

## Appendix 1a - Mandatory Module and Examination Plan for World Track

| <b>Mathematics – World Track</b>  |                                  |         |      |                     |  | <b>Jacobs Track Modules (General Education)</b>   |  |  |  |      |                     |  |                                  |  |           |            |     |                     |                                     |         |   |   |     |
|---|----------------------------------|---------|------|---------------------|--|---|--|--|--|------|---------------------|--|----------------------------------|--|-----------|------------|-----|---------------------|-------------------------------------|---------|---|---|-----|
| Matriculation Fall 2018   |                                  |         |      |                     |  |   |  |  |  |      |                     |  |                                  |  |           |            |     |                     |                                     |         |   |   |     |
| Program-Specific Modules  |                                  |         | Type | Status <sup>1</sup> | Semester                                       | Credits   |  |  |  | Type | Status <sup>1</sup> | Semester                                   | Credits                          |  |           |            |     |                     |                                     |         |   |   |     |
| <b>Year 1 - CHOICE</b>  |                                  |         |      |                     |  | <b>45</b>   |  |  |  |      |                     | <b>20</b>                                  |                                  |  |           |            |     |                     |                                     |         |   |   |     |
| <i>Take the mandatory CHOICE module listed below, this is a requirement for the Mathematics program.</i>            |                                  |         |      |                     |  |   |  |  |  |      |                     |  |                                  |  |           |            |     |                     |                                     |         |   |   |     |
| <b>CH07-FundMath Module: Fundamental Mathematics</b>  |                                  |         |      |                     |  | <b>m</b>  | <b>15</b>  | <b>JT-ME-MethodsMath Module: Methods / Mathematics</b>   |  |      |                     |  |                                  | <b>m</b>   | <b>10</b> |            |     |                     |                                     |         |   |   |     |
| CH07-100101   | Analysis I                       | Lecture | m    | 1                   | 5  | JTME-120103/ 120203   | Calculus I or Advanced Calculus I  | Lecture  | m  | 1    | 2,5                 | CH07-100111                                | Mathematical Software Lab        | Lab  | m         | 1          | 2,5 | JTME-120104/ 120204 | Calculus II or Advanced Calculus II | Lecture | m | 1 | 2,5 |
| CH07-100212   | Analysis II                      | Lecture | m    | 2                   | 5  | JTME-120112   | Foundations of Linear Algebra I  | Lecture  | m  | 2    | 2,5                 | CH07-100122                                | Undergraduate Seminar            | Lab  | m         | 2          | 2,5 | JTME-120113         | Foundations of Linear Algebra II    | Lecture | m | 2 | 2,5 |
| <b>Module: CHOICE (own selection)</b>   |                                  |         |      |                     |  | <b>e</b>  | <b>1/2</b>   | <b>30</b>  | <b>JT-SK-Skills Module: Skills</b>         |      |                     |  |                                  |  | <b>m</b>  | <b>2,5</b> |     |                     |                                     |         |   |   |     |
| <i>Students take two further CHOICE modules from those offered for all other study programs. <sup>2</sup></i>       |                                  |         |      |                     |  |   |  |  |  |      |                     |  | JTSTK-320111/ 350111             | Students take either Programming in C I or Programming in Python | Lecture   | m          | 1   | 2,5                 |                                     |         |   |   |     |
|   |                                  |         |      |                     |  | <b>JT-TA-TriArea Module: Triangle Area</b>  |  |  |  |      |                     | <b>m</b>                                   | <b>2,5</b>                       |  |           |            |     |                     |                                     |         |   |   |     |
|   |                                  |         |      |                     |  | Take one course from the triangle (BUSINESS, TECHNOLOGY & INNOVATION, SOCIETAL CONTEXT) area. Each counts 2,5 ECTS <sup>3</sup> |  |  |  |      |                     | me   | 1/2                              | 2,5  |           |            |     |                     |                                     |         |   |   |     |
