

| Advanced and Specialized Uses of Digital Tools                                                         |    |                                                            |                        |
|--------------------------------------------------------------------------------------------------------|----|------------------------------------------------------------|------------------------|
| Objectives: To provide foundational knowledge in immunology, biostatistics, and laboratory techniques. |    |                                                            |                        |
| BCC1                                                                                                   | M1 | S1                                                         | 9 ECTS                 |
|                                                                                                        |    | Molecular Foundations of Immunotherapies (in French)       | 3 Anne-Sophie CHRETIEN |
|                                                                                                        |    | Biostatistic in health science                             | 3 Herve KOVACIC        |
|                                                                                                        |    | Laboratory Practice I                                      | 3 Christophe DUBOIS    |
|                                                                                                        | M2 | S2                                                         | 12 ECTS                |
|                                                                                                        |    | Internship, Report Submission, and Thesis Defense          | 6 Christophe DUBOIS    |
|                                                                                                        |    | Biosis                                                     | 3 Eric DURAND          |
|                                                                                                        | M2 | Laboratory Practice II                                     | 3 Christophe DUBOIS    |
|                                                                                                        |    | S3                                                         | 15 ECTS                |
|                                                                                                        |    | Introduction: Descriptive Statistics Applied to Biomarkers | 3 Pierre SUCHON        |
|                                                                                                        |    | Ethics for Modern Artificial Intelligence in Healthcare II | 3 DUBOIS + GILSON      |
|                                                                                                        | M2 | Bibliographic Project                                      | 3 Christophe DUBOIS    |
|                                                                                                        |    | S4                                                         | 30 ECTS                |
|                                                                                                        | M2 | Internship and Thesis                                      | 30 Christophe DUBOIS   |

| Advanced and Specialized Uses of Digital Tools                                                                                         |    |                                                            |                        |
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| Objectives: To train students in fundamental tools for programming, data science, and digital modeling applied to health biology data. |    |                                                            |                        |
| BCC2                                                                                                                                   | M1 | S1                                                         | 12 ECTS                |
|                                                                                                                                        |    | Fundamentals of Digital Sciences                           | 3 Matthieu GILSON      |
|                                                                                                                                        |    | Introduction to Data Science                               | 6 Ioanna MILOU         |
|                                                                                                                                        |    | Introduction to Programming                                | 6 Zed LEE              |
|                                                                                                                                        | M2 | S2                                                         | 12 ECTS                |
|                                                                                                                                        |    | Applied Mathematics and Algorithms for Data Analysis       | 3 Matthieu GILSON      |
|                                                                                                                                        |    | Biological Data: Fundamental Concepts                      | 3 Pierre SUCHON        |
|                                                                                                                                        | M2 | Natural Language Processing                                | 3 Hercules DALLANIS    |
|                                                                                                                                        |    | Artificial Intelligence II                                 | 3 Letizia MILLI        |
|                                                                                                                                        |    | S3                                                         | 9 ECTS                 |
|                                                                                                                                        |    | Machine Learning: Application to Single-Cell Data Analysis | 6 Anne Sophie CHRETIEN |
|                                                                                                                                        | M2 | Advanced Programming                                       | 3 Rafika BOUTALBI      |

| Specialized Communication for Knowledge Transfer                                                    |    |                                                           |                     |
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| Objectives: Strengthen the ability to synthesize, communicate, and analyze scientific publications. |    |                                                           |                     |
| BCC3                                                                                                | M1 | S1                                                        | 6 ECTS              |
|                                                                                                     |    | Oral Presentation and Communication                       | 3 Christophe DUBOIS |
|                                                                                                     |    | Article Analysis                                          | 3 Christophe DUBOIS |
|                                                                                                     | M2 | S2                                                        | 12 ECTS             |
|                                                                                                     |    | Professional Project                                      | 3 Matthieu GILSON   |
|                                                                                                     |    | Ethics for Modern Artificial Intelligence in Healthcare I | 3 DUBOIS + GILSON   |
|                                                                                                     | M2 | Natural Language Processing                               | 3 Hercules DALLANIS |
|                                                                                                     |    | Artificial Intelligence II                                | 3 Letizia MILLI     |

| Development and Integration of Advanced Specialized Knowledge                                                                      |    |                                              |                     |
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| Objectifs : Approfondir l'expertise en IA et biomédecine pour résoudre des problématiques complexes en recherche ou en innovation. |    |                                              |                     |
| BCC4                                                                                                                               | M2 | S3                                           | 12 ECTS             |
|                                                                                                                                    |    | Bioinformatics and Mutational Analyses (BAM) | 3 Christophe BEROUD |
|                                                                                                                                    |    | Image Analysis – Biomarker Diagnostics       | 3 Kathia CHAUMOTRE  |
|                                                                                                                                    |    | Open Science and Reproducible Science        | 6 Christophe BEROUD |