                         | hics & Civics in a Multi-Cultural World                | 2  |          |  |  |  |
|                                   |                         | ealthy Living & Wellbeing                              | 3  |          |  |  |  |
|                                   | CC0006 Su               | stainability: Society, Economy & Environment           | 3  | 17       |  |  |  |
| nterdisciplinary<br>Collaborative | ,                       | ience & Technology for Humanity                        | 3  |          |  |  |  |
|                                   |                         | areer and Entrepreneurial Development for the Future   |    |          |  |  |  |
| Core (ICC)                        | World                   |  | 2  |          |  |  |  |
|                                   |                         |  |    |          |  |  |  |
|                                   | Foundatio               | nal Core (College-level)                               |    |          |  |  |  |
|                                   | HW0218 C                | Communication Across the Sciences                      | 2  |          |  |  |  |
|                                   | PS0002 Int              | roduction to Data Science and Artificial Intelligence  | 3  | 15       |  |  |  |
|                                   | CM4081 P                | rofessional Internship                                 | 10 |          |  |  |  |
|                                   |                         |  |    |          |  |  |  |
|                                   | CHEM Cor                |  |    |          |  |  |  |
|                                   | CM1001                  | Foundations of Chemistry I                             | 4  |          |  |  |  |
|                                   | CM1002                  | Foundations of Chemistry II                            | 4  |          |  |  |  |
|                                   | MH1082                  | Calculus for the Sciences                              | 4  |          |  |  |  |
|                                   | MH1804^                 | Mathematics for Chemistry                              | 2  |          |  |  |  |
|                                   | PH1801                  | Foundations of Physics I                               | 3  |          |  |  |  |
|                                   | CM2011                  | Analytical and Bioanalytical Chemistry                 | 3  |          |  |  |  |
|                                   | CM2021                  | Inorganic and Bioinorganic Chemistry                   | 3  |          |  |  |  |
|                                   | CM2061                  | Chemistry & Biological Chemistry Laboratory 1          | 3  |          |  |  |  |
|                                   | CM2031                  | Organic and Bioorganic Chemistry                       | 3  | 56       |  |  |  |
| Major                             | CM2041                  | Physical and Biophysical Chemistry 1                   | 3  |          |  |  |  |
| Requirement                       | CM2062                  | Chemistry & Biological Chemistry Laboratory 2          | 3  |          |  |  |  |
| Requirement                       | PS0001^                 | Introduction to Computational Thinking                 | 3  |          |  |  |  |
|                                   | CM3011 <sup>&amp;</sup> | Chemical Spectroscopy and Applications                 | 3  |          |  |  |  |
|                                   | CM3041 <sup>&amp;</sup> | Physical and Biophysical Chemistry 2                   | 3  |          |  |  |  |
|                                   | CM3062                  | Chemistry & Biological Chemistry Laboratory 4          | 3  |          |  |  |  |
|                                   | CM3031 <sup>&amp;</sup> |  | 3  |          |  |  |  |
|                                   | CM3021 <sup>&amp;</sup> | Organometallic Chemistry                               | 3  |          |  |  |  |
|                                   | CM3061                  | Chemistry & Biological Chemistry Laboratory 3          | 3  |          |  |  |  |
|                                   | CHEM Ma                 | <br>  jor Prescribed Electives (MPE)                   |    | <u> </u> |  |  |  |
|                                   | CM4080                  | Honours Project 1                                      | 10 | 22       |  |  |  |
|                                   | 4 x MPEs                |  | 12 | 22       |  |  |  |