|   |                                  |         |      |                     |  | <b>JT-LA-Language Module: Language</b>  |  |  |  |      |                     | <b>m</b>                                   | <b>5</b>                         |  |           |            |     |                     |                                     |         |   |   |     |
|   |                                  |         |      |                     |  | Take two German courses (2,5 ECTS each).<br>Native German speakers take courses in another offered language                     |  |  |  |      |                     | Seminar                                    | me                               | 1/2  | 5         |            |     |                     |                                     |         |   |   |     |
|   |                                  |         |      |                     |  | <b>CA01-CarAdv Career Advising<sup>4</sup></b>  |  |  |  |      |                     | <b>m</b>                                   | <b></b>                          |  |           |            |     |                     |                                     |         |   |   |     |
| <b>Year 2 - CORE</b>  |                                  |         |      |                     |  | <b>45</b>   |  |  |  |      |                     | <b>20</b>                                  |                                  |  |           |            |     |                     |                                     |         |   |   |     |
| <i>Take all three modules <u>or</u> replace one with a CORE module from a different study program. <sup>2</sup></i> |                                  |         |      |                     |  |   |  |  |  |      |                     |  |                                  |  |           |            |     |                     |                                     |         |   |   |     |
| <b>CO16-CoreMaths Module: Core Mathematics</b>  |                                  |         |      |                     |  | <b>me</b>   | <b>15</b>  | <b>JT-ME-MethodsMath Module: Methods / Mathematics</b>   |  |      |                     |  |                                  | <b>m</b>   | <b>5</b>  |            |     |                     |                                     |         |   |   |     |
| CO16-100231   | Linear Algebra                   | Lecture | m    | 3                   | 5  | JTME-120201   | Elements of Probability  | Lecture  | m  | 3    | 2,5                 | CO16-100241                                | Elements of Stochastic Processes | Lecture  | m         | 3          | 2,5 | JTME-120202         | Numerical Methods I                 | Lecture | m | 4 | 2,5 |
| CO16-100232   | Introductory Real Analysis       | Lecture | m    | 4                   | 5  | <b>JT-SK-Skills Module: Skills</b>  |  |  |  |      |                     | <b>m</b>                                   | <b>2,5</b>                       |  |           |            |     |                     |                                     |         |   |   |     |
| CO16-100242   | Numerical Methods II             | Lecture | m    | 4                   | 2,5  | JTSTK-320112/350112   | Students take either Programming in C II or Advanced Programming in Python | Lecture  | m  | 3/4  | 2,5                 | <b>JT-TA-TriArea Module: Triangle Area</b> |                                  |  |           |            |     | <b>m</b>            | <b>7,5</b>                          |         |   |   |     |
| <b>CO17-CorePureMath Module: Core Pure Mathematics</b>  |                                  |         |      |                     |  | <b>me</b>   | <b>15</b>  | Take three courses from the triangle (BUSINESS, TECHNOLOGY & INNOVATION, SOCIETAL CONTEXT) area. Each counts 2,5 ECTS <sup>3</sup> |  |      |                     |  |                                  | me   | 3/4       | 7,5        |     |                     |                                     |         |   |   |     |
| CO17-100251   | Introduction to Complex Analysis | Lecture | m    | 3                   | 5  | <b>JT-LA-Language Module: Language</b>  |  |  |  |      |                     | <b>m</b>                                   | <b>5</b>                         |  |           |            |     |                     |                                     |         |   |   |     |
| CO17-100261   | Calculus on Manifolds            | Lecture | m    | 3                   | 5  | Take two German courses (2,5 ECTS each).<br>Native German speakers take courses in another offered language                     |  |  |  |      |                     | Seminar                                    | me                               | 3/4  | 5         |            |     |                     |                                     |         |   |   |     |