|                |  |                       | 142 - 147 |
|----------------|--|-----------------------|-----------|
|                | p, =   | ,                     |           |
| DE             | Students are responsible to plan for their 2nd major courses  Any 2 BDE  | 7                     | 7         |
|                | · · ·  |                       |           |
|                | MH4512 Clinical Trials (4AU) MH4702 Probabilistic Methods in OR (4AU)  |                       |           |
|                | MH4511 Sampling and Survey (4AU) @   |                       |           |
|                | MH4320 Computational Economics (4AU)   |                       |           |
|                | MH4302 Theory of Computing (4AU)   |                       |           |
|                | MH4513 Survival Analysis (4AU)   |                       |           |
|                | MH4500 Time Series Analysis (4AU)  |                       |           |
| • •            | MH3701 Basic Optimization (4AU)  |                       |           |
| (BDEs)         | MH3511 Data Analysis with Computer (3AU)   | 9 - 12                | 9 - 12    |
| Data Analytics | MH3510 Regression Analysis (4AU)   |                       |           |
| 2nd Major in   | MH3500 Statistics (4AU)  |                       |           |
|                | MH3400 Algorithms for the Real World (4AU)   |                       |           |
|                | CM4044* Artificial Intelligence in Chemistry (3AU) ES2001 Computational Earth Systems Science (4AU)                      |                       |           |
|                | CM4043* Molecular Modelling: Principles and Applications (3AU)   |                       |           |
|                | BS4017 High-Throughput Bioinformatics (3AU)  |                       |           |
|                | BS3008 Computational Biology and Modeling (3AU)  |                       |           |
|                | BC2407 Analytics II: Advanced Predictive Techniques (4AU)  |                       |           |
|                |  |                       |           |
|                | Data Analytics Electives (Read any 3)  |                       |           |
|                | Predictive Techniques (4AU) / SC4024 Data Visualization (3AU)  | <b>5</b> <del>1</del> |           |
|                | 7) Data Visualisation/Management: BC2406 Analytics I: Visual and   | 3 - 4                 |           |
|                | 6) Data Mining: EE4483 Artificial Intelligence & Data Mining   | 3                     |           |
|                | (3AU)  |                       |           |
|                | EE4791 Database Systems(3AU)/ SC2207 Introduction to Database  | 3 - 4                 |           |
| (BDEs)         | 5) Database: BC2402 Designing & Developing Databases (4AU) /   | -                     | 16 - 18   |
| Data Analytics | 4) Algorithms: MH1403 Algorithms & Computing   | 3                     |           |
| 2nd Major in   | Thinking   | NA                    |           |
|                | 2) Linear Algebra: MH1804 Mathematics for Chemistry     3) Data Analysis/Computing: PS0001 Introduction to Computational | NA                    |           |
|                | Statistics  3) Linear Algebra: MU1904 Mathematics for Chamistry  |                       |           |
|                | 1) Probability and Statistics: MH2500 Probability and Introduction to  | 4                     |           |

<sup>^</sup>Counted towards 2nd major in Data Analytic Compulsory Course

&CM3011, CM3021. CM3031, CM3041 are offered in both semesters.