| CO17-100252   | Introduction to Algebra          | Lecture | m    | 4                   | 5  | <b>CA01-CarAdv Career Advising<sup>4</sup></b>  |  |  |  |      |                     | <b>m</b>                                   | <b></b>                          |  |           |            |     |                     |                                     |         |   |   |     |
| <b>CO18-CoreAppMath Module: Core Applied Mathematics</b>  |                                  |         |      |                     |  | <b>me</b>   | <b>15</b>  |  |  |      |                     |  |                                  | <b></b>  | <b></b>   |            |     |                     |                                     |         |   |   |     |
| CO18-110221   | Stochastic Methods               | Lecture | m    | 3                   | 5  |   |  |  |  |      |                     | <b></b>                                    | <b></b>                          |  |           |            |     |                     |                                     |         |   |   |     |
| CO18-110222   | Stochastic Methods Lab           | Lab     | m    | 3                   | 2,5  |   |  |  |  |      |                     | <b></b>                                    | <b></b>                          |  |           |            |     |                     |                                     |         |   |   |     |
| CO18-110231   | Applied Dynamical Systems        | Lecture | m    | 4                   | 5  |   |  |  |  |      |                     | <b></b>                                    | <b></b>                          |  |           |            |     |                     |                                     |         |   |   |     |
| CO18-110233   | Applied Dynamical Systems Lab    | Lab     | m    | 4                   | 2,5  |   |  |  |  |      |                     | <b></b>                                    | <b></b>                          |  |           |            |     |                     |                                     |         |   |   |     |
| <b>Year 3 - CAREER</b>  |                                  |         |      |                     |  | <b>45</b>   |  |  |  |      |                     | <b>5</b>                                   |                                  |  |           |            |     |                     |                                     |         |   |   |     |
| <b>CA02 / CA03 Module: Internship / Study Abroad</b>  |                                  |         |      |                     |  | <b>m</b>  | <b>5</b>   | <b>20</b>  | <b>JT-TA-TriArea Module: Triangle Area</b> |      |                     |  |                                  |  | <b>m</b>  | <b>5</b>   |     |                     |                                     |         |   |   |     |
| <b>CA12-MATH Module: Project/Thesis MATH</b>  |                                  |         |      |                     |  | <b>m</b>  | <b>15</b>  | Take two courses from the triangle (BUSINESS, TECHNOLOGY & INNOVATION, SOCIETAL CONTEXT) area. Each counts 2,5 ECTS <sup>3</sup>   |  |      |                     |  |                                  | me   | 6         | 5          |     |                     |                                     |         |   |   |     |
| CA12-100303   | Project MATH                     | m       | 6    | 5                   | <b>CA01-CarAdv Career Advising<sup>4</sup></b> |   |  |  |  |      | <b>m</b>            | <b></b>                                    |                                  |  |           |            |     |                     |                                     |         |   |   |     |
| CA12-100304   | Thesis MATH                      | m       | 6    | 10                  |  |   |  |  |  |      | <b></b>             | <b></b>                                    |                                  |  |           |            |     |                     |                                     |         |   |   |     |
| <b>CA-S-MATH Module: Specialization Area MATH</b>   |                                  |         |      |                     |  | <b>m</b>  | <b>10</b>  |  |  |      |                     |  |                                  | <b></b>  | <b></b>   |            |     |                     |                                     |         |   |   |     |
| Take 10 ECTS of specialization courses <sup>2</sup>   |                                  |         |      |                     |  | me  | 5/6  | 10   |  |      |                     |  |                                  |  | <b></b>   | <b></b>    |     |                     |                                     |         |   |   |     |
| <b>Total ECTS</b>   |                                  |         |      |                     |  |   |  |  |  |      |                     | <b>180</b>                                 |                                  |  |           |            |     |                     |                                     |         |   |   |     |

<sup>1</sup> Status (m = mandatory, e = elective, me = mandatory elective) <sup>2</sup> For a full listing of all CHOICE / CORE / CAREER / Jacobs Track modules please consult the CampusNet online catalogue and / or the module handbook (on our website).

<sup>3</sup> You are required to take six Triangle Area courses in total. Select two from each of the three triangle areas (BUSINESS, TECHNOLOGY & INNOVATION, SOCIETAL CONTEXT).

<sup>4</sup> Mandatory component of the Jacobs University's Counseling and Advising Scheme.

## Appendix 1b - Mandatory Module and Examination Plan for Campus Track

| <b>Mathematics – Campus Track</b>   |   |          |                                       |           |   |  |  |                      |                              |            |  |                                    |                  |          |
|---|---|----------|---------------------------------------|-----------|---|--|--|----------------------|------------------------------|------------|--|------------------------------------|------------------|----------|
| Matriculation Fall 2018   |   |          |                                       |           |   |  |  |                      |                              |            |  |                                    |                  |          |
| Program-Specific Modules  |   |          |                                       |           | Jacobs Track Modules (General Education)            |  |  |                      |                              |            |  |                                    |                  |          |
| Type  | Status <sup>1</sup>                         | Semester | Credits                               | Credits   | Type  | Status <sup>1</sup>  | Semester   | Credits              | Credits                      | Credits    |  |                                    |                  |          |
| <b>Year 1 - CHOICE</b>  |   |          |                                       |           | <b>45</b>   |  |  |                      |                              |            | <b>20</b>  |                                    |                  |          |
| <i>Take the mandatory CHOICE module listed below, this is a requirement for the Mathematics program.</i>      |   |          |                                       |           |   |  |  |                      |                              |            |  |                                    |                  |          |
| <b>CH07-FundMath</b>  | <b>Module: Fundamental Mathematics</b>      |          |                                       | <b>m</b>  | <b>15</b>   | <b>JT-ME-MethodsMath</b>   | <b>Module: Methods / Mathematics</b>                                       |                      |                              | <b>m</b>   | <b>10</b>  |                                    |                  |          |
| CH07-100101   | Analysis I                                  | Lecture  | m                                     | 1         | 5   | JTME-120103/ 120203  | Calculus I or Advanced Calculus I  | Lecture              | m                            | 1          | 2,5  |                                    |                  |          |
| CH07-100111   | Mathematical Software Lab                   | Lab      | m                                     | 1         | 2,5   | JTME-120104/ 120204  | Calculus II or Advanced Calculus II  | Lecture              | m                            | 1          | 2,5  |                                    |                  |          |
| CH07-100212   | Analysis II                                 | Lecture  | m                                     | 2         | 5   | JTME-120112  | Foundations of Linear Algebra I  | Lecture              | m                            | 2          | 2,5  |                                    |                  |          |
| CH07-100122   | Undergraduate Seminar                       | Lab      | m                                     | 2         | 2,5   | JTME-120113  | Foundations of Linear Algebra II   | Lecture              | m                            | 2          | 2,5  |                                    |                  |          |
|   |   |          | <b>Module: CHOICE (own selection)</b> |           | <b>e</b>  | <b>1/2</b>   |  | <b>30</b>            |                              |            |  |                                    |                  |          |
| <i>Students take two further CHOICE modules from those offered for all other study programs. <sup>2</sup></i> |   |          |                                       |           |   |  |  |                      |                              |            |  |                                    |                  |          |
| <b>Year 2 - CORE</b>  |   |          |                                       |           | <b>45</b>   |  |  |                      |                              |            | <b>20</b>  |                                    |                  |          |
| <i>Take all three modules or replace one with a CORE module from a different study program. <sup>2</sup></i>  |   |          |                                       |           |   |  |  |                      |                              |            |  |                                    |                  |          |
| <b>CO16-CoreMaths</b>   | <b>Module: Core Mathematics</b>             |          |                                       | <b>me</b> | <b>15</b>   | <b>JT-ME-MethodsMath</b>   | <b>Module: Methods / Mathematics</b>                                       |                      |                              | <b>m</b>   | <b>5</b>   |                                    |                  |          |
| CO16-100231   | Linear Algebra                              | Lecture  | m                                     | 3         | 5   | JTME-120201  | Elements of Probability  | Lecture              | m                            | 3          | 2,5  |                                    |                  |          |
| CO16-100241   | Elements of Stochastic Processes            | Lecture  | m                                     | 3         | 2,5   | JTME-120202  | Numerical Methods I  | Lecture              | m                            | 4          | 2,5  |                                    |                  |          |
| CO16-100232   | Introductory Real Analysis                  | Lecture  | m                                     | 4         | 5   | <b>JT-SK-Skills</b>  | <b>Module: Skills</b>  |                      |                              | <b>m</b>   | <b>2,5</b>   |                                    |                  |          |