<sup>\*</sup>Can be counted towards CHEM MPE

|                         | mistry and Biological Chemistry) with 2n  | d major | in Data Ana | lytics (CHDA)           |   |            |        |
|-------------------------|---|---------|-------------|-------------------------|---|------------|--------|
|                         | Study Plan for AY2022-2023 intake   |         |             |                         |   |            |        |
| with Profes             | sional Internship and FYP   |         |             |                         |   |            |        |
| Year 1 Sem              | ester 1   |         |             | Year 1 Sem              | ester 2   |            |        |
| Course                  |   | Туре    | AU          | Course                  |   | Туре       | AU     |
| CM1001                  | Foundations of Chemistry I  | С       | 4           | CM1002                  | Foundations of Chemistry II                                 | С          | 4      |
| MH1802                  | Calculus for the Sciences   | С       | 4           | MH1804^                 | Mathematics for Chemistry                                   | С          | 2      |
| CC0001                  | Inquiry and Communication in the<br>Interdisciplinary World   | СС      | 2           | PH1801                  | Foundations of Physics I                                    | С          | 3      |
| CC0002                  | Navigating the Digital World  | CC      | 2           | CC0003                  | Ethics & Civics in a Multi-Cultural<br>World                | СС         | 2      |
| CC0005                  | Healthy Living & Well-being   | CC      | 3           |                         | BDE 1   | BDE        | 3      |
| HW0001                  | Introduction to Academic Communicat   | ion*    |             |                         | BDE 2   | BDE        | 4      |
|                         |   |         | 15          |                         |   |            | 18     |
| *for studen             | its who have not cleared QET  |         | 13          |                         |   |            | 10     |
| Year 2 Sem              | ester 1   |         |             | Year 2 Sem              | ester 2   |            |        |
| Course                  |   | Туре    | AU          | Course                  |   | Туре       | AU     |
|                         | Analytical and Bioanalytical Chemistry M2021 Inorganic and Bioinorganic Chemistry M2061 Chemistry & Biological Chemistry Laboratory 1 Introduction to Computational Thinking Sustainability: Society, Economy & Environment |         |             |                         |   |            |        |
| CM2011                  |   | С       | 3           | CM2031                  | Organic and Bioorganic Chemistry                            | С          | 3      |
| CM2021                  | Inorganic and Bioinorganic Chemistry  | С       | 3           | CM2041                  | Physical and Biophysical Chemistry 1                        | С          | 3      |
| CM2061                  |   | С       | 3           | CM2062                  | Chemistry & Biological Chemistry<br>Laboratory 2            | С          | 3      |
| PS0001^                 | · ·   | С       | 3           | PS0002                  | Introduction to Data Science and<br>Artificial Intelligence | FC         | 3      |
| CC0006                  |   | CC      | 3           | CC0007                  | Science & Technology for Humanity                           | CC         | 3      |
| ML0004                  | Career and Entrepreneurial Development for the Future World   | CC      | 2           | MH1403                  | Algorithms & Computing                                      | BDE        | 3      |
|                         |   |         |             |                         |   |            |        |
|                         |   |         | 17          |                         |   |            | 18     |
| Year 3 Sem              | ester 1   |         |             | Year 3 Sem              | ester 2   |            |        |
| Course                  |   | Туре    | AU          | Course                  |   | Type       | AU     |
| CM3xxx <sup>&amp;</sup> | CHEM-Core   | С       | 3           | CM3xxx <sup>&amp;</sup> | CHEM-Core   | С          | 3      |
| CM3xxx <sup>&amp;</sup> | CHEM-Core   | С       | 3           | CM3xxx <sup>&amp;</sup> | CHEM-Core   | С          | 3      |
| CM3062                  | Chemistry & Biological Chemistry<br>Laboratory 4  | С       | 3           | CM3061                  | Chemistry & Biological Chemistry<br>Laboratory 3            | С          | 3      |
| BC2402                  | Designing & Developing Databases (CHDA-Core)  | BDE     | 4           | HW0218                  | Communication Across the Sciences                           | FC         | 2      |
| BC2406                  | Analytics I: Visual and Predictive Techniques (CHDA-Core)   | BDE     | 4           | MH3500                  | Statistics (CHDA-Elective 1)                                | BDE        | 4      |
| MH2500                  | Probability and Introduction to   | BDE     | 4           |                         | CHDA-Elective 2   | BDE        | 3      |
|                         | Statistics (CHDA-Core)  |         |             |                         | CHEM MPE 1  | MPE        | 3      |
|                         |   |         |             |                         |   |            | 24     |
|                         |   |         | 21          |                         |   |            | 21     |
| Year 4 Sem              | ester 1   |         |             | Year 4 Sem              | ester 2   |            |        |
| Course                  |   | Туре    | AU          | Course                  |   | Туре       | AU     |
|                         | Professional Internship   | FC      | 10          | CM4080                  | Honours Project 1   | MPE        | 10     |
| CM4081                  | r   | -       | -           | CM4043+^                | Molecular Modelling: Principles and Applications            | MPE        | 3      |
| CM4081                  |   |         |             |                         |   |            |        |
| CM4081                  |   |         |             |                         | CHEM MPE 3  | MPE        | 3      |
| CM4081                  |   |         |             |                         |   | MPE<br>MPE | 3<br>3 |
| CM4081                  |   |         |             |                         | CHEM MPE 3  |            |        |
| CM4081                  |   |         | 10          |                         | CHEM MPE 3<br>CHEM MPE 4                                    | MPE        | 3      |

This study plan is meant as a guide.
^Counted towards 2nd major in Data Analytic requirements

<sup>&</sup>amp; CM3xxx refers to CM3011, CM3021, CM3031, CM3041 - These courses are offered in both semesters