| CO16-100242   | Numerical Methods II                        | Lecture  | m                                     | 4         | 2,5   | JTSK-320112/350112   | Students take either Programming in C II or Advanced Programming in Python | Lecture              | m                            | 3/4        | 2,5  |                                    |                  |          |
| <b>CO17-CorePureMath</b>  | <b>Module: Core Pure Mathematics</b>        |          |                                       | <b>me</b> | <b>15</b>   | <b>JT-TA-TriArea</b>   | <b>Module: Triangle Area</b>   |                      |                              | <b>m</b>   | <b>7,5</b>   |                                    |                  |          |
| CO17-100251   | Introduction to Complex Analysis            | Lecture  | m                                     | 3         | 5   | Take three courses from the triangle (BUSINESS, TECHNOLOGY & INNOVATION, SOCIETAL CONTEXT) area. Each counts 2,5 ECTS <sup>3</sup> |  |                      |                              |            |  |                                    |                  |          |
| CO17-100261   | Calculus on Manifolds                       | Lecture  | m                                     | 3         | 5   |  |  |                      |                              |            |  |                                    |                  |          |
| CO17-100252   | Introduction to Algebra                     | Lecture  | m                                     | 4         | 5   | <b>JT-LA-Language</b>  | <b>Module: Language</b>  |                      |                              | <b>m</b>   | <b>5</b>   |                                    |                  |          |
| <b>CO18-CoreAppMath</b>   | <b>Module: Core Applied Mathematics</b>     |          |                                       | <b>me</b> | <b>15</b>   | Take two German courses (2,5 ECTS each). Native German speakers take courses in another offered language                           |  |                      |                              |            |  |                                    |                  |          |
| CO18-110221   | Stochastic Methods                          | Lecture  | m                                     | 3         | 5   |  |  |                      |                              |            |  |                                    |                  |          |
| CO18-110222   | Stochastic Methods Lab                      | Lab      | m                                     | 3         | 2,5   | <b>CA01-CarAdv</b>   | <b>Career Advising<sup>4</sup></b>   |                      |                              | <b>m</b>   | <b>5</b>   |                                    |                  |          |
| CO18-110231   | Applied Dynamical Systems                   | Lecture  | m                                     | 4         | 5   | Take two courses from the triangle (BUSINESS, TECHNOLOGY & INNOVATION, SOCIETAL CONTEXT) area. Each counts 2,5 ECTS <sup>3</sup>   |  |                      |                              |            |  |                                    |                  |          |
| CO18-110233   | Applied Dynamical Systems Lab               | Lab      | m                                     | 4         | 2,5   |  |  |                      |                              |            |  |                                    |                  |          |
| <b>Year 3 - CAREER</b>  |   |          |                                       |           | <b>45</b>   |  |  |                      |                              |            | <b>5</b>   |                                    |                  |          |
| <b>COXX</b>   | <b>Module: Additional (4th) CORE module</b> |          |                                       | <b>m</b>  | <b>5/6</b>  |  | <b>15</b>  | <b>JT-TA-TriArea</b> | <b>Module: Triangle Area</b> |            |  | <b>m</b>                           | <b>5</b>         |          |
|   |   |          |                                       |           |   |  |  |                      |                              |            | Take two courses from the triangle (BUSINESS, TECHNOLOGY & INNOVATION, SOCIETAL CONTEXT) area. Each counts 2,5 ECTS <sup>3</sup> |                                    |                  |          |
|   |   |          |                                       |           |   |  |  |                      |                              |            |  |                                    | <b>CA12-MATH</b> |          |
| CA12-100303   | Project MATH                                |          |                                       |           | <b>m</b>  | <b>5</b>   |  | <b>5</b>             | <b>CA01-CarAdv</b>           |            |  | <b>Career Advising<sup>4</sup></b> |                  | <b>m</b> |
| CA12-100304   | Thesis MATH                                 |          |                                       |           | <b>m</b>  | <b>6</b>   |  | <b>10</b>            |                              |            |  |                                    |                  |          |
| <b>CA-S-MATH</b>  | <b>Module: Specialization Area MATH</b>     |          |                                       | <b>m</b>  | <b>15</b>   |  |  |                      |                              |            |  |                                    |                  |          |
|   |   |          |                                       |           | Take 15 ECTS of specialization courses <sup>2</sup> |  |  |                      |                              |            |  | <b>me</b>                          | <b>5/6</b>       |          |
| <b>Total ECTS</b>   |   |          |                                       |           |   |  |  |                      |                              | <b>180</b> |  |                                    |                  |          |

<sup>1</sup> Status (m = mandatory, e = elective, me = mandatory elective)

<sup>2</sup> For a full listing of all CHOICE / CORE / CAREER / Jacobs Track modules please consult the **CampusNet online catalogue** and / or the module handbook (on our website).

<sup>3</sup> You are required to take six Triangle Area courses in total. Select two from each of the three triangle areas (BUSINESS, TECHNOLOGY & INNOVATION, SOCIETAL CONTEXT).

<sup>4</sup> Mandatory component of the Jacobs University's Counseling and Advising Scheme.